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OF THE MINISTRY FOR EMERGENCY SITUATIONS
OF THE REPUBLIC OF BELARUS

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«CONSOLIDATED APPROACH TO RESCUE
FIREFIGHTER TRAINING»

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СОДЕРЖАНИЕ

SECTION 1

STRUCTURE, METHODS AND FORMS OF EDUCATION AND THEIR EVALUATION

<i>Grachev A.V.</i> Problems of distance learning in civil defense courses and ways to solve them	4
<i>Murashka V.V.</i> Advantages and disadvantages of distance learning courses	6
<i>Semichev V.V.</i> Features of preparation of students of civil defense courses according to the training program «Fire-technical minimum»	8

SECTION 2

EDUCATION IN THE FIELD OF FIRE PREVENTION AND FIREFIGHTER TRAINING

<i>Chernousik A.A., Vasyuk G.S.</i> Training methods for firefighters to perform professional rescue activities at height	11
<i>Chizh L.V., Komar E.I.</i> Psychological training of rescuer as an element of providing emergency rescue works at emergency situations elimination	12
<i>Fedotova E.V.</i> Specificity of training foreign communications at the University of Civil Protection of the Ministry of Emergency Situations of the Republic of Belarus	14
<i>Kamalova D.M., Khasanova O.T.</i> Features of reducing the flammability of construction materials	15
<i>Kornyushchenko O.N.</i> Firefighter training at a distance	17
<i>Rakhimbobaeva M.Sh., Mukhamedgaliev B.A.</i> Some features of the selection of antipyrene	19
<i>Rakhimbabaeva M.Sh., Khasanova O.T.</i> Safety in geodesy and prevention of fires and explosions in mine	22
<i>Sadiq-zada U.A.</i> The main tasks of search and rescue operations	24
<i>Sevruk A.D., Kavaleva T.G.</i> Practical approach to teaching professional foreign language communication to workers of rescue services	27
<i>Sluchak V.U., Vasyuk G.S.</i> Teaching first aid skills as a component of consolidated approach to rescue firefighter training	29
<i>Vasyuk G.S.</i> Teaching English as an integral part of the complex approach to rescue firefighting training	31

SECTION 3

INNOVATION, RESEARCH AND DEVELOPMENT IN FIRE PREVENTION AND FIREFIGHTER TRAINING

<i>Abdukadirov F.B., Kasimov I.U.</i> A new technology of epoxy resin modification new polymer fire-retardants	33
<i>Jumanova S.G., Mukhamedgaliev B.A.</i> Fire and ecoprotection oil and gas branch the requirement of time	35
<i>Kamalov J.K., Abdukadirov F.B., Babakulova N.B.</i> Study of toxicity and smoke-forming products of polymer and wood combustion	37
<i>Kasimova G.A.</i> Obtaining high performance concrete in the conditions of the Republic of Uzbekistan to increase the seismic resistance of buildings and structures	40
<i>Kulikov S.V.</i> Practical use of training facilities for the training of firefighters and rescuers	42
<i>Kulikov S.V.</i> Modern means of rescuing victims in Emergency Situations	46
<i>Kuznetsov M.V.</i> Ensuring fire safety of forests by processing substandard wood and woodworking waste into useful products	49
<i>Kuznetsov M.V.</i> A new approach to the problem of reducing the risk of fires and methane explosions in coal mines based on their suppressions by catalytic curtains	50
<i>Tregubov D.G., Tregubova I.M.</i> Using projects method during teaching disciplines of professional direction	51
<i>Wang J.W.</i> Research in remote-monitoring system for urban fire protection	53
<i>Yusupov U.T., Mukhamedov N.A., Kasimov I.I.</i> New additives to increase fire resistance of building constructions for oil and gaz industry	55

Section 1

STRUCTURE, METHODS AND FORMS OF EDUCATION AND THEIR EVALUATION

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PROBLEMS OF DISTANCE LEARNING IN CIVIL DEFENSE COURSES AND WAYS TO SOLVE THEM

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SPb GKU DPO «UMTS GO and emergency situations»

Abstract. The article considers the problems of distance learning in civil defense courses and suggests ways to solve them.

Keywords: distance learning, psychological barriers, self-discipline, independent work.

In recent decades, distance education technologies have received intensive development. Civil defense courses have started organizing training of students in the DPO system based on the use of distance educational technologies.

The term «distance education» has not yet been fully established in both Russian and English-language pedagogical REFERENCES There are such options as «distant education» (distant education), «distant learning» (distant learning). Some foreign researchers, assigning a special role to telecommunications in the organization of distance learning, define it as teletraining. But still, the term «distance learning» is most often used.

Technological bases of distance learning.

Distance learning in the form of distance learning was born at the beginning of the XX century. Today, you can get not only higher education in absentia, but also learn a foreign language, prepare for admission to a university, etc. However, due to the poorly established interaction between teachers and students and the lack of control over the educational activities of part-time students in the periods between examination sessions, the quality of such training is worse than what can be obtained with full-time training.

Modern computer telecommunications are able to provide knowledge transfer and access to a variety of educational information on an equal basis, and sometimes much more effectively than traditional means of teaching. Experiments have confirmed that the quality and structure of training courses, as well as the quality of teaching in distance learning, are often much better than in traditional forms of education. New electronic technologies, such as interactive CD-ROM disks, electronic bulletin boards, multimedia hypertext, accessible via the global Internet using Mosaic and WWW interfaces, can not only ensure the active involvement of students in the educational process, but also allow managing this process, unlike most traditional educational environments. The integration of sound, movement, image and text creates a new extremely rich learning environment, with the development of which the degree of student involvement in the learning process will also increase. The interactive capabilities of the programs and information delivery systems used in the distance learning system (ETS) make it possible to establish and even stimulate feedback, provide dialogue and constant support, which are impossible in most traditional learning systems.

Distance learning in the world.

According to foreign experts, higher education has become the minimum level of education necessary for the survival of mankind. Training of such a mass of students in full-time (full-time) form is unlikely to withstand the budgets of even the most prosperous countries. Therefore, it is no coincidence that over the past decades the number of students studying non-traditional technologies has been growing faster than the number of full-time students. The global trend of transition to non-traditional forms of education can also be traced in the growth of the number of universities conducting training in these technologies. For the period 1900-1960, 79 of them were created, 70 in 1960-1970, and 87 in 1970-1980 alone.

The long-term goal of the development of SDS in the world is to enable every student living in any place to take a course of study at any college or university. This implies a transition from the concept of physical movement of students from country to country to the concept of mobile ideas, knowledge and learning in order to distribute knowledge through the exchange of educational resources.

At the civil defense courses, when using distance educational technologies, we encountered the following problems.

Problem 1: lack of personal communication with the teacher

It is not possible to find a teacher at any convenient time to explain an incomprehensible topic. All communication takes place at a strictly regulated time, and it will not be possible to influence the deadlines for completing tasks by persuasion.

Solution: the listener needs to accustom himself to discipline and fixing difficult moments on paper. Then, during the lesson, you can ask interesting questions without missing anything.

Problem 2: Technical problems during distance learning.

The education system cannot solve the problem of the teacher's communication with the audience over the network for a lecture in an instant. It is necessary to bring the work of technical means and programs to automatism, which is not yet possible to do everywhere.

Transferring everyone to distance learning is associated with huge financial costs. In addition to equipping all teachers and students with the necessary technical means and software, special personnel should be trained to help solve technical problems in the learning process.

Solution: use ready-made solutions and platforms. Use the tested tools: for video conferences Skype, Zoom-here each participant can ask their questions and see the interlocutor;

tools for collaboration on Google Classroom and Google Docs documents;

platforms with ready-made content for independent work at home (such as Yandex.Textbook, Teach.ru, yaklass, MASH, NES, InternetUrok.ru).

There is not much experience in this area yet, so mistakes will be inevitable. The task is to quickly respond to emerging problems by correcting the content in a timely manner.

Problem 3: there is no opportunity to develop live communication skills (by teachers with students) The lack of live contact does not give an understanding of the depth of perception of the material by the listeners.

Solution: the listener can only rely on himself. You will have to look for live communication in other places: for example, theaters and exhibitions.

Problem 4: not all categories of trainees can master training programs remotely.

We are faced with the fact that not every topic, especially with the development of practical issues, can be studied remotely. For example, first aid. It is not enough to show a video with the implementation of a practical task for conducting cardiopulmonary resuscitation or applying bandages. It is necessary for students to perform these exercises correctly at home on their own. But in the absence of an appropriate material base, this is not possible. And it turns out that the students are working out tasks on toys.

Solution: for such programs, a mixed learning system is most often needed, when part of the classes are held remotely, and part live.

Problem 5: Lack of self-motivation and self-discipline

Not everyone has enough willpower and maintaining motivation to learn. All this is further complicated by the fact that students are often sent to training courses without taking into account their desire and in terms not agreed with the students.

Solution: find your motivation to learn – there are different techniques for this. It is necessary to work on self-discipline.

Problem 6: The student cannot compare his achievements with the achievements of other students in the study group.

We are not talking about grades, but about working in the classroom. The answer at the blackboard, the skills of working at seminars, presentations-all this allows you to assess your strength, the skills of others and, as a result, strive for perfection. And with distance learning, this is not the case.

Solution: but this is rather a plus, because now listeners can freely and objectively evaluate themselves without looking at others. However, there are no indicators where to grow.

You can ask the teacher to make a list of criteria by which you could develop further. Or in a general chat, ask the listeners of the group to boldly criticize you on the merits. And also be sure to find out all possible ways of feedback from the teacher and the rules of communication with him (convenient time and method of communication).

Problem 7: Detached evaluation of the material

With traditional teaching, there is a chance that even dry and boring material can captivate if the teacher gives it with a spark. The emotional coloring and temperament of the teacher's lively speech can «infect» the listeners, make it easier to understand heavy material.

Solution: you need to accept that information is just information. Evaluate it critically, and not by the emotional coloring of the teacher's speech.

Problem 8: it is difficult for a teacher to assess non-verbal indicators of assimilation and understanding of the material

Incomprehensible views, long silence after submitting the material, questions asked – all this can be used to assess the degree of understanding of the information. If necessary, the teacher can even find a weak point and explain it here and now, giving new examples, changing the pace of speech and even the way of presenting the material.

In the remote form, training is limited to dry delivery and control, because there is no such close connection with the listeners.

Solution: all dissatisfactions and incomprehensible moments must be voiced immediately. It must be remembered that the teacher does not know how to read thoughts and may not even see you. Help him to see the weak points and eliminate them.

Problem 9: depersonalization of the teacher and students.

When a teacher sees a listener in front of him, he sees a person: with its own advantages and disadvantages, problems and life situation, features of information assimilation. All this allows us to approach everyone individually. And here the main difficulties of distance learning arise.

At the same time, listeners are perceived as objects, the total mass. This creates certain psychological problems in the organization of effective distance learning.

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ADVANTAGES AND DISADVANTAGES OF DISTANCE LEARNING COURSES

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Abstract. The article describes the advantages and disadvantages of distance learning courses.

Keywords: Distance learning courses, online, students, advantages and disadvantages.

Distance learning and online courses have become very popular over the past few years. Distance learning programs have helped many people who are unable to attend full-time courses to realize their educational aspirations.

Advantages:

1. Convenience and independence. The biggest advantage is that the classroom is at your disposal 24 hours a day; seven days a week so students can study when they want and where they want, wearing anything they want. Students can get announcements, access notes, review assignments, take part in quizzes, discuss questions, and chat with fellow students and study any time they want. They can make their own schedule for completing the requirements of the course. A disciplined and self-motivated student can learn at his or her own pace.

2. Comfortable atmosphere. For most of the adult students, going back to the classroom is rather intimidating. They can be too shy to ask questions and give answers. Distance education combines the use of tutorials, learning materials and video conference class sessions to deliver knowledge to students. That means that students with different abilities can have the opportunity to understand the course without problems.

3. More individual attention. Students have a direct pipeline to the teacher via e-mail or online, they can get their questions answered directly.

4. Students can choose a teacher. It is very comfortable in case of learning a foreign language. When learning a foreign language, first, you need to pay attention to the quality of teaching, to the knowledge and skills of the teacher, and this can cause a problem. With the help of the Internet students can study with native speakers of the target language, they have an opportunity to listen to various ways of pronunciation because people living in different places have their own peculiarities.

5. Help meet interesting people. Many of us do not really take the time to get to know our fellow students, especially in large classes. For some people it can be rather difficult to communicate with other people face to face. In case of online courses, they have an opportunity to get to know other students using chat rooms and mailing lists.

6. High motivation. The success depends on students themselves. There is nobody nearby telling them to do this or that task right now. They succeed because they realize the importance of doing things on time or even ahead of time. No one is there to make students ask questions or post responses. The motivation to study comes from inside. Distance learning requires great responsibility and self-discipline.

7. Life-long learning. Forgetfulness is a distinctive feature of our memory. We often forget what we learn in a course within a week or two after the end of classes. Having that spark of interest and knowing how to find information online insures that what your learning is always available to you. If you become interested in a certain topic, perhaps because of something you see, read or hear about, or perhaps because one of your children or friends has a question, you can get online and look it up. You will have developed the skills to find information, digest it, synthesize it and formulate an answer to any question that comes your way.

8. Cost savings. The cost of online-based courses is generally lower compared to those in class though in this case students must buy some device like a computer and pay for the Internet.

9. Real world skills development. Learning how to get information via the Internet opens up a world of possibilities for students' personal and professional life. People can find jobs online, get college applications online, make travel plans online, get dealer costs for cars online, comparison shop online, access great works of art and REFERENCES online, meet people from around the world online, follow sports and movies online, and so on. The possibilities are practically endless.

10. No discrimination. Distance learning courses are suitable even for people with disabilities.

Disadvantages:

1. Lack of social interaction. Students have less emotions and feelings. There are no constant reminders about deadlines. It only requires one to be self-motivated and focused to be able to complete a course successfully.

2. Distance learning courses require more time than traditional classes. Students spend more time studying and completing tasks in the online environment because the online environment is often text-based. It is necessary to type many messages and to post responses to communicate with teachers and other students, as it is known typing is slower than speaking.

3. Distance learning courses require good time-management skills. This type of education is good only for those who can plan their schedule properly. It requires much responsibility. Students have to make online studying a priority and not let other activities interfere.

4. Distance learning courses may create a sense of loneliness. Studying alone only with a computer as your companion can be terrifying. Nobody whispers in the back of the classroom, nobody helps you find the answer.

5. Distance learning courses give you more freedom. But this freedom can be dangerous if students can't handle it.

So, there is no doubts that distance learning courses have many advantages but they are not suitable for everybody.

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FEATURES OF PREPARATION OF STUDENTS OF CIVIL DEFENSE COURSES ACCORDING TO THE TRAINING PROGRAM «FIRE-TECHNICAL MINIMUM»

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Abstract. The article discusses some aspects of the training of students of civil defense courses under the training program «Fire-technical minimum».

Keywords: training, knowledge, skills, skills, methods and forms of training.

The training program «Fire-technical minimum» is designed to provide students with the knowledge, skills and abilities necessary to ensure fire safety measures in their organizations and institutions in the amount of a minimum of fire-technical knowledge. The educational process is carried out in accordance with the approximate special training programs for fire-technical minimum for managers, chief specialists and employees responsible for fire safety and conducting fire training in institutions (offices), in educational organizations, in medical organizations, cultural, educational and entertainment institutions, approved by order of the Ministry of Emergency Situations of Russia No. 645 of December 12, 2007. The program is implemented both in full-time and part-time forms of education with the use of technical and multimedia means to ensure the educational process. Study of educational material on the following topics: «Fire protection regime in organizations» and «Fire safety measures in organizations» should be carried out taking into account the characteristics of the category of trainees, selectively for each organization (institution) in accordance with the requirements of the Rules of fire protection regime in the Russian Federation and Federal Law No. 123-FZ «Technical Regulations on fire safety requirements». A special feature of the training of students is practical classes that must be conducted using the available primary fire extinguishing means and formalized documents. To strengthen the practical orientation of the training of students, topic No. 8 «The use of primary fire extinguishing means» should be carried out using the training complex of fire extinguishing means MKSH-01/OG or a container for simulating a fire source and fire extinguishers.

The purpose of the training is to obtain and improve new knowledge, skills and abilities necessary for professional activities to ensure fire safety in organizations and institutions.

To check the volume and quality of mastering the educational material, stimulate the students' academic work and improve the methods of conducting classes, the teacher conducts ongoing monitoring of the students' progress. The current control is carried out during the students' working out of practical questions, with the grades «excellent», «good», «satisfactory» and «unsatisfactory» in the lesson log.

Independent work is performed without the direct participation of the teacher in order to consolidate and deepen the acquired knowledge and skills, search and acquire new knowledge, as well as perform training tasks, prepare for upcoming classes and final testing. Self-training hours are also used for studying educational and methodological manuals, working with primary fire extinguishing equipment, consultations, as well as viewing educational video materials (Candle, Fire Extinguishers, Fire safety, etc.).

The use of portable fire extinguishers, including the use of fire extinguishing agents MKSH-01/OG.

Mandatory application of training on the use of primary fire extinguishing means (fire cranes and means to ensure their use, fire equipment and a blanket for isolating the hearth and fire).

As a result of mastering the program, the student must know the main provisions of regulatory legal acts and regulatory documents of the Russian Federation in the field of fire safety, the basic requirements for ensuring fire safety in organizations, the rights and duties of responsible officials and employees in the field of fire safety, the content of organizational documents developed in organizations. At the end of the program, the student should be able to: use primary fire extinguishing means, develop documents, organize and conduct practical training on evacuation of people in case of fire in their organizations and institutions, organize work on evacuation of people and extinguishing fires before the arrival of fire protection, use personal protective equipment for people from fire hazards.

Special attention is paid to such topics as «Requirements of the main normative acts and normative documents in the field of fire safety», «Fire safety regime in organizations», «Fire safety measures in organizations», practical classes: «Development of documents for conducting practical training during evacuation of people in case of fire», «Application of fire extinguishing means». At the end of the training, the final control testing (testing of knowledge of fire safety requirements) is carried out for the students.

The program is implemented in a network form using the resources of other organizations (partner organizations) in accordance with the concluded contracts.

The program can be implemented both in full-time and in full-time and part-time education using e-learning (hereinafter referred to as EE) and distance learning technologies (hereinafter referred to as DOT).

It is important to approach the presentation of educational materials in a differentiated manner, taking into account the level of training of students, to comprehensively use technical training tools, to give specific examples from the practical activities of this category of trainees.

In order to improve the quality of students' training, the Program includes the principle of a modular-competence approach to training. The modules are designed taking into account the basic training of trainees and obtaining the necessary level of knowledge and skills required to perform their official duties.

The training of students is planned and carried out in the amount of 16 hours (full-time training).

The duration of daily classes with a teacher is up to 8 academic hours.

The number of listeners in the group should not exceed 25 people. For practical classes and classes on special topics, it is allowed to divide the study group into subgroups of 10-13 people.

The curriculum provides the following types of training sessions: lectures, practical classes.

The theoretical knowledge gained by the students is consolidated in the course of their practical and independent tasks.

The current monitoring of students' progress is carried out in the classroom after studying the logically completed part of the educational material (topic, educational question).

The teacher uses the following forms of current control, corresponding to:

methods of written control: testing (including computer);

methods of oral control: oral survey, report;

methods of practical control: implementation of practical tasks, standards.

The methods of current control are chosen by the teacher, based on the specifics of the training content, the competencies formed.

The results of the current monitoring of students' progress are determined by the grades «excellent», «good», «satisfactory», «unsatisfactory» and are reflected in the journal of accounting for training sessions.

The results of the current control serve as the basis for the admission of students to the final certification.

The test is carried out in writing: testing on 30 questions determined by the computer program in any order or at least two versions of test tasks issued on paper and issued by the teacher, approved by the director of the Institution. The assessment depends on the degree and level of development of the program.

Students who have received unsatisfactory grades based on the results of the interim certification and have not eliminated academic debt are not allowed to the final certification.

The training of students ends with a final certification in the form of a credit.

When implementing the full-time and part-time program, in accordance with the calendar training schedule, it is planned to alternate classroom classes with extracurricular (independent) work of students. At the same time, each student is provided with individual unlimited access to the electronic information and educational environment of the Institution, which contains the necessary electronic educational resources, throughout the entire period of training.

When conducting lectures with students who are mastering the program in full-time and part-time, the BigBlueButton video conferencing system is used, integrated into the Institution's distance learning system (hereinafter referred to as SDO).

Practical classes, as well as the final certification of students are conducted in person.

Extracurricular independent work of students (hereinafter referred to as SRS) during the implementation of the program in full-time and part-time form is organized in accordance with the methodological recommendations for the online course (electronic educational and methodological complex).

Consultation of students is carried out using elements of an online course or an electronic educational and methodological complex (hereinafter-EUMC) such as «Forum», «Chat», «Message menu», intended for individual consultations. The BigBlueButton video conferencing system can be used for both group and individual consultations.

When a teacher uses the BigBlueButton video conferencing system for lectures and consultations, it is mandatory to record these events.

The results of the current control, intermediate and final certification of students during the implementation of the program in full-time and part-time with the use of EO and DOT are necessarily recorded in the SDO.

Safety during classes should be ensured by their clear organization, accurate compliance with safety requirements, the provisions of manuals and orders, as well as the use of knowledge and skills acquired during various types of briefings and classes on the study of safety requirements.

When conducting classes, teachers are obliged to take measures to prevent injuries to students, timely bring the necessary safety requirements and ensure strict compliance with them.

Section 2

EDUCATION IN THE FIELD OF FIRE PREVENTION AND FIREFIGHTER TRAINING

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TRAINING METHODS FOR FIREFIGHTERS TO PERFORM PROFESSIONAL RESCUE ACTIVITIES AT HEIGHT

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Abstract. «Emergency and rescue training» is one of the most important special disciplines taught at the specialized educational institutions that train senior and ordinary staff for emergency services. One of them is the University of Civil Protection that is the head and leading educational establishment of the Ministry of Emergency Situations of Republic Belarus. Emergency and rescue training contributes much to the main goal – provision of the state with highly qualified specialists capable of carrying out any professional duty in the field of emergency prevention and elimination. *Keywords:* rescue activities, emergency and rescue training, the course of training, means and equipment, work at height.

Academic discipline «Emergency and rescue training» includes a wide range of vocational and applied issues for the training of high-level professionals in case of any emergency. The training program focuses

On the purpose and use of combat and special clothing and equipment;

Handling of fire hoses, barrels, sleeve fittings and accessories (marking of fire hoses, hose laying, etc.);

Work with fire escapes and lifting mechanisms (hand-held fire ladders of various types, lifting mechanisms);

Work and maintenance of life-saving and safety devices and equipment (the ropes used to conduct CPR at height, climbing equipment, its types and purpose, knots, their types, purpose and methods of knotting, basic methods of conducting rescue operations using climbing equipment);

Combat deployment and work with emergency and rescue equipment, technology of carrying out emergency and rescue activities in the event of car crashes. [1]

All classes are held in a practical and demonstrative form with the obligatory accompaniment and supervision of a teacher.

In the course of this unit of study, trainees must learn the techniques of work with the firefighting equipment, and with systematic training, the acquired skills become automatic. The main training method should be a practical demonstration with a brief explanation of the rules and techniques of the exercise. Depending on the type of exercise, the training lessons can be easy or simple, complex or difficult. That is why, when doing simple exercises such as connecting and disconnecting the hoses, hose laying, coiling ropes into a ball, there's no need to use complex techniques because they're easy to digest. It is necessary to show them correctly, to clarify the technique of actions and to correct errors in a timely manner. The main principle here remains «safety first». [2]

In case of complex and difficult exercises, such as dealing with mountaineering equipment, it is necessary to divide the exercises into elements and separate the stages. Having achieved the

correct performance of one stage of the exercise at a slow pace, we should move to its training on higher speed and at the same time start learning the next stage at a slow pace. Element or «step-by-step» learning provides the right skills and is the fastest way to guarantee quality initial practical experience. During the period of further training, the ability to perform the exercise as a whole should be pursued. [3]

The implementation of the standards with time control for the exercises and techniques studied is the result of the training of a firefighter. Emergency and rescue training standards and regulations are the criterion for the professional readiness of the personnel to carry out their duties and combat missions. These training activities are annually monitored in the units and subunits of the Ministry of Emergency Situations, as successful emergency response depends not only on the correct tactical decision and available equipment, but also on the skilful correct use of all the rescue equipment and means used during rescue activities at height. [4]

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PSYCHOLOGICAL TRAINING OF RESCUEER AS AN ELEMENT OF PROVIDING EMERGENCY RESCUE WORKS AT EMERGENCY SITUATIONS ELIMINATION

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Abstract. In the course of preparation for the performance of rescue operations in the center of emergency response, special work is carried out to provide psychological support to the personnel of the subdivisions.

Keywords: professional activity, psychological stability, special psychological training, targeted psychological training, algorithms for first aid to victims, psychological well-being.

The content of psychological training in all its forms is the development of an active response of the rescuer to the real situation. Psychological training is carried out on the basis of moral and psychological education and tactical and special training.

The formation of a combat active psychological state, the development of a clear internal attitude to perform a specific task, preparation for a specific action to eliminate emergency situations (ES) involves targeted psychological training, carried out by increasing the functional activity of the rescuer's psyche and improving performance before the start of active actions to eliminate the emergency.

High professional activity and psychological stability of the personnel, practical and theoretical acquaintance with specific dangerous phenomena and damaging factors that arise in the centers of emergency situations, is achieved by special psychological training. Many tasks of special psychological training should be solved in the process of tactical-special and complex exercises with the practical use of special technical and protective equipment, means of a phantom-modular complex in conditions as close as possible to the situation of a real emergency.

The basis for the search and development is the idea of maximizing the approximation of the environment of studies and exercises to the conditions of emergencies of a natural and man-made nature.

The methods of psychological preparation are:

creation and use of emergency models with characteristic features and consequences.

mental tension should be achieved by introducing elements of danger into the setting of exercises and tactical-special exercises according to the mechanism of an unconditioned or conditioned reflex.

training should be carried out in extreme weather and climatic conditions, at training bases with the use of the combined effect of various emergency factors, victims with imitation of the terminal state and traumatic injuries, to create tension and imitation, with the indispensable condition of the personnel being in the emergency center.

the participants of the classes must work in protective equipment, use the available technical means for conducting emergency rescue operations. In the outbreak, various dummies (phantom modules), located in places with imitation of emergency situations, should be actively used to work out algorithms for first aid to victims;

it is necessary to use for educational purposes such stress factors as: uncertainty in the current situation by limiting the transmitted information; deliberate lack of time to complete educational tasks; unexpected and sudden changes in the situation [1];

an important place in psychological training is occupied by special exercises designed to solve primarily psychological problems. For educational purposes, computer game classes with programs should be used, in which, as in life, elements of randomness and unexpectedness are necessarily present;

to solve psychological problems, special courses of psychological training should be used; simulators, phantom modules, using which the shift personnel learn to eliminate emergency situations;

in the course of developing algorithms using models of emergency centers. along with the skills of dealing with damaging factors, important personality traits are developed: courage, self-control, endurance, accurate calculation, which can be effectively used in the course of real rescue operations.

For the effective work of the head of emergency response, including making optimal management decisions, it is very important to have the ability to cope with stressful situations, trust relationships with others, the ability to take care of the well-being of others (both subordinates and those who are being rescued), independence in judgment, the ability to effectively use provided opportunities, to capture or create conditions and circumstances, feelings of control over what is happening around, the ability to improve based on the experience gained, to have a sense of direction in life, the ability to draw positive conclusions from the past, even erroneous situations. All these qualities and personality traits are components of the above factors of psychological well-being.

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SPECIFICITY OF TRAINING FOREIGN COMMUNICATIONS AT THE UNIVERSITY OF CIVIL PROTECTION OF THE MINISTRY OF EMERGENCY SITUATIONS OF THE REPUBLIC OF BELARUS.

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Abstract. Observance of the principle of communicativeness as the problem of practical knowledge of foreign languages at the University of Civil Protection.

Keywords: specificity, communicativeness, productive, active, competence, aspiration, achievement, linguistic, ability, intercultural.

Observance of the principle of communicativeness provides the problem of practical knowledge of foreign languages. First of all, language knowledge, with the productive practical purpose, is the study of a language as a means of communication – productive and active.

One of the subjects at the higher school which forms a communicative competence is the foreign language. Practical possession of a foreign language is provided thanks to principle of observance of communicativeness. In the modern society the professional aspect of studying any foreign language is especially important. It also defines an essential role in the formation of communicative competence at the UCP of the Ministry of Emergency Situations of the Republic of Belarus. The foreign language as a means of formation a professional orientation, i.e. interest to the future profession of rescuers and aspiration to receive as much as possible knowledge in the sphere of their professional interests gets nowadays a paramount value. Thus, foreign language knowledge gives the chance to the specialists of the Ministry of Emergency Situations to get acquainted with different achievements in the professional area abroad. Teaching to possess one of the modern professional-focused foreign language has an aim not simply to form communicative competence of cadets and officers speaking foreign language, but also to increase the level of their professional training.

Any cadets, graduating from the University of Civil Protection of the Ministry of Emergency Situations of the RB is a potential leader, and, the greatest difficulties at the decision of their professional problems are problems of communicative character – such, as the choice of adequate transmission of the information; the correct argument of the position and etc. Therefore, the communicative competence of all cadets and, of course, officers, studying at our university can be considered as their basic professionalism. Actually the formation of communicative competence has two main objectives – professional and social which are crossed with each other. The higher is a level of cadets' and officers' development, the more they estimate the importance of communicative competence of the professional training.

Formation of linguistic and communicative competence are equally important problems of teaching any foreign language. These competences become essential qualifying characteristics. The leader in the given list of competences is the communicative competence, because it represents, first of all the defining language level.

The structure of communicative competence of all cadets and officers speaking any foreign language consists of linguistic group of competences. Linguistic group of competences is that which defines the knowledge of oral and written speech. Linguistic professional group of competences is an ability to work with texts in the sphere of structures of the Ministry of Emergency Situations; an ability to work with a special vocabulary; an ability to analyze a material of the professional-focused subject matter. Hence, the communicative competence is formed in the course of professional-focused training and can be characterized by close interrelation of linguistic and linguistic professional groups of competences which are formed and become more active in the professional work of the employees of the Ministry of Emergency Situations. Communicative

competence of cadets and officers of the UCP speaking any foreign language is formed on the basis of the use of communication between subjects in the frame of professional-focused training and considered as an ability and readiness of the specialists to solve communicative problems in the sphere of their professional work.

It should be noticed that one of the most used methods of teaching a foreign language in the USP are modern technologies with the use of different useful programs in professional activities. The knowledge of different programs is considered today as a fundamental factor for the effective organization of any activity, and the teacher is the organizer of information flows. In this regard, the most important areas in the training of cadets and officers of the University of Civil Protection are:

- implementation of a virtual information and educational environment at the level of the chair of modern languages, providing the implementation of a set of works to create and ensure the technology of its functioning;
- system integration of information technologies that support the processes of learning, research and organizational management;
- development of information, communication and technological competencies of teachers of our chair;
- building a unified educational information space.

Officers serving at the Republican Special Response Team «Zubr» of Emergency Situations of RB of the Republic of Belarus are very often have to work not only in our country, but also abroad, with the aim of elimination of accidents of natural and man-made character and rescuing people in various emergency situations. The perfect knowledge of English language is absolutely necessary for them especially in the sphere of their professional duty. They also need the knowledge of English language as a means of receiving modern information and raising their professional communication. The main result of improving the quality of their education on the basis of information resources is information literacy and mastery of technologies that allow them to acquire new knowledge and improve their professional skills.

The final role of teaching foreign language at our university is caused by that role which it plays in the life of every employee of the Ministry of Emergency Situations. Training a foreign language activates the formation of the communicative competence, brings up the person capable properly to fulfill professional-business intercultural communications.

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FEATURES OF REDUCING THE FLAMMABILITY OF A CONSTRUCTIONS MATERIALS

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Abstract. We have developed discrete polymeric coatings based on polyols and amidophosphates for cellulose and paper materials. cellulose is a natural polymer. The main regularities of the influence of the macrostructural organization of discrete polymer coatings on the manifestation of

their fire-retardant properties in the composition of the «paper-coating» system have been established. It is shown that optimization of the coating structure is an effective way to increase the fire resistance of samples.

Keywords: combustion, fire retardant, impregnation, destruction, coke residue, fire, explosion.

A fire is called an uncontrolled combustion that develops in time and space, dangerous to people and causing material damage. Fire and explosive safety is a system of organizational and technical means aimed at preventing and extinguishing fires and explosions.

Fires in industrial plants, in transport, in everyday life pose a great danger to people and cause enormous material damage. Therefore, the issues of ensuring fire and explosive safety are of national importance.

Investigation of the processes of ignition and combustion of natural and synthetic high-molecular compounds, as well as various composite materials based on them, is now also of extremely important practical importance. Interest in this rapidly developing field of science is due to the urgent need to create scientific foundations for the purposeful synthesis of non-combustible polymeric materials, a rational technology for obtaining fire-safe materials, predicting the conditions of their operation, excluding the possibility of the occurrence and spread of fires, since the production of polymer materials is one of the most rapidly developing areas of the chemical industry.

Already, the world production of plastics, chemical fibers, synthetic rubbers and other polymeric materials has reached almost hundreds of millions of tons. The growth in the production and consumption of many polymeric materials in various branches of technology is somewhat constrained by a number of disadvantages, and, in particular, their increased fire hazard. The fire hazard of natural and synthetic polymers is determined by their ability to ignite and propagate the combustion process, and the consequences of this process.

When polymer materials are burned inside and on the surface of the condensed phase, complex physicochemical processes are also carried out, such as phase transitions, thermal and thermal oxidative decomposition, etc. Combustion of many polymeric materials, especially fire retardant materials, involves signs of both a homogeneous and a heterogeneous process. This is due to the fact that the high-temperature decomposition of polymers during combustion is often accompanied by the formation of a new phase of the carbonized layer. The latter burns out as a result of the reaction of the interaction of the gaseous oxidant with the carbon surface. The rate of the heterogeneous chemical process of burnout of the carbonized layer of polymers is determined by the rate of oxygen diffusion from the gas phase to the carbon surface. Obtaining complete information on the chemistry of the combustion process of polymers is a particularly difficult and practically insoluble problem.

Natural and synthetic polymers are extremely complex systems. Until now, the kinetics and detailed mechanism of polymer degradation have not yet been fully established, even at a relatively moderate temperature and rate of thermal action.

To establish the relationship between the structural characteristics of polymeric substances and the laws of their combustion, of course, knowledge and understanding of the physicochemical process of the transformation of the starting material into final combustion products at all stages of this transformation is necessary. This ultimate goal cannot be achieved without taking into account chemical kinetics and the influence of physical factors on the latter. A specific feature of polymer combustion is the presence of various critical phenomena observed during its onset and development. In combustion theory, the establishment and study of critical combustion conditions is one of the main tasks. Knowledge of the patterns and critical conditions of combustion of polymeric materials serves as a scientific foundation for assessing their true fire hazard and establishing fire safety standards when using products made of polymers in various fields of technology. Investigation of the mechanism and patterns of combustion of polymeric materials is currently in the initial stage of development.

For a scientifically grounded approach to the problem of reducing flammability and obtaining non-combustible polymeric materials, it is necessary to combine the efforts of chemists,

physicochemists and physicists in the direction of studying such issues as high-temperature decomposition of polymers under conditions approaching combustion conditions, the effect of the chemical structure and supramolecular structure of polymers. on the laws of ignition and combustion, the effect of aging of polymers on the change in their flammability, in the direction of establishing the mechanism of the extinguishing action of various additives, creating methods for quantitatively assessing the effectiveness of fire retardants, etc.

We have developed discrete polymer coatings based on polyols and amidophosphates for cellulose and paper materials. Cellulose is a natural polymer. The main regularities of the influence of the macrostructural organization of discrete polymer coatings on the manifestation of their fire-retardant properties in the composition of the «paper-coating» system have been established. It is shown that optimization of the coating structure is an effective way to increase the fire resistance of samples. Of all the gases that inhibit ignition, ammonia is the most effective. For fire-retardant wood treatment, ammonium salts are widely used, which decompose when heated with the release of ammonia.

The decomposition temperature of ammonium salts varies widely and does not coincide with the ignition temperature of wood. Diammonium phosphate, already at a temperature close to 65 °C, noticeably releases ammonia, transforms into monoammonium phosphate. Ammonium sulfate partially decomposes when it reaches 220°C, complete decomposition with the release of the theoretical amount of ammonia occurs only at 533°C.

We have found that when processing pulp and paper materials with the developed fire retardants, chemical fire protection is manifested. The most important feature of chemical fire protection is that it reduces the thermal stability of the material in the region of the temperature preceding combustion, and does not lead to its increase, as in fire protection based on physical phenomena. Practical application of the development can solve many economic and social problems of the republic.

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FIREFIGHTER TRAINING AT A DISTANCE

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Abstract. This article examines a number of conflicts and dilemmas that arise in the transition to remote firefighter training. The article discusses the contradictions, as well as the opportunities that may arise in the process of implementing a distance-learning programme supported by professional technologies.

Keywords: firefighter training, instructors, digital, contradictions.

One consequence of the rapid development of information technologies is that technology-supported distance education is becoming a common study mode also in vocational training.

Teaching and learning in firefighter training seen from an instructor perspective can be described as a relatively unexplored area, while a few studies with a student perspective have been presented in recent years.

A transition from face-to-face training to online training is often described as a shift from a teacher-centred to a learner-centred approach in which the teacher is expected to be a facilitator who designs and organises an interactive learning environment. In order to facilitate such a change, it is important that teachers' pedagogical, digital and disciplinary knowledge be integrated and that their previous educational approach be the subject of reflection and review.

Changes in policies and design in firefighter training are an important starting point for increasing the understanding of such processes in terms of challenges, contradictions and changes.

In recent decades, the firefighter profession has gradually changed from being a physical profession to being a white collar-like profession in many western countries. This change is described in terms of professionals acting in a field of tension between the media image of the sacrificing firefighter and society's demand for public services such as preventive and educational efforts in the local communities.

However, there seems to be a lack of internal consensus within the profession about what constitutes the core of the profession and a lack of consensus between training institutions and emergency services about how training should be conducted. Furthermore, it has been described how two cultures, one formal and one informal support these different ideas. In the formal culture, mainly represented by management staff, it is claimed that both the vocation and the training are developing in line with new policies on extended professional skills and increased gender equality and diversity. However, in the informal culture, which is predominantly represented by firefighters, there is an emphasis on preserving the professional values prevailing in their work teams. One example of such a value is the perception that smoke diving and firefighting work constitute the profession's main duties, even though such work only occupies about 3% of the total working time. Another key value is that men with physical strength are better suited as firefighters than women.

These commonly held perceptions within the profession seem to be established early on in training. Examples of such views are that students on the firefighter training programme are given incorrect information and that the training they receive is inadequate, which results in their colleagues in the emergency services having to 'retrain them when they're out in the real world'.

However, some studies also recognise the existence of progressive training programmes, where the instructors are normally recruited from outside the emergency services. Their teaching emphasises the value of a development-oriented learning in order to broaden the students' knowledge of both accident prevention and emergency response work.

The expansion of the online distance mode means that the training instructors are required to teach in both study modes. A number of dilemmas and conflicts can be identified, some of which can be termed as contradictions.

New tools for instruction: A dilemma can be identified between the instructors (subjects) and the digital technology (tools). Some instructors lack familiarity with the digital technology tools and others a knowledge of teaching in digital learning environments. From an instructor perspective, the distance activity can be designated as a relatively uncertain and difficult training environment, where the instructors cannot rely on their previous teaching knowledge and skills.

Changed division of labour: Another dilemma concerns a prominent view among the instructors that compared to virtual environments, physical training environments offer much better conditions for imparting knowledge, checking the students' attention and progression and receiving confirmation of the quality of the training through verbal and visual clues. The fact that the instructors' opportunities for face-to-face teaching are limited in the distance mode and replaced with digitalised training materials and that instructors and students are reduced to names on the screen represent a dilemma in relation to their views of how firefighter training should be conducted. This dilemma can be regarded as a contradiction between a historically grounded approach to training, focused on instructor-led knowledge imparting and control, and an alternative approach to the division of labour, in which instructors are expected to facilitate and support the students' learning.

Changed rules: In the class activity instructors still have more opportunities to act in accordance with experiential-based and practice-oriented guidelines and routines deeply rooted in the firefighter profession, while in the online distance activity they are expected to follow the new course guidelines with extended theoretical elements and process orientation.

From an instructor perspective, the transition from the face-to-face activity to the distance activity can be described as follows:

From a high-status work regulated by professional routines on the training grounds to computerised deskwork regulated by more academised guidelines.

From an essentially oral-based training tradition with the instructors at the centre to a largely writing-oriented, less hierarchically organised training.

From a position where occupational and practical skills constitute the most important resources to a position where theory-based knowledge and approaches emerge as important complementary assets.

Changing training object: The basic and fundamental contradiction is that the distance training is failing to adapt to the traditional demands of the firefighter profession, and that an increasingly theoretical and digital training environment makes this adaption even more difficult.

To sum up, we can highlight some themes that are relevant to vocational training. First, an implementation of a technology-supported distance programme in vocational training has the potential to visualise inherent contradictions, it can also be a catalyst which can contribute to changes and improvements in training practices.

Second, the implementation of the distance mode leaves a lasting impact on the firefighter training as a whole. Increased transparency and shared responsibility for both study modes means that good training examples can be disseminated and that pedagogical development issues are given increased attention. To facilitate this development, it is recommended that vocational instructors' influence be ensured regarding how the distance and the face-to-face modes should be designed, that the instructors be given access to ongoing in-service training and mentoring, and that the principles for the recruitment of instructors be reviewed.

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SOME FEATURES OF THE SELECTION OF ANTIPYRENE

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Abstract. The article discusses the possibilities of creating new fire retardants for wood building materials and structures. It is shown that fire retardants obtained on the basis of waste and secondary resources are effective fire retardants for a number of wood materials and structures.

Keywords: fire retardant, fire protection, combustion, polymer, inhibitor, stabilizer, plasticizer, destruction.

When developing an effective composition for fire protection of cellulose materials, as well as wood-based panels, it is necessary that when heated, the composition excludes or slows down the formation of levoglucosan, interacting, interacting with the primary hydroxyl groups of cellulose, it promoted the catalytic dehydration of wood components, that is, it was an acid or formed it, acted in the gas phase, released ammonia halogens or other compounds that create a self-extinguishing effect and inhibited the decay process.

As mentioned above, the fire hazard of chipboard and fibrous boards is reduced either by fire protection of finished boards by surface treatment and impregnation, or by fire protection in the

process of their manufacture. The degree of fire resistance depends on the properties of the composition used, the amount and method of applying or introducing it into the board. The so-called «refined» chipboard and fiber boards are becoming more and more popular.

They are made by pressing a decorative layer of paper impregnated with melamine resin onto the surface of the boards. Tightening building regulations, organizing measures to prevent fires and improving extinguishing means have a positive effect, but do not completely rule out the possibility of fires. A more radical measure is to supplement the measures with the requirement to use materials that are not capable of ignition and subsequent self-combustion. Such fire retardant materials localize the action of a low-calorie ignition source and exclude the spontaneous development of a fire.

The fire hazard is also reduced by coating materials with inorganic films and foil, using inert fillers. In this case, the nature of the design is of great importance. A large number of formulations have been proposed to cover the plates, for example, a fire retardant composition made of liquid glass (15-20% of the weight of dry chips), urea-formaldehyde resin (10-12%) and ammonium chloride (1% of the weight of the resin). To increase the resistance to fire, molten metal is sprayed onto the surface of the chipboard. Metallic coatings improve the appearance and weather resistance of the slabs.

For the introduction of a fire retardant to the entire depth of the slab, an impregnation method is used, similar to the method of impregnating wood.

There is dip impregnation and pressure impregnation. Despite its effectiveness, chipboard impregnation is used to a limited extent. It is suitable only for boards made with waterproof phenol-formaldehyde binders. In the process of impregnation, the wood swells, irreversibly deforms, as a result of which the surface roughness class decreases. The subsequent drying of the boards makes the process unprofitable.

More promising and effective is the method of pressing a fire retardant onto the surface of the slab. The composition or substance is applied to the surface of the finished board by conventional means. The choice of method is determined by the state in which the substance is applied. The processed board is fed into a hot press and pressed at a high temperature. Monobasic ammonium phosphate and liquid ammonium polyphosphate with a water content of about 40% were used as fire retardants. To obtain chipboard and fiberboard with fire resistance properties that are the same over the entire section of the slab, a fire retardant is introduced into the shavings before the carpet is formed.

A special place is occupied by a relatively new direction of fire protection of wood-based panels and plastics in the process of their production, when the modifying composition is introduced into the intermediate product. During subsequent hot pressing, it interacts with the components of the wood fiber.

It is necessary to combine this interaction with the main processes of formation of plates and plastics, without reducing the quality of the latter. The fire retardant is actively involved in the processes occurring during pressing and hardening of plates. It acts as a plasticizer for wood fiber, then forms spatial crosslinks, which leads to an increase in the strength characteristics of the finished material.

The effectiveness of the fire-retardant properties of phosphorus-containing compounds can be increased by introducing nitrogen-containing compounds into them, for example, urea, melamine, guanidine, etc. We have also established an increase in the effectiveness of fire-retardant action by the joint use of nitrogen- and phosphorus-containing compounds obtained on the basis of wastes of the chemical industry of our republic. It was shown that the introduction of halogen-containing compounds additionally increases the efficiency of reagents containing phosphorus and nitrogen; however, these fire retardants are characterized by the disadvantages that are inherent in low-molecular-weight additives.

The technology of creating fire-retardant wood-based panels, as much as possible, should rely on already existing known technology. The fire protection process is most conveniently carried out before the formation of the wood fiber, so that in the process of hot pressing, plates with

predetermined properties are formed that do not require additional processing. The uniformity of the properties of fire-retardant fibreboard is determined by the uniformity of distribution of the fire retardant or, in the general case, by the modifying system in the wood fiber, which can be achieved by spraying an appropriate aqueous solution or introducing it into the grinding equipment. In this case, it becomes necessary to develop conditions for the manufacture of fire-resistant wood-based panels and, on their basis, to formulate requirements for a fire-retardant composition, to determine the parameters of the process.

We have found that in the process of hot pressing of wood-based panels, fire retardants decompose and cause thermal destruction, leading to a drop in the strength of wood fibers. In particular, the presence of such inorganic salts as $ZnCl_2$, NH_4Cl , $(NH_4)_2SO_4$ leads to carbonization even if the intensity of hot pressing of the boards decreases. For the same reason, wood-based panels are made with the introduction of 20% of inorganic salts into pine wood fiber, the most common as fire retardants, are characterized by reduced strength and water resistance compared to control panels.

According to the results, it should be noted that all the applied inorganic salts at an air humidity of 95% migrated to the surface of the fibreboard, thereby reducing the achieved degree of fire resistance and deteriorating the presentation. In determining the consumption of a fire retardant, for comparison, it is more convenient to calculate not by the mass of the introduced components, but by the mass of the working element in the general composition of wood-based panels. For this purpose, we have determined the minimum required phosphorus content in the fibreboard, which ensures the exclusion of self-combustion of the samples during ignition. It turned out that this content corresponds to 3% and corresponds to the consumption of phosphoric acid in the amount of 9.5%. However, it should be noted that the phosphorus content required for fire protection depends on the type of phosphorus-containing compound.

Phosphate and ammonium sulphate, as has been shown, when heated, decompose to the corresponding acids, which are responsible for the fire retardant effect.

The calculation of the recipe was made based on the content of phosphorus in the fiber in the amount of 3%. The performance of the samples is additively dependent on the consumption of the components of the buffer mixture. An increase in the concentration of phosphorus, which has basic properties, lowers the fire resistance; the sample acquires a tendency to smolder, which once again emphasizes the importance of the acidic environment at the time of ignition. But at the same time, according to the conditions for the formation of wood-based panels, it is required that the active acidity at the initial stage of the pressing process is maintained within the pH range of 4-5.

Thus, the first condition for the formation of fire-resistant wood boards is to provide a variable active acidity in the board as follows: at the initial stage of pressing, for the hydrolytic and destructive processes of wood fiber components to occur, a weakly acidic environment is required, the manufacturing process, according to the conditions of product durability, is completed in a neutral environment, while when the plates are ignited, the fire retardant composition must decompose with the formation of compounds with acidic properties, as well as gases that prevent the ignition of the formed flammable volatile pyrolysis products.

Internal protection of chipboard can be carried out either in the technological process in production, or on ready-made boards. It should be noted that during the production of chipboard there is the possibility of easy access to protect the individual particles that make up the board. For this reason, the introduction of protection into the mass for chipboards is, from our point of view, a more logical measure. The use of all these methods revealed a number of shortcomings in the economics and production technology and the properties of the plates protected by these methods. The solution to many problems associated with the use of low molecular weight fire retardants is possible only by the use of polymer fire retardants.

When modifying, stabilizing, and also fire protection of synthetic and natural polymers, low-molecular compounds of phosphorus, sulfur and nitrogen are mainly used. However, these compounds are also characterized by a number of undesirable side effects associated with migration to the surface, namely volatilization, dissolution by solvents, extraction and others, which can be

eliminated only by the use of high molecular weight modifiers and flame-retardants. In addition, the used industrial low molecular weight additives are introduced in large quantities, which, naturally, deteriorates the technological parameters of the target product, for example, increases the fragility, hardness, density, etc. In addition, industrial modifiers are difficult to obtain, toxic, scarce, expensive, and are also imported from abroad for foreign currency.

In addition, it is absolutely topical to create a technology for the synthesis and use of polymer form modifiers and fire retardants, which could eliminate many technological and social disadvantages inherent in low molecular weight additives for special purposes, as well as study the process of modifying various synthetic and natural polymers with the aim of increasing fire retardant, thermal and other applied properties is a very urgent problem and affects many areas of modern polymer chemistry, production technology, physics of combustion of condensed systems, environmental ecology, medicine and toxicology.

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SAFETY IN GEODESY AND PREVENTION OF FIRES AND EXPLOSIONS IN MINE

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Abstract. Proper storage of flammable liquids is of particular importance because they are highly flammable, and the resulting fire spreads faster than conventional fuels. Combustible and flammable liquids in limited quantities are often stored underground in many mines. Sometimes the main storages of diesel fuel, lubricating oils and hydraulic fluid are located underground. Since a fire in an underground repository of flammable and flammable liquids has extremely serious consequences, the organization and operation of such storages requires the strictest observance of special security measures.

Keywords: mine, geodesy, explosion, safety, structure, land, storage.

Fires and explosions pose a constant threat to the safety of miners and the productivity of mines. Fires and explosions in mines are traditionally considered to be one of the most destructive types of industrial accidents [1].

At the end of the nineteenth century, the number of lives taken and the material damage caused by fires and explosions in the mines could not be compared with an accident in any other industry.

This article describes the main causes of fires and explosions in underground mines, as well as measures necessary to prevent them.

In the premises of the permanent ancillary services, work is carried out that is associated with a certain risk of a fire and therefore requiring special precautionary measures. The greatest danger in underground mines is the equipment of underground maintenance shops [2].

Often a source of fire is the machine park maintenance workshops. In mine diesel installations, fire may occur due to leakage of fuel from high-pressure hydraulic systems when splashing is hot. When splashes of hot flammable liquid fall, for example, on a hot exhaust pipe or a turbo electric generator. Fire on such equipment can spread very quickly. Most of the machinery used in underground mines combines flammable substances (such as diesel or hydraulic fluids) and components that can cause it to ignite (diesel engines, electrical equipment). Thus, the operation of these machines is associated with significant fire risk. Welding work in the mines is the most common cause of fire. In the maintenance shops these works are carried out regularly. In order for

welding work not to cause a fire or an explosion, it is necessary to observe special safety measures. Careful consideration should be given to the possibility of equipping maintenance shops in the form of enclosed rooms of refractory material. This is especially important if the camera is supposed to be used for more than 6 months. In the event that this is not possible, the chamber should be fully equipped with automatic fire extinguishing systems. This is of particular importance for coal mines, where the risk of fire should be minimal.

Another important requirement is that a separate ventilation drift is used for ventilation of each chamber. This limits the possibility of the spread of combustion products in case of fire. The storage and use of flammable and flammable liquids in all branches of the mining industry is associated with an increased risk of fire. Many underground mines have a diesel engine park. The fuel used is the cause of fire in a significant proportion of cases. Proper storage of flammable liquids is of particular importance because they are highly flammable, and the resulting fire spreads faster than conventional fuels. Combustible and flammable liquids in limited quantities are often stored underground in many mines. Sometimes the main storages of diesel fuel, lubricating oils and hydraulic fluid are located underground. Since a fire in an underground repository of flammable and flammable liquids has extremely serious consequences, the organization and operation of such storages requires the strictest observance of special security measures.

A potential fire hazard is any manipulation of flammable and flammable storing, refueling, and using them as fuel directly in cars.

The basis of fire safety measures in underground mines are general principles for the prevention of fires and explosions. Usually, they include simple rules dictated by common sense, such as the prohibition of smoking. In addition, it is planned to install special systems to prevent the spread of fire, such as portable fire extinguishers or fire alarm systems.

Measures to prevent mining fires and explosions can be divided into three categories: limiting the number of sources of ignition, limiting the number of sources of fuel and limiting the possibility of their contact.

Limiting the number of sources of ignition is apparently the main way to prevent a fire or explosion. It should be completely excluded the presence of any sources of ignition, except those that are necessary for the process of extraction of coal or ore. For example, smoking or open fire should be prohibited, especially in coal mines.

To prevent explosions, it is also necessary

to eliminate electrical sources of ignition. Electrical equipment in the conditions of work with methane, sulphide dust or other potentially flammable substances should be designed, designed, tested and installed so that its operation does not lead to a mine fire or explosion.

Devices such as forks, chucks and knife switches used in high-risk areas should be explosion-proof. Another important requirement is that a separate ventilation drift is used for ventilation of each chamber. This limits the possibility of the spread of combustion products in case of fire. The storage and use of flammable and flammable liquids in all branches of the mining industry is associated with an increased risk of fire. Many underground mines have a diesel engine park. The fuel used is the cause of fire in a significant proportion of cases. In coal mines, this danger is exacerbated by the presence of coal, coal dust and methane [3]. prohibition of smoking. In addition, it is planned to install special systems to prevent liquids, including loading them underground, the spread of fire, such as portable fire extinguishers or fire alarm systems. Measures to prevent mining fires and explosions can be divided into three categories: limiting the number of sources of ignition, limiting the number of sources of fuel and limiting the possibility of their contact. Limiting the number of sources of ignition is apparently the main way to prevent a fire or explosion.

It should be completely excluded the presence of any sources of ignition, except those that are necessary for the process of extraction of coal or ore. For example, smoking or open fire should be prohibited, especially in coalmines. All automatic or mechanical equipment, the details of which can be very hot, such as conveyors for example, must be equipped with switches that decrease the number of revolutions successively and temperature automatic switches on electric motors.

Explosives are an obvious fire hazard, but they can also cause the ignition of suspended dust or gases, so their use should be in strict accordance with special instructions. special observers must ensure that smoldering fire does not appear anywhere during the entire period of work. Chambers with a high content of combustible materials, such as storage and warehouses of fastening wood, explosives and flammable liquids, should be equipped so that the sources of ignition are as low as possible. In the mine machines, the supply lines for hydraulic fluid, fuel, and lubricating oil must be removed from hot surfaces, electrical appliances, and other potential sources of ignition, liquid does not fall on a potential source of ignition. Restricting the sources of fuel begins with a good organization of labor: all rubbish, including oily rags and coal dust, must be cleaned regularly, since its accumulation is unsafe. If possible, instead of flammable materials, their counterparts with less fire risk should be used, in particular, this applies to hydraulic fluids, conveyor belts, hydraulic hoses and ventilation pipes.

Preference should also be given to materials whose burning during a possible fire will not lead to the formation of toxic products. For example, earlier in the underground mines isopenopolyurethane was widely used as ventilation insulation, but now its use is prohibited in many countries. In underground coal mines, coal dust or methane often becomes the primary source of ignition.

When mining coal and other underground minerals, methane is usually mixed with air in ventilation systems and removed from the mine with an exhaust fan. As for coal dust, everything is being done to prevent its formation in the process of coal mining. But for the occurrence of an explosion, a very small amount of dust is enough, the appearance of which is almost impossible to avoid. A layer of dust on the floor only 0.012 mm thick can already cause an explosion if it rises into the air. The use of powder from inert materials, such as limestone, dolomite or gypsum, helps prevent such explosions.

The limitation of contact between the fuel and the source of ignition is determined by the insulation of the fuel. For example, if welding work cannot be performed in a fireproof place, the floor should be moistened, and all nearby combustible objects should be covered with refractory material or moved. Fire extinguishers must be prepared, and

Special screens must be installed so that when a possible leak of a drop of flammable

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THE MAIN TASKS OF SEARCH AND RESCUE OPERATIONS

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Abstract. The article provides general information about rescue operations, search and rescue operations. The organization of search and rescue operations and activities with the authorities are being considered. The main tasks of search and rescue operations are defined.

Keywords: Search and rescue, rescue, emergency, tactics, disasters.

Despite the achievements of scientific and technological progress, the threat of disasters to society is growing. The number of victims of natural disasters is growing by about 6% a year.

According to the Scientific Center for Epidemiological Disasters (Brussels), between 1965 and 1992, 3.6 million people died in natural disasters, more than 3 billion people were affected, and the total economic damage was more than \$ 340 billion [3]. The data provided by various countries to the World Conference on Natural Disasters (Yokohama, 1994) show that between 1962 and 1992, the country suffered severe economic losses (up to 1% of its annual gross domestic product and more).) the number of natural disasters increased by 4.1 times, while the number of victims increased by 2.1 times. The most catastrophic economic losses are floods, droughts and earthquakes. These account for 32, 22 and 10 percent of all emergencies, respectively. The most dangerous disasters: drought (30%) and floods (32%) according to the number of victims; According to the number of casualties, floods (26%), epidemics (17%) and earthquakes (13%). This is evidenced by the analysis of statistical data on emergencies on Earth over the past 30 years [3]. However, the number of wars, terrorist attacks and various types of armed conflicts in the world is constantly growing.

There are more than 15 types of various dangerous natural phenomena in the territory of Azerbaijan, which is characterized by a variety of geological climate and relief conditions [2].

The most destructive of these are:

floods; erosion; earthquakes; landslides; floods; avalanches; hurricanes; storms; vortices.

Some of these events occur unexpectedly and are short-lived (earthquakes, landslides, avalanches, landslides, vortices), but result in large material losses and human casualties.

If we take all possible emergencies as a whole, then they can be divided into conflict and non-conflict types in the first place. Conflicting emergencies include military clashes, extremist-political struggle, social explosions, national and religious conflicts, criminals inciting terrorism, and so on. can be attributed [1].

Apart from natural emergencies, war is a topical issue in our republic, large-scale operations can begin at any time, and our settlements on the line of contact may face the possibility of fire

The successful conduct of the search and rescue (SR) is an important element of an emergency. The main purpose of the SR is to create conditions for the effective operation of the forces and means required to carry out their work in a comprehensive and operational manner in a short period of time (with minimal costs and losses).

Data collection, analysis, assessment of the real situation, decision-making, work schedule: at this stage of the search and rescue, the manager collects all the necessary information to fully achieve the goal, taking into account the time allotted for this work and the conditions to be implemented in subsequent stages of management evaluates [4].

Continuous monitoring of the situation, development of possible options to prevent large-scale emergencies;

Assessment of the real situation, identification, optimal options for conducting the SR, operational preparation of the initial work plan in case of changes in the situation and the situation at the scene: the decision made at this stage of management is implemented. In the planning process, the responsibilities of the subordinate forces and governing bodies are specified, the duration of this task is calculated, the sequence of implementation, the rules of interaction between the forces in the group, the necessary reserves for comprehensive support of future activities are determined

Determining the degree of danger of emergency factors, setting the boundaries of dangerous areas;

- Calculation of forces and means for conducting SR;
- Proper assignment, delivery to the executors;
- Ensuring the interaction of all participants in the SR;
- Analysis of the results of the current work and preparation of amendments;
- Checking the implementation of the specified tasks;
- Organization of the final stage of the SR;
- The main forms of SR management: strategic, operational, tactical, normative;
- The management of the SR must be reliable and uninterrupted;
- The management of the SR starts at the moment of receiving the information about the occurrence of the emergency and continues until the completion of the work.

The SR management system is subordinated to the Crisis Management Center.

The activities of the governing bodies are based on constantly updated information about emergencies. Decisions are made on the basis of information. After the decision is made, the matter is transferred to rescuers. The area where the SR will be held is indicated, the methods of their implementation, the conditions of interaction, the participants, working groups and the time of completion of the SR are noted.

Organization of SR during the wreckage:

1. Siege of the emergency zone with the help of the state traffic safety inspectorate;
2. Siege of law enforcement agencies in the area of the disaster;
3. Headquarters (MES AR);
4. Precinct for providing medical care to minor victims;
5. Precinct for providing medical care to critically injured victims;
6. Victim identification platform;
7. Victim sorting medical center;
8. Open road for two-way traffic (ambulances);
9. Open road for two-way traffic (firefighting and construction vehicles);
10. Input and output coordination point;
11. Rescue room for rescuers;
12. Room for heating rescuers;
13. Room for feeding rescuers;
14. Reserve force;
15. Reception point for found documents and valuables;
16. Spare equipment;
17. Gas station for refueling equipment;
18. Forces and means of necessary emergency services;
19. Working zone;
20. Emergency zone;

Accidents related to natural (geophysical, geological, meteorological, hydrological, marine-hydrological, natural fires, etc.) and man-made (fires, explosions, collapse of buildings and structures, chemical, radioactive and biologically hazardous substances) of the population and territories of the Republic of Azerbaijan, protection and elimination of consequences (emergencies) in power systems, life-saving utilities, treatment plants, hydrodynamic facilities, oil and gas production and refining facilities, main pipelines, accidents, traffic accidents, etc., management in these areas, FH- Special tactical training is one of the main forms of training of the MES forces for practical action, which provides a quick response when there is a high probability of occurrence or occurrence. Thus, the tactics of conducting rescue operations (RES), based on scientific facts, applying them in practice and summarizing the modern experience of combating emergencies, explores the nature of accidents, natural and man-made disasters and their development [4].

Modern rescue tactics apply new technologies to the training of rescue teams, as well as to the conduct of rescue and other emergency operations (ESD) during the elimination of the consequences of emergencies, and especially to the rescue of their main type of people. Therefore, it expresses the theoretical basis of the combat operations of the forces of the Ministry of Emergency Situations, studies their regularities and develops more effective forms and methods of eliminating the Ministry of Emergency Situations in the shortest possible time. At the same time, the tactics of conducting rescue operations ensure the adoption of substantiated decisions by the commander-in-chief for each specific situation.

In the tactics of rescue operations, regardless of where and by what forces and means the accident was eliminated, it is possible to distinguish a general theoretical basis that is equally relevant to the process of its elimination. For tactics, the organizational structure of the MES forces, as well as the method of managing the combat operations of rescue teams, as well as the interaction of personnel, their scientific justification should be of great importance.

It covers the nature of combat operations, the rules of mobilization and deployment of forces and equipment, the necessary and sufficient conditions to limit and eliminate the consequences of natural and man-made disasters, the tactical capabilities of rescue teams and calculation methods for their use, as well as the organization of liquidation. and the management of hostilities.

The tactics of conducting search and rescue operations depend on the tactical and technical capabilities of special purpose equipment, the introduction of new rescue vehicles. As rescue teams are gradually being equipped with more sophisticated equipment and rescue equipment, it is important to continuously improve the tactics of conducting rescue operations by improving them with new methods and ways of conducting the rescue operation.

Search and rescue tactics are one of the disciplines relevant to the main profile of the training of highly educated specialists on emergencies and life safety. Application of governing bodies and forces in carrying out emergency and rescue and other urgent works: activity of governing bodies in carrying out STSD; Management during the conduct of the Institute; One of the main directions is the conduct of the Institute [6].

Thus, the determination of the degree of danger of FH factors, the establishment of the boundaries of dangerous zones are considered to be key issues. Successful search and rescue operations lead to the elimination of the consequences of emergencies and minimization of casualties

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PRACTICAL APPROACH TO TEACHING PROFESSIONAL FOREIGN LANGUAGE COMMUNICATION TO WORKERS OF RESCUE SERVICES

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Abstract. The development of practically oriented technology of training the dispatcher of 112 rescue service in the field of language communication in English. The algorithm of the creation of specific professional course is proposed.

Keywords: special communication needs, communication situation, linguistic skills, emergency operator

The safety of the citizens and the state is one of the priority areas of scientific, technical and innovative activities in the Republic of Belarus. Protection against emergencies includes an extensive list of scientific topics, concretized in accordance with a variety of practical tasks. An important role in this direction is given not only to the development of modern means and methods of rescue, but also to raising the professional level of all employees of the Ministry of Emergency Situations, because the life and health of citizens depends on their competent work.

In addition to the everyday events of the internal life of the country, the number of large-scale events of global significance held in the Republic of Belarus is currently enlarging, therefore, the need for the practical use of English language by the workers of bodies and departments of the Ministry of Emergency Situations is significantly increasing.

The relevance of knowing English by dispatchers or the service 112 is due to the fact that under the new conditions, any employee of the MES duty service may be faced with the need to take a phone call from a foreign citizen who only speaks English. In this connection, the task of practical knowledge of elements of the English language, which are necessary and sufficient for adequate telephone interaction of the dispatcher with foreign citizens by phone is vital. Communication skills of the worker on duty should be sufficient to determine the nature of the emergency during telephone communication, give instructions to the caller, and send an appropriate service depending on the situation.

The analysis of information sources and regulatory documents showed that the situations in which 112 calls are made can be reduced to certain types. The list of typical situations about which calls are made includes the followings: fire in a car, fire in a residential building, drowning person, finding a wild animal on the territory of a settlement, detection of mercury, attack (threat of attack) of stinging insects, limitation of human mobility (blocking) between structures, presence of unknown smell, detection of a source of ionizing radiation, blocking a person in a lift or in a car, a sharp deterioration of health, lost in an unfamiliar city.

The linguistic skills necessary for the realization of communicative interaction in English within the framework of these situations are as follows: phonetic skills at the level of distinguishing phonemes; approximated reproduction of sounds and basic intonation patterns; practical knowledge of vocabulary in the amount of 500-600 units (everyday vocabulary and restricted number of professional words); practical knowledge of basic grammatical structures predominantly they are simple sentences as well interrogative and imperative structures.

The set of above-mentioned skills will provide the dispatcher with an understanding of the nature of the emergency, making adequate clarifying questions, and formulating short recommendations. Having understood the reason of the call, the dispatcher will perform a sequence of actions in accordance with the requirements of the guidelines for involving the forces and means of the Ministry of Emergency Situations, as well as other interaction services (police or ambulance).

For the formation and development of the necessary skills and abilities, a practical goal-oriented training course «Elements of professional English speaking communication» has been developed, which includes phonetic patterns, lists of active vocabulary, grammar comments, recordings of model dialogues.

Each element of the course has its own significance, characteristics and specific features. As the professional foreign language teachers say, «at any level the basic tools students need to speak English with confidence are Grammar, Vocabulary and Pronunciation». In the professionally oriented course for the 112 workers the grammar is presented in a clear and simple manner including only basic grammar tools like word order in imperative and affirmative phrases, forms of present and past simple, structures with the verbs «be», «have», «do», numbers, prepositions and some others. The limited basic grammar references are followed by a set of exercises emphasized to put grammar knowledge in practice.

Special attention is paid to the vocabulary. It is worth to mention that there are not enough sources of lexical information in this field, there is no analogical published academic courses. The selection of the necessary and sufficient number of lexical units was made on the basis of information documents of the Ministry of Emergency Situations of the Republic of Belarus, recommendations of workers of the service on duty 112. Some foreign authentic documents (Internet texts, authentic recordings of real calls from emergency places) were analyzed and involved. Every unit and subunit of the course has an evident lexical aim. All vocabulary lists are articulated which helps to train high-frequency lexical entities within the main topic. For example, the unit «Fire risks with electrical devices» includes only the names of household electrical devices, while the unit «Lost in the city» contains the designations of city objects and places. The topical

words and expressions are provided with phonemic scripts and recordings. As it was for the grammar, the vocabulary comments are followed by a set of exercises aimed to get practical skills in listening and using the given words in practice.

The dispatcher does not have the need to read in English large authentic text fragments or write traditional text types like essay, e-mail, reports. That is why the course does not include large-scale reading and writing exercises, they are only minimized as the support of the practical needs in speaking and listening.

The problem of developing listening skills is always complicated for many students at all levels even for those who study everyday English. The work of a 112 dispatcher is based completely on listening, that is why all elements of the professional English course have their records and scripts so the students are constantly exposed to the variety of accents of native and non-native speakers.

Thus, the successful teaching English for professional purposes requires first of all the identification of special needs which are relevant in specific situations of communication in professional sphere. These specific needs can be clarified after consulting the specialists in the field, analyzing published regulative documents and available texts, studying analogue experience abroad. The general needs being determined; it is necessary to decide which foreign language skills (speaking, listening, reading, writing) have to be developed predominantly to satisfy these special needs. The next step is to accumulate the materials in order to select a finite list of vocabulary and grammar structures to use this vocabulary. Afterwards the right time is to develop exercises and tests, make or find recordings, choose the technical possibilities to incorporate all materials in clear, modern easy-to access form. Each of these steps can be considered as an algorithm of a pedagogical technology «Elements of Professional English-based Communication» as it corresponds to the main requirements of any technology. These are the following requirements: scientific base, coherence, logical character, reproducibility, controllability, effectiveness.

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TEACHING FIRST AID SKILLS AS A COMPONENT OF CONSOLIDATED APPROACH TO RESCUE FIREFIGHTER TRAINING

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Abstract. Training of modern rescuer firefighters is a multifaceted, long-lasting and difficult work. The number of academic and practical disciplines that a future rescuer must study is very large. This is due to the number of tasks that every professional must be prepared to perform. One of such disciplines is «First Aid» training. It is of vital importance as rescuers are the first to face an injured person and to render first aid before medical professionals arrive at the accident scene.

Keywords: first aid, render, victim, training process, methods and techniques, professional skills.

In the course of his activity, a person is constantly exposed to dangers, both from the world around him, and from other people, sometimes he can become a source of danger to himself. The necessity and importance to have knowledge and skills in the field of medicine, especially in the sphere of first aid rendering, can be very useful in various situations of our modern life.

Rescuers, when having arrived at the scene, instantly assess the situation, organize an evacuation, remove the wounded, provide first aid (stop bleeding, apply a splint, etc.). All these measures in the official language are called elimination of consequences. They require determination, focus on work and honed skills from a professional called a rescuer or a firefighter. Rescuers are the first to respond to an emergency and consequently the first to provide medical assistance. Besides they rescue trapped people, remove them down from roofs and trees, take out of the water, etc. Providing first aid for injured persons is one of the most essential skills that should be mastered not only by medical professional personnel, but also by any common person. There is no need to explain much why first aid skills are especially significant for a rescuer firefighter. [1]

Because a person's life is proclaimed the highest value, the very attempt to protect this value is placed above the possible errors in the course of providing first aid, since it gives an injured person a chance to survive.

One of the basic first aid principles is its urgency or emergency character: the faster it is provided, the more there is hope for a favorable outcome. Therefore, such assistance can and must be provided in a timely manner by the one who is next to a victim. Firefighters and rescuers improve their skills thanks to a specially developed training program for the personnel of the Ministry of Emergency Situations of Republic Belarus.

One of the subjects is «First Aid» taught at the University of Civil Protection. The cadets are trained in order to provide them with knowledge and skills to properly render first aid to victims in the event of various emergencies. Employees of the Ministry of Emergency Situations receive the necessary knowledge in the field of human anatomy and physiology; study the rules of first aid. Medical training of rescuer firefighters is a cycle of classes aimed at gaining knowledge of resuscitation methods, bleeding stoppage, applying bandages, splints, tourniquets. [2]

To improve the level of students' training, it is necessary to simulate situations close to real life. Training should be carried out on modern phantom modules and means of full-scale modeling and simulation of various emergencies. The students have all the possibilities to brush up and perfect the skills of various techniques as close to a real emergency as possible. Teaching first aid skills is performed by highly qualified personnel, who have phantom-modular complexes at their disposal with an unlimited possibility of full-scale modeling of emergency conditions and states of the victim's body. [3]

Besides, during training lessons it is possible to simulate emergency conditions to enable the mental and cognitive processes of rescuer firefighters in order to teach them to make quick and the only right decisions, choose behavioral tactics and perform practical algorithms. In case of an emergency situation, the theoretical knowledge and primary skills are not enough, well-trained and tested automatized practical skills are necessary. They are developed in the form of repeated numerous practical actions. In the process of students' training, auxiliary means can be used: simulators, manuals, dummies, photos, videos, improvised materials that greatly help future rescuer firefighters master their skills. Emergencies are diverse and cause various injuries, so the employees of the Ministry of Emergency Services have to solve many problems. The knowledge and practical skills gained through the process of medical training facilitate the emergency service as a whole.

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TEACHING ENGLISH AS AN INTEGRAL PART OF THE COMPLEX APPROACH TO RESCUE FIREFIGHTING TRAINING

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Abstract. Ensuring a high quality of education is a priority of the educational policy of the Republic of Belarus. In the modern social and economic conditions, high requirements are imposed on future modern specialists: fundamentality of professional training, high qualification under conditions of continuously changing legislation and economic situation, professional mobility, skills of active creative activity. There is a growing need for professionally competent, educated specialists with a sufficient level of theoretical and practical training, who are creative and in demand on the labour market. The task of our citizens is to intensively develop their own creative potential, which is the basis of our country's economic well-being.

Keywords: world educational space, integrated approach, comprehensive training, rescue firefighter, foreign language communication.

The rapidly changing modern world and the processes taking place in it: globalization, population migration, climate change on the planet, which causes constant large-scale natural disasters, – all these require a certain improvement in the quality of education and training of rescuers. The use of an integrated approach in training firefighters, rescuers and other categories of employees of the Ministry of Emergency Situations is quite evident. The difficulty in training future firefighters and rescuers arises mainly due to the large differentiation of the functional responsibilities of these specialists. This important problem can be solved only by approaching the training of future professionals for the Ministry of Emergency Situations in a comprehensive manner, i.e. developing both professional qualities, forming professional competencies, and also molding psychological preparedness and the necessary corresponding physical qualities in the course of the implementation and assimilation of the State educational standard. [1, p.215]

A modern firefighter is under considerable strain, both physically and psychologically, and when faced with an emergency, he must act quickly, according to the prevailing situation. He must make decisions independently and be responsible for his actions, actions on which his own life and the lives of citizens in the epicentre of events will depend. His activities must be in full and absolute accordance with the current situation. Moreover, in case the firefighter is involved in an international event, providing humanitarian aid, his skills in foreign language communication are no less important than the high professional level.

A comprehensive approach to the training of rescuers is necessary to develop cadets' psychological stability, emotional-volitional adaptation to risk and danger, as well as self-control, determination, courage, endurance and other qualities necessary for rescuer firefighters [2, p.96]. Once in a foreign language environment, a rescuer who possesses the skills of a foreign language communication will not be confused or discouraged. He will not have to solve the problem of the language barrier and will focus on carrying out his professional duties.

One of the most pressing problems of modern higher education is the need to form professional competencies of future specialists, i.e. the formation of a complex of abilities to apply knowledge and certain personal qualities in a real life situation, i.e. in professional activities. In the system of training firefighter rescuers, the disciplines «Foreign languages» and «The Practice of Foreign Language Communication» (which are taught at the University of Civil Protection) become a tool for enhancing the personal potential of future specialists, increasing their professional competence. Integration of the Republic of Belarus into the world educational and socio-economic space requires improving the quality of the foreign language communicative competence of the Ministry of Emergency Situations specialists.

The educational establishments of our country that train firefighters and other specialists for the Ministry of Emergency Situations often face the challenge of developing and introducing into pedagogical practice the main components of the process of forming the foreign language communicative competence on the basis of a social and cultural approach. At the same time, it is of vital importance not to exclude from the training system professionally oriented foreign language communication. Only such an integrated approach will ensure the successful training of fire and rescue specialists for intercultural communication in the field of professional activity.

Many researchers emphasize that among the requirements that are set before for modern specialists, one of the main ones is the possibility of personal self-realization. This is achieved primarily due to the ability of a specialist's social adaptation of in the process of professional activity. In the course of professional development, it is not only the system of professional knowledge, skills and abilities that is important, but also certain qualities of a specialist's personality. M.A. Ivanova reveals the concept of professional competence as a characteristic of a specialist's behavior who «owns his specialty, skills and abilities that allow him to effectively perform his duties» [3, p. 6]. Therefore, we observe the combination of the traditional and sociocultural models of a specialist's professional training in their interaction. In the context of a new social demand, a specialist must be capable not only of performing professional tasks, but also of social, economic, and of intercultural forms of activity.

The need and validity of learning English by practicing present-day and future rescue specialists is justified by the progressive development of intercultural ties and cooperation of rescue services at the interstate level. Due to the obvious need to provide all possible assistance and mutual assistance in cases of emergencies and disasters, when human lives and health, environmental safety and nature conservation are at stake. [4, p.297]

It is impossible to overestimate the importance of improving the professional training of rescue services personnel in the form of teaching intercultural communication. In this regard, the lexical aspect is an integral component, requiring further development of methods and techniques that ensure the study of a foreign language (English) as a means of communication and intercultural professional communication of emergency service employees in different states. [5, p.57]

The training should focus on practical activities by conducting the training process in conditions close to the future work activity (smoke, high temperature, lack of oxygen, low light, limited space, physical fatigue, etc.). To practice a training skill, it is necessary to create a different tactical environment conditioned by the aims and objectives of the training session. A tactical situation is simulated in an environment necessary for mastering the sequence of techniques and actions. This also applies to foreign language training.

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Section 3

INNOVATION, RESEARCH AND DEVELOPMENT IN FIRE PREVENTION AND FIREFIGHTER TRAINING

A NEW TECHNOLOGY OF EPOXY RESIN MODIFICATION. NEW POLYMER FIRE-RETARDANTS

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Abstract. The article shows the possibilities of modifying the ED-20 epoxy resin with new phosphorus-containing polymers based on the waste of JSC «Maxam-Ammophos» with epichlorohydrin (ECG). It was found that with the introduction of a small amount of polymer modifiers containing phosphorus-halogen in its composition into the epoxy composition with a one-time decrease for hardener, the curing rate of the composition increases and the anticorrosive properties are improved. The main regularities of the modification process are revealed.

Keywords: polymer, hardener, flammability, strength, durability, epoxy resin, modification, composition, strength, adhesion, corrosion.

To obtain polymeric materials with improved properties, modification of large-capacity industrial polymers with small additions of other polymers or oligomers is widely used [1-2]. The introduction of small amounts of fine crystallization nuclei, thermoplastic elastomers, oligomeric and polymeric additives. The basis of the modification of polymers or oligomers by small additives laid down ideas about the significant influence of the supramolecular structure, as well as the conditions of the relaxation processes on the properties of polymers. In this case, there is a complex effect of additives on the structure and properties of polymers.

The use of polymer modifiers is promising from the point of view of preventing some undesirable processes characteristic of low molecular weight modifiers, as well as using them in small quantities. The compositions cured at room temperature. The samples of epoxy compositions prepared in this way were subjected to physic mechanical and chemical tests according to State Standards. The experiments used modern physicochemical research methods, such as IR, -MPR-, EPR-spectroscopy, elemental analysis. Thermogravimetry and DTA analysis, pycnometry to determine the density, etc. were used to determine the heat resistance of the samples.

In this aspect, it is of interest to develop a technology for modifying an epoxy resin synthesized by a phosphorus-containing polymer based on the interaction of phosphorous acid synthesized on the basis of the waste of JSC «Maxam-Ammophos» with epichlorohydrin (ECG), because due to its close chemical nature, as well as the thermodynamic and kinetic compatibility of components, leading to good mixing, it is possible to obtain epoxy compositions with improved physicommechanical properties.

As can be seen from the results with the introduction of an insignificant amount of a polymer modifier containing phosphorus and halogen in its composition into the epoxy composition while simultaneously reducing the amount of hardener introduced, the curing rate of the composition increases, and the physic mechanical properties are improved. High physic mechanical indicators obtained in laboratory studies in the modification of epoxy resin, confirmed by industrial tests, which were conducted at the Tashkent Production Association «Tashkentmramor», where epoxy resin of the brand ED-20 was used according to the technological regulations and TU-06-05-1082.

One of the effective methods of corrosion protection of process equipment and structures is the development and use of composite polymer coatings. In this regard, the role of quality control and prediction of the long-term strength of such coatings is increasing. Increasing the service life of coatings can significantly reduce the consumption of scarce and expensive polymers, more efficiently use production facilities, as well as improve the environmental situation in enterprises using aggressive media in their units. In this regard, the use of epoxy film-forming with active plasticizers modifiers as well as fillers containing metal oxides. Their use allows to increase the operational and deformation, strength characteristics, to reduce the diffusion permeability of metal-polymer structures. Thus, it was of interest to study the effect of synthesized polymers based on the interaction of phosphorous acid with ECG as fire-retardants on the physic mechanical and anticorrosive properties of polymer composite coatings.

Molecular interaction, according to the adsorption theory of adhesion, is preceded by the formation of contact between the adhesive and substrate molecules. Temperature increase the introduction of the modifier, the pressure increase, the use of solvents – all these factors facilitate the flow of the first stage of the process and contribute to achieving a more complete contact. Wetting and cracking of the adhesive on the substrate surface are accompanied by surface diffusion, migration of adhesive molecules on the surface. It is this circumstance, as well as the flexibility of polymer macromolecules and their ability to make the micro-Brownian motion, were taken into account in the adsorption theory of adhesion. When adhesive failure does not always require the breaking of chemical bonds, and with cohesive destruction of the network adhesive, breaking of chemical bonds is inevitable. When loading the adhesive connection due to the different elastic constants of the adhesive and the substrate, an additional stress concentration occurs. Under these conditions, a gap along the interfacial surface is more likely than in the array of adhesive and substrate, even if the bonds are equally strong, since the durability of the adhesive bonds decreases with increasing voltage. Finally, in many cases, the adhesive compound is affected not only by mechanical loads, but also by moisture, various chemical agents, and an elevated temperature. It is the phase boundary that is most affected by these factors. One of the ways to increase the durability of a composite material and adhesive compounds is to facilitate relaxation processes in the zone of contact of the polymer with the substrate, with a dispersed or fiber-like filler. These processes can be changed by regulating the intensity of the interfacial interaction, as well as by applying elastic layers. Adhesive compounds possess optimal properties, along with strong chemical bonds, in the contact zone, less durable, but easily recoverable, labile polar bonds occur, characterized by a low value of activation energies. Such bonds are characteristic of groups containing a mobile hydrogen atom, as well as heteroatoms with non-generalized electrons. A rare mesh of strong chemical bonds in combination with a sufficiently large number of easily regenerated less strong bonds creates favorable conditions for relaxation of overvoltages and sticking of defects. The role of hinged groups with low potential for rotation is also very important. It is shown that in systems containing not only strong interfacial covalent bonds, but also hydrogen bonds characterized by low recombination energy, more favorable conditions arise for the redistribution and variation of the voltages of stabilizing defects. Apparently, the chemical nature of the polymer modifiers introduced has a significant effect on the structure and properties of the cured epoxy composition. In addition, the anticorrosive properties of modified composite coatings are also affected by the factor of chemical compatibility of high molecular weight modifiers and polymer, leading to the formation of a homophasic system. In addition, in all likelihood, the polymer modifiers synthesized by us, in addition to the modifier, also act as a structurant for the polymer matrix, contribute to the ordering of macromolecules near its surface, and this leads to a decrease in the entropy of the system. Synthesized phosphorus-containing polymers based on the interaction of phosphorous acid with ECG can be used as an effective modifier and accelerator for curing epoxy composite coatings.

The factor of chemical compatibility of high-molecular modifiers and a polymer, leading to the formation of a homophasic system, also influences. In addition, in all likelihood, the polymer modifiers synthesized by us, in addition to the modifier, also act as a structurant for the polymer matrix, contribute to the ordering of macromolecules near its surface, and this leads to a decrease in

the entropy of the system. Synthesized phosphorus-containing polymers based on the interaction of phosphorous acid with ECG can be used as an effective modifier and accelerator for curing epoxy composite coatings. Such modifiers are non-volatile, non-toxic, easily combined with epoxy resin; the technology for their preparation is simple, which makes it possible to use them widely.

The laboratory and industrial tests of the polymer obtained from the interaction of phosphorous acid based on the technogen waste with ECG and MAC as a flame retardant modifier for epoxy compositions indicate the promise of the phosphorus-containing polymers synthesized by their possible industrial realization and us.

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FIRE AND ECOPROTECTION OIL AND GAS BRANCH IS THE REQUIREMENT OF TIME

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Abstract: The purpose of this report is to provide the public and decision-makers with understandable, up-to-date and reliable environmental information.

Keywords: ecology, environmental protection, pollution, ecosystem, oil-and-gas branch.

Well-known, those questions of ecology and preservation of the environment for oil-and-gas branch are actual. Today there is no sharp necessity to prove, that a principle to use, more precisely, conditions of a natural-material life the societies formed its basis, are in essence already settled. Changes in the biosphere, growing out the vigorous activity of oil-and-gas branch in present century (rise in temperature of a surface of the Earth, global pollution of water, air and ground, desertification of a planet, pollution of the World Ocean, destruction ozone a layer), are known now to each person. Therefore, modern concepts of wildlife management should be based on principles harmonious optimization conditions of interaction of this branch with the nature.

Quality of an environment and the analysis of potential opportunities of its basic ecological components offer the precise organization of monitoring of system of supervision and the control over its condition. Thus, toxicological aspects of the all-round analysis of an environment in conditions of modern ecological crisis get the special importance.

The all-round analysis of an environment provides an estimation of its ecological condition and influence on it of natural and anthropogenesis influences. Character of these influences is rather specific. A limiting parameter of a level of natural and anthropogenesis influences is the maximum-permissible ecological load which in many countries is established in connection with that normal functioning and stability ecosystems and biospheres are possible at no more the certain maximum loads on them. Change of a condition of biosphere under influence of production factors of oil-and-gas branch occurs in shorter time terms. Therefore, with the purpose of measurement, estimation and the forecast of anthropogenesis changes abiotic making biosphere and response biots on these changes, and also the subsequent changes in ecosystems as a result of influences of oil-and-gas branch the information system of ecological monitoring is created.

The state ecological examination represents system of the state nature protection actions directed on check of conformity of projects, plans and actions in the field of a national economy and natural resources to requirements of protection of an environment from harmful influences.

The toxicological characteristic of technological processes of oil-and-gas branch demands a substantiation of recommendations on such change of manufacture to reduce quantity harmful half production or collateral connections or to exclude them, and medico-technical requirements to planning industrial premises, the equipment, the sanitary-engineering equipment, including clearing or disseminating, and - in case of need - to individual means of protection. Activization of industrial activity of oil-and-gas branch in modern conditions of wildlife management and global scales of its negative influence on the main making biospheres create the situation of sharp ecological crisis caused by degradation of objects of an environment. In this connection for optimization of conditions of interaction of oil-and-gas branch with the nature important the role of the all-round analysis of a surrounding environment which main tasks is the complex estimation of an ecological reserve of biosphere and its potential opportunities to self-restoration and auto purification, the analysis of a wide spectrum of various types of influences on natural ecosystems and studying of specific features of these influences is represented. Last years the special importance and a urgency is got with toxicological aspects of the all-round analysis of an environment. A serious problem is the establishment threshold effect of toxicological influence in systems «toxicant – an environment» and «toxicant – an alive organism» and definition of dependence «a doze – response» which has served as an active impulse for development of a new direction in the ecology, based on fundamental bases toxicological, microbiology and the ecological chemistry, named ecotoxicological. The scientific importance ecotoxicological consists in studying modern representations of toxicity and carcinogenicity of elements and their connections, research of specific biogeochemical features of behavior toxicants an environment, the mechanism of their distribution and a metabolism; an establishment of interrelation between necessity and toxicity of elements; definition of localization of cancerogenic ions; To estimation of threshold effect of toxicological influence.

The concept threshold assumes high quality of environment and full safety for the person and any populations under condition of pollution of this environment below the certain level, which influence on any organisms less than some threshold value.

Parameters of negative influence of emissions of oil-and-gas branch on alive organisms are their toxicity and carcinogenicity. The quantity, at which chemical components become really dangerous to an environment, depends not only on a degree of pollution by them of hydrosphere or atmospheres, but also from chemical features of these emissions and from details of their biochemical cycle. Global carry toxicants occur through an atmosphere and the greater rivers bearing waters in oceans. The Earth, a box of the rivers, oceans serves as though as the tank for congestion toxicants. This or that limit up to which the atmosphere introduces toxicant either in the ground, or on a surface of ocean over a natural cyclic level, can be expressed by means of the factor of enrichment.

In order to prevent unnecessary, and at times and irreparable damage, to put to an environment, such influence on Wednesday should be planned carefully. Thus, it is necessary to combine satisfaction of needs of the person due to the nature with active protection of an environment against consequences of human activity. As a rule, these purposes do not exclude each other though in some cases it is necessary to accept conciliatory proposals.

It would seem, today to all it is clear, that time of «conquest of the nature» has irrevocably passed, and the period of the deep, interested knowledge of its laws has begun. However, in practice volumes of waste in republic grow in two-rub times more quickly, than volumes of manufacture and a population. The avalanche of waste pollutes the nature; their harmful toxic components litter the ground, air, the rivers, the seas and lakes. The reason is covered in momentary benefit for manufacture. But the reasonable person should not consider as benefit destruction of all alive, «mad fire» resources, not only the, but also belonging the future generations. Hence, has come to change radically time the approach to concept of advantage when it is a question of wildlife management.

Position becomes complicated that sphere of consumption in much smaller degree, than the sphere of manufacture, gives in to economic regulation. The sphere of consumption is always focused on the concrete people living according to numerous national traditions, features of regions, a level of culture, etc.

Thus, achievement of rational use of resources in sphere of consumption is a challenge and its decision can be reached by means of the measures conditionally divided into two basic groups. The first unites the measures undertaken in branches of public service (economic regulation), the second – the measures of educational character directed on development at each citizen of the conscious attitude to consumed resources (regulation by education). In practice, these measures have complex character, mutually supplementing each other. Introduction of new technical decisions by means of which the economy of resources is reached, should be accompanied by their propagation and creation of conditions for wide use.

For the decision of a question of rational wildlife management, it is necessary to adjust the careful account of all spent water and operatively to eliminate technical malfunctions in systems of maintenance of the energy carrier (gas, gasoline). That opportunities for this purpose are, significant distinctions in a consumption level of energy between various cities and regions of republic, and also the reached consumption level of energy in a number of the developed states testify.

For the decision of the set forth above problems of economy of our republic on department «Building materials and chemistry» of Tashkent institute of architecture and civil engineering, the centre of science on maintenance of ecological and industrial safety of the industrial enterprises of all branches of our republic is created. The center of science renders the necessary competent and practical help at the decision of various problems both natural, and ethnogeny character, and develops necessary recommendations under their decision.

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STUDY OF TOXICITY AND SMOKE-FORMING PRODUCTS OF POLYMER AND WOOD COMBUSTION

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Abstract. In this article researches some questions of a obtain to smoke and toxics compounds mixing waste gaz. Work out some recommendations by to selecting type wood in production building constructions. The shrouded what concentration of a smoke depends from structuring peculiarities and chemical containing wood materials. In smoke gazes, obtainium in firing wood materials to expose more 100 compounds – products incomplete fire wood materials, majority from which concerogens compounds.

The shrouded also what compounds, which to share out from components wood after evaporation and following condensation at particle cinders or variation as soon as partial in motion temperatures.

Keywords: toxically, smoke obtained, fire, bioindication, bouldering, wood, building constructions, flammability.

The release of smoke and toxic gases is a great fire hazard. The hazard arises from the toxic and irritating effects of combustion products and from reduced visibility in a smoky environment. Reduced visibility makes it difficult to evacuate people from the danger zone, which increases the risk of poisoning by combustion products. The situation in the event of a fire is further complicated by the fact that flue gases quickly spread in space and penetrate into rooms far from the fire source [1-2].

We have found that the concentration of emitted smoke and its nature depend on the structural features and chemical composition of the combustible material.

More than 100 compounds – products of incomplete combustion, most of which are carcinogenic substances – have been found in the flue gases formed during the combustion of wood. Compounds were identified that are released from wood components without changing them due to

evaporation and subsequent condensation on soot particles or only partially changed during an increase in temperature. Some wood combustion products are used as markers to determine, by smoke, the belonging of the original burning plant biomass to a particular species and species. In particular, some components of substances extracted from wood, decomposition products of lignins and lignans serve as such markers.

Analysis of flue gases in the atmosphere, on the one hand, confirms the concept that extractives from different types and species of wood differ in their chemical composition and the content of individual components, on the other hand, it shows their different contribution to the combustion process of wood.

We have carried out a study of the smoke-generating ability of 8 species of coniferous and deciduous wood species in the most dangerous, in terms of smoke formation, smoldering combustion mode [3].

The tests were carried out according to the standard method at the density of the external radiation heat flux from 10 to 35 kW / m². Wood samples of the stems of Guza-Pai, Asiatic poplar (terak) and saxaul were taken from the southern regions of Uzbekistan. For comparison with southern wood species, a sample of Russian pine was taken. The moisture content of the samples ranged from 4-9%.

The maximum value of the optical density of smoke during combustion of each of the types of wood depends in a complex way on the density of the external heat flux.

The D_{max} index first increases with an increase in the heat flux intensity to q_e = 20-25 kW / m², and then decreases. The extremum in the D_{max} = f (q_e) dependence curves is due to spontaneous ignition of the samples. During the transition from the regime of thermal decomposition and decay to fiery combustion of wood, the nature of the smoke changes. Carbon black becomes the main component of the condensed smoke phase. The position of the extremum corresponds to the value of the critical heat flux density, below which the flame combustion process of wood without an initiating local ignition source is not realized.

It follows from the results obtained that deciduous wood species exhibit lower values of the critical density of self-ignition (q_{cr.sw} = 20-22 kW / m²) than its coniferous varieties (~ 25 kW / m²). The exception is the samples of elm and poplar wood, which are close to conifers in this indicator, probably due to the high content of extractable substances. Samples of guza-pai stems have the highest smoke-generating capacity at the smoldering combustion limit (from 853 to 1066 m² / kg). After self-ignition of wood materials, a rather sharp decrease in the smoke production coefficient occurs with an increase in the heat flux density.

At q_e = 35 kW / m², it decreases several times. However, the obtained values of D_{max} (163-570 m² / kg) remain higher than those recorded in the flame regime with a local initiating ignition source. Apparently, this fact is associated with the difference in the conditions of accumulation in the pre-flame zone of combustible decomposition products of wood to their lower concentration limit and heating the gas phase to the appropriate temperature.

This assumption is supported by a comparison of the time of self-ignition and ignition (in the presence of a dense flame as an ignition source) of pine samples with a heat flux of the same density equal to 30 kW/m²:

$$\tau_{CB} = 70 \text{ c} > \tau_B = 23 \text{ c}.$$

With an increase in the heat flux density up to 35 kW / m², the difference in the smoke-forming ability of the studied types of wood is smoothed out. However, the general trend noted above for the q_{cr.sw} parameter is still preserved: coniferous wood, guza-pai, elm and pines have higher D_{max} values than deciduous wood.

From this it follows that it is not the type of wood (soft or hard) that is the decisive factor in the formation of smoke during combustion, but rather the relative content of the main components in its composition. High indicators of the formation of toxic substances in the gaseous emissions of combustion of the stalks of guza-pai, due to the fact that in cotton fields

a huge amount of various pesticides, herbicides and pesticides are introduced, which accumulate in cotton stalks.

Thermal decomposition of materials is a decisive stage in the process of their combustion. As it was established in [3], parameters such as the decomposition temperature of wood, the average rate of formation of volatile products, the yield of coke residue, liquid and gas fractions depend on the ratio of wood components.

For example, the temperature of the onset of decomposition decreases when the total content of hemicellulose and extractable increases in relation to the content of cellulose. The yield of the carbonized residue increases with an increase in the lignin content. The yield of a liquid, resinous fraction (tar) depends on the participation of holocellulose in pyrolysis. Apparently, it is it that significantly affects the formation of smoke due to the relatively high content of different types of wood in the wood. The flue gases generated during the combustion of wood, in addition to soot, contain a large amount of various toxic substances.

The combination of strong smoke and toxicity of combustion products in the event of a fire creates not only a great threat to people in buildings, but also makes it difficult to carry out work to save people and extinguish the fire. It is still very difficult to predict what types and amounts of toxic products will be released when burning wood, except for cotton stalks. Therefore, the toxicity of flue gases was determined empirically.

There are two approaches to assessing the toxicity of flue gases: an analytical chemical method and a biological method for assessing the lethality of animals in 30 minutes.

The period of their stay in the smoke-gas atmosphere of the test chamber and the next 14 days of the post-effect [4]. Although a large number of compounds are found in flue gases from wood combustion, methods for assessing fire hazard by toxicity of products based on an analytical approach focused mainly on the presence of CO, CO₂ and the decrease in oxygen concentration.

It was revealed that carbon monoxide makes the greatest contribution to the toxicity of wood combustion products. In the mode of smoldering combustion of poplar wood, the CO yield was 70-240 times higher than the CO yield during flaming combustion.

We have studied the effect of the type and type of wood on the toxicity of combustion products under the action of an external radiation heat flux with a density of 10-65 kW/m², we have estimated the yield of carbon monoxide and carbon dioxide in the mode of flame and smoldering combustion of wood. Samples of stalks of cotton, pine and poplar were used as objects. Samples of elm, oak and saxaul timber were taken from the southern regions of Uzbekistan.

The determination of the toxicity index was carried out by gas chromatographic and analytical methods according to SHNK 2.01.02-04. The local ignition source was not used during the test.

The observed extreme dependence of the HCL50 index is due to the fact that self-ignition occurs at a certain temperature.

In case of fiery combustion, the toxicity of wood combustion products decreases. In the smoldering mode in the temperature range of 450-550°C, the toxicity of combustion products of wood samples is the highest (HCL50 is in the range of 20-33 g/m³). All types of wood in these conditions manifest themselves as highly hazardous in terms of toxicity combustion products, which, according to the ShNK 2.01.02-04 standard, belong to the T₃ group.

With an increase in the intensity of the thermal effect to 60-65 kW/m² (corresponding to a temperature of 700-750°C), according to the toxicity of combustion products, wood of different types passes into the group of moderately hazardous materials T₂. Compared to deciduous species, regardless of their place of growth, the stems of guza-pai and pine wood form combustion products with a higher toxicity. Noteworthy is the noticeable difference in HCL50 values for saxaul and poplar wood samples, despite the relatively close values of their density (490 and 430 kg/m³).

At the same time, according to this indicator, the elm sample ($\rho = 400 \text{ kg/m}^3$) is closer in behavior to pine wood ($\rho = 450 \text{ kg/m}^3$). The conclusion suggests itself that not only the structural differences of different types of wood, their density, but mainly the chemical composition of wood affects the processes associated with the development of combustion of this material.

Summarizing the above, we can make the following conclusion that when choosing wood for the production of building structures, it is necessary to take into account the toxicity and smoke-generating capacity of the tree.

With the right choice, many undesirable and negative consequences of fires can be excluded.

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OBTAINING HIGH PERFORMANCE CONCRETE IN THE CONDITIONS OF THE REPUBLIC OF UZBEKISTAN TO INCREASE THE SEISMIC RESISTANCE OF BUILDINGS AND STRUCTURES.

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Abstract. The article discusses some of the issues of concrete production with high performance. It is shown that the use of a new type of concrete makes it possible to make the structure more frost-resistant and waterproof. It is shown that with an increase for additive in the composition of Portland cement, the structure of the cement stone becomes denser due to micro silica particles, which serve as crystallization centers of calcium hydro silicates and affect the acceleration of strength. Increment of developed concrete.

Keywords: cement, concrete, additive, microsilica, strength, frost resistance, heat resistance.

High Performance Concrete has truly unique and beneficial properties. The use of this particular type of concrete makes it possible to make the structure more frost-resistant and waterproof. The property of the new concrete is of excellent deformation control properties. This quality of concrete made it possible to bring to life the most daring projects that humanity could not even dream of before.

Some of the most common construction masterpieces with new concrete are:

1. The bridge, which was built across the Akashi Strait, which is located in Japan, with a span of almost 2000 m;
2. The well-known tunnel that runs under the English Channel is also built with this concrete;
3. Indescribably high and beautiful skyscraper, the height of which is 610 m, and there are 125 floors.

The use of a new generation of concrete in construction provides a guaranteed reliable and safe building and structure. This concrete will perfectly withstand all any harmful effects of the environment, as well as with enviable resistance it will transfer all the loads that may be placed on it.

Concrete with such qualities is now mainly used in the construction of special monolithic structures, as well as in the construction of pavements on runways and airfields. Precisely where qualities such as durability and reliability are of paramount importance.

We have conducted research on the production of high-performance concrete on local raw materials of Uzbekistan.

One of the conditions for obtaining new generation concretes is the use of high-grade cement. We conducted a study on the production of HPC concretes using Portland cement grade 400 and using modified Portland cement grade 600, developed at the Center for Advanced Technologies.

Table 1. Concrete strength indicators at 7 % replacement of a part of cement with microsilicon and superplasticizer

№	Unit of measurement	Crushed stone	Sand	Portland cement 400	Microsilica	Superplasticizer	Water	Compressive strength, MPa		
								7	14	28
1.	Kg/m ³	1085	435	573	-	-	200	22,4	31,8	44,2
2.	Kg/m ³	1085	435	533	40	8,6	169	42,4	56,3	60,8

The design strength of the concrete mixture presented in Table 1 was 80MPa.

The results of testing concrete samples show that the compressive strength increased by 27% compared to the control concrete samples without additives, but by 25% lower compared to the projected strength.

As stated earlier an important condition for the design and production of high-performance concrete is the use of high-activity Portland cement, that is, PC 500-600. Therefore, we conducted studies to increase the activity of Portland cement by its mechanical activation with active mineral and chemical additives. During the mechanochemical activation of a Portland cement clinker with a modifying additive consisting of a mineral and chemical component, a modified Portland cement of increased strength was obtained. The compressive strength of the modified Portland cement increased by 51% compared to the control composition of normal strength Portland cement.

Further, concrete samples were prepared on the basis of cement modified with a complex additive. The test results of concrete samples based on high-activity cement are shown in Table 2.

Table 2. Strength indicators of concrete based on modified cement

№	Unit of measurement	Crushed stone	Sand	Portland cement 400	Microsilica	Superplasticizer	Water	Compressive strength, MPa		
								7	14	28
1.	Kg/m ³	1085	435	573	-	-	200	22,4	31,8	44,2
2.	Kg/m ³	1085	435	533	in the composition of cement	in the composition of cement	133,2	71,0	80,1	85,2

As can be seen from the results of the experiment, when using modified high-strength cement, the compressive strength of 7-day concrete cube samples increased by 68.2%, and the compressive strength of 28-day concrete samples increased by 48.1% compared to control samples.

The water demand of the concrete mix decreased from 0.35 to 0.25, that is, by 28.6%. It should be noted that a complex additive in the composition of cement affects the water demand of the cement system. Microsilica, which is part of the complex additive, thickens the structure of the contact zone due to the reaction with Ca (OH) 2. As a result, the porosity decreases, the strength of the adhesion of the cement stone to the aggregate increases. Pozzolanic reactions, as a factor of chemical action, cause a further increase in the density and strength of concrete. Also, microsilica particles serve as crystallization centers around which crystalline hydrates are formed - the products of the interaction of cement clinker minerals with water. The smallest particles of microsilica catalyze the formation of a crystalline hydrate structure in the hardening cement stone and affect the rate of strength of concrete.

Nanomodified silica additives effectively fill the space between cement particles, compacting and strengthening the molecular structure of the concrete mixture. This provides a compressive strength that is much higher than the strength characteristics of conventional concretes.

Conclusion

The experimental results confirmed the effectiveness of the developed additive for the hardening of cement systems. The introduction of a complex additive into the composition of the

cement accelerates the hydration process, affects the compaction of the structure of the cement stone and increases the strength, in particular, the 28-day strength of cement with the additive increased by 56.4% compared to the control samples, and the 28-day strength of concrete cubes increased by 44.7%.

It was found that when designing high-performance concrete (HPC), the early strength, in particular 3.7 days of concrete hardening, increased by 40.2%.

It is shown that with an increase in the amount of a complex additive in the composition of Portland cement, the structure of the cement stone is compacted due to microsilica particles, which serve as centers of crystallization of calcium hydrosilicates and affect the acceleration of the strength gain of the developed concrete.

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UDK 371.39

PRACTICAL USE OF TRAINING FACILITIES FOR THE TRAINING OF FIREFIGHTERS AND RESCUERS

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Abstract. The article discusses the features of the use of multifunctional training complexes for the training of firefighters and rescuers of various types. The analysis of their use made it possible to identify the positive aspects of these complexes, as well as the existing shortcomings.

Keywords: training complex, preparation of gas and smoke protectors, fireman, rescuer.

Optimization of methods of training firefighters and rescuers, the introduction of new training complexes, their active use, is one of the important areas of improving the quality of the educational process. The use of new, modern equipment that solves professional tasks contributes to the formation of highly qualified, professional personnel.

Often, the professional activity of firefighters and rescuers is associated with working in conditions that are of an extreme nature.

This is work in:

- personal respiratory protection equipment (masks);
- conditions of high humidity or high temperatures;
- conditions of insufficient (limited) visibility;
- the ability to quickly switch from one type of activity to another.

Such a specific professional activity requires a high level of psychophysical readiness.

One of the main methods of improving the efficiency of the work of the departments of the Federal Fire Service of the State Fire Service (FPS GPS) during emergency rescue operations in emergency zones is the training of gas and smoke protectors. The nature of the activities of firefighters makes it necessary to conduct classes with them in personal respiratory and visual protection equipment (PPE), regardless of work experience.

It is worth noting that, despite all the improving technical equipment of firefighters, the number of deaths among them does not decrease. Obviously, this is due to the fact that at the same time the complexity, transience and unpredictability of fires increases due to changes in the composition of materials used in construction, decoration and furnishing (layout) of premises. The solution of this problem became possible thanks to the use of various polygons (training complexes (UTK)) in the process of preparation.

The use of polygons (UTK) allows firefighters and rescuers to improve their professional competencies, as well as learn how to correctly apply the acquired knowledge in practical conditions. They include elements of danger, anxiety, risk, long-term maximum psychophysical and emotional loads. This allows us to achieve from firefighters-rescuers the full return of strength, mental tension and volitional efforts. Moreover, it is noted that one of the important components of the effectiveness of actions the fire and rescue unit is the effective work of each employee of this unit [5] and it is difficult to agree that the assessment of the effectiveness of the fire and rescue unit directly depends on the effectiveness of the activities of officials, namely the heads of the unit.

The implementation of standards with the use of educational and training modeling complexes may be included in one of the issues of a comprehensive check of the readiness of a fire and rescue unit to conduct actions to extinguish fires and conduct emergency rescue operations works for the purpose of evaluating the performance of officials of fire and rescue units.

To achieve this goal, the following tasks were solved:

- the analysis of the existing training complexes for firefighters and rescuers in the territorial fire and rescue garrisons and educational organizations of additional professional education and higher education of the Ministry of Emergency Situations of Russia was carried out;
- an analysis of shortcomings was carried out and proposals were prepared to improve the use of UTK for specific working conditions of fire and rescue units.

All UTCs are distributed by types: heat and smoke chamber (hereinafter TDK), TDK PTS «Grotto», firing range (hereinafter OP) PTS «Lava», a fire training complex (hereinafter referred to as the OTC) PTS «Ugolek». All the presented complexes can be divided into two groups: stationary and mobile.

The analysis of the presented information allowed us to come to the conclusion that the most common are adapted rooms with an unsuitable zone for breathing (a heat and smoke chamber). These training facilities, as a rule, have a service life of more than 10 years and often do not meet modern requirements for conducting training sessions with gas and smoke protectors, which can significantly affect their professional training.

Of the greatest interest are such complexes as TDK PTS «Grot» and OP PTS «Lava», which are mobile, have small sizes and meet modern requirements for training personnel of fire and rescue units. At the same time, TDK PTS «Grot» and OP PTS «Lava» have a number of disadvantages, the main of which are low throughput, low reliability of equipment, failures of equipment (software), difficulty of use in low temperature conditions.

An alternative version of these UTCs can serve as stationary tDCS, which will eliminate the disadvantages presented above and significantly increase the functionality. An example of such a TDK is the «Training and training modeling complex "Fire House"» (Picture).



Picture 1 – Educational and training modeling complex «Fire house».

The purpose of the training and simulation complex is to develop the skills of using new technical means, fire-rescue equipment and fire extinguishing technologies, emergency response, as well as training firefighters and rescuers to work in particularly difficult conditions and in aggressive environments. The equipment of the complex allows you to conduct training in order to form a psychological readiness for action in extreme situations.

The training complex provides:

- modeling of various factors of emergency situations;
- providing full control over the working out of exercises (tasks) by the operator;
- automatic blocking of systems that simulate various emergency situations;
- video recording of the training process, saving it in the database for further analysis and analysis;
- the use of environmentally friendly substances that do not affect the environment;
- multi-stage automatic security system.

The training complex consists of 8 block modules:

The block is a control module. The equipment of the control panel is designed to constantly monitor the progress of the training using video surveillance, maintain two-way voice communication, as well as manage the operation of all systems and equipment of the complex.

The block module of technical systems consists of a compartment for heating and water supply systems, a compartment for storing fuel. The heating system is mounted on the basis of the Galan «Geyser» electrode boiler 9" with a capacity of 9 kW. The heating system provides a temperature regime in the block modules in the range from + 14 to + 24°C. The water supply consists of a block, which includes a 1 m³ flow tank and two water pumps. In the storage compartment of the combustible substance there are gas cylinders with propane and gas equipment for the distribution and accounting of the combustible substance.

The orientation block module is used to train the moral and volitional qualities of firefighters in conditions of limited space, smoke, and difficult-to-pass obstacles. The block module is equipped with: a narrow manhole simulator with a steep descent; an obstacle simulator with impassable areas, with falling structures, with a wobbly floor; a flooded territory simulator and a drencher curtain simulator. In addition, the system sound and light effects, smoke-complicate the passage of simulators.

The fire unit module is designed for practical training of firefighters to work in an environment unsuitable for breathing under fire influences, high temperature with the use of various types of personal protective equipment and practicing tactical techniques for extinguishing fires. The fire module contains: a fire module-a simulator of a burning electric motor; a fire module-a simulator of burning cylinders; a fire module-a simulator of a burning pipeline; a fire module - a simulator of volumetric ignition; a fire module-a simulator of a burning cable tray; a fire module-a simulator of a burning door.

The block module for the elimination of an accident with chlorine is a chlorine storage room, the equipment of which allows you to simulate several typical accidents with chlorine.

The block module for the elimination of an accident at a refrigeration unit is a model of a production room, the equipment of which allows you to simulate several typical accidents with gas and liquid leaks of refrigerant.

The block module for the transportation of chemically hazardous substances consists of a container filled with standard cubic containers and 200l barrels and it is intended for the elimination of accidents during the transportation of chemically dangerous substances.

The block module for the elimination of accidents in transport is designed for the practical training of firefighters to work on the elimination of accidents in transport and consists of two simulators: a simulator of a railway tank and a simulator of a car tank. The simulators are equipped with liquid and gas duct systems and three firing modules. The two simulators are connected to each other in a single structure.

The main practical exercises conducted in the training modeling complex «Fire house»:

Exercise № 1. Conducting reconnaissance in the orientation module with the search for the «victim» and taking him out into the fresh air. Sequence of execution: gas and smoke protectors as part of the link GDZS, having turned on the breathing apparatus, move around the premises of the block-module, find the «victim» and take him out into the fresh air.

Exercise № 2. Conducting reconnaissance in the «fire» block module in order to detect the «fire source» and eliminate «gorenje» using manual the fire barrel. The sequence of execution: vasodilatating in the wing GDZS, navigate from the AC mains and the working of the line pass block module with the filled bag line, ensure the shut off electrical energy (switching device in position «off»), find «the fire», which can be: the burning door, gas cylinders, motor, cable channel, duct, ceiling the fire, alternately eliminate fire using the manual fire barrel and return to fresh air.

Exercise № 3. Conducting reconnaissance in the block-module «accidents with chlorine» in order to eliminate the depressurization of equipment, as a result of which an emergency release of chlorine occurred. The sequence of execution: gas and smoke protectors as part of the GDZS link pass into the block module, which is a room for storing chlorine, with the help of special equipment located in the block module, eliminates the cause of an emergency release of chlorine.

Exercise № 4. In the block-module for the transportation of chemically hazardous substances, unloading is performed a container filled with standard containers with a volume of 200 liters. The sequence of execution: gas and smoke protectors as part of the GDZS link open a standard railway container filled with containers (barrels), take the containers to a safe distance, eliminate leaks in the containers with the help of emergency rescue equipment. They all work at the same time.

Exercise № 5. Conducting exploration in the block module «liquidation of an accident at a refrigeration unit» in order to eliminate accidental emissions of gases or liquids used as refrigerants. The sequence of execution: gas and smoke protectors as part of the GDZS link pass into the block module, which is a model of a production room, find a pipeline with depressurization, close the necessary valves and return to fresh air.

Exercise № 6. In the block-module, the following is performed work on the elimination of accidents in transport, the elimination of «gorenje» automobile and railway tank cars. The sequence of execution: gas – smoke protectors as part of the GDZS link lay the main and working lines from the AC, pass to the block-module with a sleeve line and with the help of a medium-multiplicity foam generator eliminate the gorenje of a gorenje or automobile tank, after the elimination of burning, gas-smoke protectors eliminate the depressurization of tanks with the help of pneumatic emergency rescue equipment.

When passing each block-module in UTMC works out the psychological stability of personnel in:

- overcoming obstacles in conditions as close as possible to a real fire;
- development of emotional and volitional qualities of the personnel, prevailing fear, indecision, excitement;
- development of strength, courage and dexterity.

Without fail, before performing the exercises, the head of the classes must conduct an instruction, check the equipment and equipment, as well as organize a high-quality warm-up.

The existing training complexes for training firefighters and rescuers in local fire and rescue garrisons and educational organizations of the Ministry of Emergency Situations of Russia are not always multifunctional training complexes of modern designs. The most popular training complexes are heat and smoke chambers, but often technically equipped tDCS are not available in every local fire and rescue garrison and are located at a great distance from some units. In order to reduce the cost of fuel and lubricants and the travel time to the place of training, it is necessary to gradually equip the FPS units with training complexes. A sufficient number of UTCs will allow you to organize regular training in an environment unsuitable for breathing, at normal and high temperatures, which will significantly improve the physical and psychological readiness of gas and smoke protectors, which is an important component of the professional activities of firefighters and rescuers.

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MODERN MEANS OF RESCUING VICTIMS IN EMERGENCY SITUATIONS

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Abstract. the article provides an overview of modern emergency rescue tools designed to improve the safety of rescuers, firefighters and victims, contact with victims in the rubble in foreign languages, and improve the efficiency of analyzing the rubble of destroyed buildings and structures during emergency rescue operations.

Keywords: hydraulic pulse crusher, lifeguard beacon, mobile automated translator, floating, crawler search and rescue transporter, pneumatic ladder.

1. «Lifeguard Beacon» for rescue of firefighters and rescuers.

To survive and save is the main meaning of the profession of rescuers and firefighters who put their lives in danger every day. Every year in Russia there are cases of death and injury of firefighters in fires, rescuers in the conditions of destruction of buildings and structures, therefore, the «Mayak of the Rescuer» was developed and adopted for equipment in the system of the EMERCOM of Russia, designed to improve the safety of rescuers and firefighters.

In the «Lighthouse of the Rescuer», modern technologies of guiding sound are used, with the help of which it became possible to determine the location of the sound source by ear in conditions of limited visibility or complete absence of visibility. The complex «Mayak of the Rescuer» was accepted for supply in the system of the Ministry of Emergency Situations of Russia (Figure 1).



Figure 1 – The «Lifeguard's Lighthouse» complex

With its help, tasks are performed to ensure the safety of rescuers and firefighters: remote monitoring of the rescuer's condition from the security post in real time and in automatic mode; if necessary, the transmission of an alarm signal; centralized notification in case of danger of all rescuers and the transmission of the «All out» command; immediate search for rescuers or firefighters in case of an unforeseen situation with them for further evacuation to a medical institution. In the case of using a two-way radio channel, the control of message delivery is provided.

2. Floating crawler conveyor search and rescue PTS-PS.

PTS-PS is a novelty of Omsk designers. The conveyor is used to rescue the population, their property, domestic and farm animals during floods, as well as to deliver rescuers and emergency rescue equipment and rescue equipment to the flood area (Figure 2).



Figure 2 – Floating crawler conveyor search and rescue PTS-PS

This amphibious vehicle is able to move equally well both on land (at a speed of 55 km/h for a distance of up to 500 km) and on water (at a speed of 10 to 14 km/h for up to 9 hours). It can successfully move at a water flow speed from 1 to 3 m / s and overcome waves up to 3 points (with installed marine equipment). The cabin for the crew is spacious, there is a good view from it. The engine has become more powerful.

PTS-PS can be equipped with various types of work modules: transport unit to transport the personnel of the Ministry of emergency situations and evacuation of the population in areas of natural disasters; health module – to provide emergency medical care to the population; the command post to control the units of the EMERCOM of Russia in the zones of emergency situations; crane module for disassembly of rubble and destruction, repair contractors in zones of emergency situations. The PTS-PS is equipped with an autonomous power unit, heating and air conditioning systems, sleeping places, a sanitary device, a device for cooking, means of communication of the HF and VHF band. The crew is 3 people.

3. Pneumatic ladder.

The pneumatic ladder was developed, tested and created by the Federal State Budgetary Institution VNIPO of the EMERCOM of Russia using the experience of the Savateh company (Slovenia) as part of the ROC on the instructions of the EMERCOM of Russia]. It is designed for emergency descent (rescue) of people in the event of a fire or other emergency situation, when the use of the main escape routes is impossible or difficult (Figure 3).



Figure 3 – Pneumatic ladder

Its estimated capacity is 6 people / min. ; the time of filling the ladder with air with two electric fans is up to 5 minutes; the ladder material is of domestic production, resistant to open flame for more than 5 seconds and retains its strength after contact with a surface heated to 300°C for 2 seconds.

The ladder is used mainly for the rescue of children, the sick and the elderly, whose evacuation is difficult or impossible independently by stairs from a height of up to 15 m (5 floors). Its use is possible in any weather, time of the year and day.

4. Hydraulic pulse crusher «OCTOPUS» (DGIS).

The hydraulic pulse crusher «SPRUT» (DGIS) (Figure 4) is a downhole device for destroying rocks or other monolithic objects (concrete foundations) with a high pulsed liquid pressure.



Figure 4 – Hydraulic pulse crusher «OCTOPUS»

When using DGIS, it is placed in a water-filled hole with a diameter of 45 mm and charged with a charge with a mass of gunpowder of 8-10 g. The object is destroyed by a hydraulic shock initiated by the high pressure of the powder gases. At a high impact energy-30-35 kJ (3000-3500 kGm), the destruction occurs without seismic phenomena, shock waves, gas contamination of the work site and extremely insignificant

the expansion of the destroyed material. The destruction is characterized by several sloping cracks. Therefore, DGIS is especially effective when analyzing the rubble of collapsed structures during emergency rescue operations, destroying old foundations in

existing workshops without stopping production. Equipping the DGIS with an electric drive of the striker allows you to use the tool

outside the line of sight and for group detonation. The durability of the DGIS is at least 1000 shots.

Conclusions:

1. The complex «Mayak of the Rescuer», adopted for supply in the system of the EMERCOM of Russia, ensures the safety of rescuers and firefighters, in particular, monitors their condition, provides centralized notification in case of danger and provides an opportunity for their prompt detection and evacuation to a safe place.

2. The crawler search and rescue PTS-PS designed for rescue and evacuation of the population in flood conditions can be equipped with various types of working modules: transport, medical, command, crane.

3. A pneumatic ladder has been created and tested, designed for emergency descent (rescue) of people, mainly children, the sick and the elderly from a height of up to 15 m (5 floors) in the event of a fire or other emergency situation, when the use of the main escape routes is impossible or difficult.

4. A mobile automated voice electronic translator has been developed that allows rescuers of the EMERCOM of Russia to communicate with victims not only in English, but also in several dozen other foreign languages when conducting emergency rescue operations abroad.

5. The hydraulic pulse crusher «SPRUT» (DGIS) is a downhole device for destroying rocks or other monolithic objects (concrete foundations) with high pulsed liquid pressure. DGIS is especially effective when analyzing the rubble of destroyed buildings and structures during emergency rescue operations.

UDC 674.8; 674.06/07; 67.017; 504.75; 614.841.42

ENSURING FIRE SAFETY OF FORESTS BY PROCESSING SUBSTANDARD WOOD AND WOODWORKING WASTE INTO USEFUL PRODUCTS

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Abstract. In the present work there are new comprehensive and progressive proposals for the problems solution facing the EMERCOM of Russia, the Ministry of Nature Protection, the Forest Service and other agencies responsible for the fire safety, forests rehabilitation and ensure their environmental safety. Progressive and environmentally friendly processing technology and use of all of the above substandard species of woody materials proposed by the authors will contribute to the ecological situation improvement in the forests, providing them with fire safety and increasing production volumes of useful wood products through high-quality composite wood-strand materials and products from them.

Keywords: rehabilitation of forests, fire safety, environmentally friendly domestic technology, waste cuttings and plants, waste-free processing of all types of wood, high-quality composite materials.

New integrated approaches to solving the tasks facing the EMERCOM of Russia and other departments (including the international ones) responsible for fire safety, forest sanitation and ensuring their environmental safety are proposed. These tasks are solved in combination with ensuring economic benefits through the introduction of fundamentally new technological approaches into woodworking industries that ensure the almost waste-free use of all types of wood materials, including dry, rotten, pre-rotten and trees affected by various types of pests, as well as all types of waste from wood, wood-chip production and waste remaining after felling. The proposed environmentally friendly technology for processing substandard types of wood materials contributes to improving the situation in forests, ensuring their fire safety, as well as increasing the production of useful woodworking products.

An important economic aspect of the proposed technological approach is the possibility of converting non-branded wood and woodworking waste into a new wood material with a high environmental status and the same indicators of marketable quality. As a technological basis, it is proposed to compact wood and chipboard compositions by hot pressing using techniques to increase the ability of wood to plastic deformation. This choice is due to the fact that the existing methods of recycling do not provide high physical qualities of the resulting product and require the use of environmentally harmful synthetic binders. The advantages of the proposed production technology are as follows: absolute environmental friendliness both in terms of the technological process and the quality of the final product (synthetic resins-binders are completely excluded); the time of technological suitability of the initial chip and sawdust material is practically unlimited, since the resinous substances of wood fibers (binder) they are «preserved» inside the cell

membranes; the technology of implementing the proposed method is carried out in a short time in a single-stage process mode; the strength, water resistance and fire safety of the chipboard composite materials obtained by the proposed method exceed these parameters of traditional chipboard by orders of magnitude, since the natural binder fills the intracellular and intercellular pores of the wood-fiber filler and gives solidity to the final product; environmentally friendly disposal of spent products.

The proposed technology has significant economic advantages, since it also allows the use of rotten or pre-rotten wood in the manufacture of high — quality chipboard, which opens up broad prospects for improving and rehabilitating forests by including huge masses of rotting forest windbreaks and trees located in swamps-sources of bio-epidemics and forest fires in industrial processing. The proposed technology of thermo-mechanical action also allows you to modify cheap varieties of wood, giving them the qualities of noble, expensive breeds in environmentally friendly industries.

UDC 622.817; 622.812.2; 544.47; 544.478.1

A NEW APPROACH TO THE PROBLEM OF REDUCING THE RISK OF FIRES AND METHANE EXPLOSIONS IN COAL MINES BASED ON THEIR SUPPRESSIONS BY CATALYTIC CURTAINS

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Abstract. Sorbents with increased adsorption capacity on the basis of silica fiberglass woven structures have been developed. The obtained sorbents have significant advantages in a number of important parameters over the known analogues – granulated and powder silica gels and alumogels. The proposed micro - and nanoporous sorbents can be used, for example, in connection with the development of new approaches to the prevention and reduction of the consequences of methane explosions in coal mines through the use of solid catalytic active surfaces in mine spaces, which complicate the implementation of explosive processes in order to facilitate the activities of emergency rescue units of EMERCOM.

Keywords: micro- and nanoporous sorbents, control of porosity, methods of manufacturing and chemical processing, methods of use, catalytically active surfaces, mining spaces.

A new approach is proposed to prevent and reduce the consequences of methane explosions in coal mines by using solid catalytically active surfaces in mine spaces that complicate the implementation of explosive processes, in order to simplify the activities of emergency rescue units, paramilitary mining and rescue units of the EMERCOM of Russia, as well as other structures responsible for the safety of mine and mining workings.

In view of the increased frequency of methane explosions in mine workings, it became necessary to revise the existing methods of monitoring and preventing such explosions in favor of alternative ways to reduce their probability and reduce the consequences in the event of explosive situations.

The ideology of such an alternative approach is based on the concept of the influence of solid surfaces that are catalytically active with respect to free radical recombination reactions on the critical conditions for the development of a free explosion in gaseous media. It is known that the introduction of such solid surfaces into a gas explosive environment narrows the ignition peninsula and complicates the implementation of the fire and explosive process. Previously, attempts were

made to control explosive processes (when modeling them) by programmatically introducing a platinum rod into the gas medium by analogy with the schemes used to control chain nuclear reactions using graphite neutron trap rods.

In preliminary experiments on the study of the reactions of catalytic combustion of ammonia and hydrocarbons, results were obtained that allow us to assert that the presence of a catalytic element in the gas environment significantly hinders the development of a homogeneous explosion and significantly increases the critical concentration of the combustible component.

The preliminary results obtained allow us to conclude that the use of a catalytic factor in mine workings is the tool that will reduce the risk of explosive situations during multiple methane emissions during coal mining. Traditional catalytic materials cannot solve this problem due to their granular design. Specially designed for such purposes, fiberglass catalysts allow you to organize «catalytic curtains» in the form of cartridges in the drifts and can form the basis for creating protective anti-explosion screens.

Certain difficulties may arise when implementing the described approach due to the presence of smoke and dust in the mine gas media. However, despite this, the implementation of the «catalytic» method of combating methane explosions in coal mines seems appropriate to the author.

USING PROJECTS METHOD DURING TEACHING DISCIPLINES OF PROFESSIONAL DIRECTION

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Abstract. We consider the educational process as a way to socialization in future activities. This result will be achieved if the bachelor will have an interconnected competency system. It is shown that the current training program is not always forming these relationships. This disadvantage can eliminate the projects method. In its implementation, there is a comprehensive application of knowledge and skills, but this learning can mention software topics earlier than their profound study has been taken. It is concluded that the method of projects is better to use during the teaching. By the type of project, it will be appropriate to form a basic mono-project of creative orientation.

Keywords: educational process, socialization, competency, training program, projects method.

The ability of the rescuer to successful professional activity is determined by its willingness to conscious actions in a possible emergency situation. For this, the rescuer must have a system of interconnected knowledge, skills and competencies. Training should be focused on socialization – creating opportunities for adaptation in society and in a professional sphere in a wide range of internal, external conditions and circumstances that change quickly. In modern conditions of post-industrial society, the problem acquires additional relevance – knowledge and information become extremely necessary. Therefore, a modern person should have a knowledge that the ability to understand the flow of information, internal and external dynamism, professionalism, competence [1]. The content of vocational training must meet these requirements. This will provide the implementing possibility by a rescuer of effective actions in standard and non-standard situations during professional duties. Currently, education enjoys the process of consistent training program that entirely covers a specific information field. In this case, there is a consistent accumulation of knowledge and skills. But this does not always provide interiorization and interconnection, and the emergence of systemic knowledge in the listener primarily relies on memory. Such a teaching method eliminates the possibility of using concepts previously not studied. Therefore, it is sometimes difficult to provide a link between educational topics. Such a situation requires the search for teaching methods that will help to eliminate this disadvantage in a consistent program.

The educational process will be productive if it will have a creative component. This will ensure the creation of a community of goals in interactions between a teacher and a student. Among known teaching methods, such a result can provide a «projects method». It provides integration of knowledge and skills. The project method is widely used in pedagogical practice to increase the general level of knowledge of subjects of training. This creates educational effects that are similar to the process of gaming methods of training: immersion in the environment of interconnected activities. The pragmatic component of the method is the need for the result [2]. The value of the method is to create conditions for the interiorization of acquired knowledge and skills. The implementation of the projects method uses links between different topics and educational disciplines. It creates an imitation of their practical application as opposed to learning with a consistent program. This approach allows you to form a holistic systemic knowledge. But the main advantage of the project method can be called a deeper professional orientation. The disadvantage of projects method is the probability to be ahead of the curriculum and the passage of certain concepts within this project. Therefore, we propose the simultaneous use of the projects method as an additional with the main program. There is a significant number of varieties of projects method. Therefore, it is necessary to determine the one that will be most useful in terms of conditions for the formation of a holistic system of knowledge and skills in the event of a standard program in higher education institution.

Educational projects may have creative or cognitive orientation. They can create or a certain product of activity or the result is the systematization of the learner's knowledge [3]. The real project always carries a creative function, so the training project will be more useful if it will have creative orientation. According to the «Quality» criterion distinguish such levels of projects: the basic – according to the standard execution algorithm, the individual – individual execution in advising mode, the creative – individual execution [2]. We chose education on the boundaries of the basic and the individual projects method. According to the concept of a creative learning model, knowledge gains should be carried out in the zone of the nearest development [4]. But in most cases, the student can not independently master the zone of the nearest development, so close interaction with the teacher (counseling mode) is needed for this purpose.

According to the «sizes» distinguish between projects: the mini project – within the same section of the training course; the mono project – taking into account most sections; the mix project – combines several training courses according to this educational program; the maxi-project – combines several groups of training courses according to this educational program; the global project – combines all educational courses. At different levels of mastering the educational program, it makes sense to realize various «sizes» of projects. For example, a mini project can be implemented as a patent search within a particular topic; mono-project – generalizing work within this study course for binding to a single meaningful different topics; global project is a diploma job or writing an article based on the results of work in a scientific society.

It is recommended to evaluate the implementation of a particular project by the criteria [5]: a) the depth of project awareness; b) the completeness of illumination; c) the logic of text formation; d) the degree of non-standard solution to the problem; e) the formation of information data; is) the communicative culture; e) the speech culture during report..

We have investigated the possibility of combining into a single «project» task for most of the training course «Theory of Development and Extinguishing of Combustion». This course is a base for specialty «Fire safety» and has a professional focus. In this case, the formulation of current tasks should be the generalized and the practical, so that the decision requires the use of knowledge and skills from different topics (as opposed to teaching a particular topic when applied directly formulation of the problem to get acquainted with new educational material). This approach allows you to effectively form a professional competence in the student. That is, we have created a basic mono-project of creative orientation.

The project considered a probable emergency situation: an explosion in the boiler room. Then the formulation of the general problem is as follows: «Install the reasons for the emergence and conditions of development and consequences, promising methods of stopping combustion

during an emergency situation in the premises of the boiler-house of the specified sizes, if emergency leakage in the premises of 10 kg of a given combustible fluid occurred.

The project requires protection that should be based on a clear report on the procedure for events during an emergency with the use of received digits regarding the parameters determined.

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RESEARCH IN REMOTE-MONITORING SYSTEM FOR URBAN FIRE PROTECTION

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Abstract. Remote monitoring of existing building fire-fighting facilities and fire detection system alarm is a technical development trend to improve the first-time response ability of fire alarm. Reducing the rate of false alarm or maintaining the accuracy of fire alarm is the key of developing fire remote monitoring. Combining of building information model (BIM) and temporal and spatial characteristics of fire spread can effectively distinguish the authenticity of fire alarm.

Keywords: fire detection, false alarm, IOT, architectural structure micro-elements.

In 2020, a total of 252,000 fire incidents were reported in China, with 1,183 deaths and 775 injuries, which caused direct property losses of appropriately \$612 million. Remote monitoring of existing building fire-fighting facilities and fire detection system alarm is a technical development trend to improve the first-time response ability of fire alarm. How to quickly and effectively reduce or identify the false alarm of fire detection is an urgent problem to be solved in the process of promoting the construction of urban fire remote monitoring system.

The development of fire detector has always focused on two core objectives: high sensitivity and low false alarm rate. At present, the high false alarm rate of building fire detection is largely due to the fact that the current alarm depends on a single fire detector. When the fire is judged only based on the signal of a single detector, there is a contradiction between improving the sensitivity and reducing the false alarm rate, which is difficult to solve fundamentally. Therefore, the alarm mode based on a single detector is difficult to effectively reduce fire false alarm in a short time.

By integrating the spreading law of fire smoke with the temporal and spatial distribution of detector signals, the correlation between detector signals adjacent to multiple spatial positions is used for fire identification without increasing the number and distribution of detectors. Multiple signals are mutually verified and have strong resistance to environmental interference. It is expected to basically eliminate the problem of false alarm of building fire caused by false alarm of a single detector.

The concept of Architectural Structure Micro-elements was put forward as the smallest spatial unit that characterizes the law of smoke spread in the architectural space.

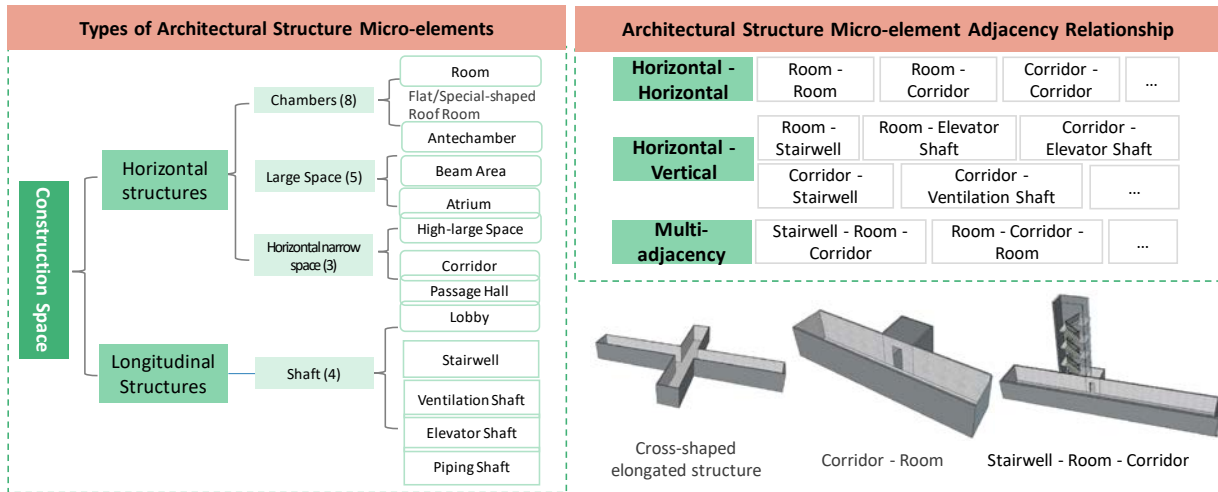


Fig. 1 The types and adjacency relationship of architectural structure micro-element.

Through experimental research, the influence of building structure micro element on smoke spread and temporal and spatial distribution of detector signal is revealed. The calculation formulas of alarm time difference in different architectural structure micro-element is derived.

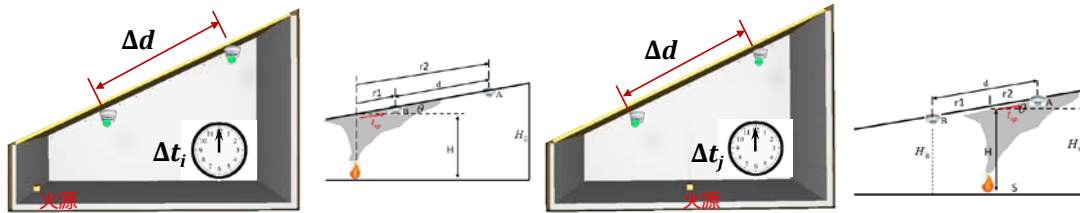


Fig. 2 Examples of microelement smoke spreading in special-shaped roof room

With the development of big data, cloud computing, and IoT, the fire safety cloud platform based on device-cloud collaboration can provide big data and computing support for large-scale data computing. A fire safety cloud platform with a three-tier architecture was designed.

The first tier architecture consists of detectors in different equipment directions at the front end that mainly based on edge computing based on single point data. The second tier is the field simulation control composed of building structure micro elements. The data obtained by single point calculation are calculated in the field simulation to improve reliability and prevent false positives. In the third tier, it is the center of the fire safety cloud platform. For a city, continuous learning and deepening iteration of various models for fire prevention and control are carried out to optimize the accuracy of the model and improve the efficiency of edge calculation.

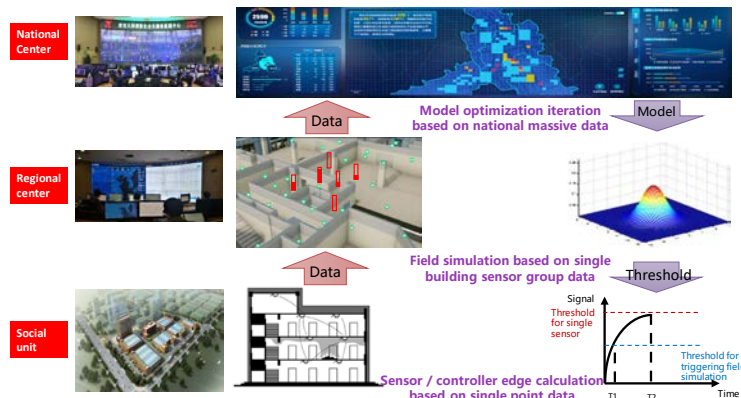


Fig. 3 the three-tier architecture of a fire safety cloud platform.

The characterization and regularization of the smoke spread in architectural structure micro-element will change the traditional mode of fire detection and alarm. Through the aggregation, extraction, optimization and training of a large number of BIM data and fire alarm data on the cloud platform, a new mode of intelligent fire detection will be opened.

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NEW ADDITIVES TO INCREASE FIRE RESISTANCE OF BUILDING CONSTRUCTIONS FOR OIL AND GAZ INDUSTRY

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Abstract. Based on the studies, a technology has been developed to produce effective composite additives from industrial waste – a mechanically-chemically activated mixture of ash from the Novo-Angren TPP+phosphogypsum. Taking into account the double effect on the cement of the mechanically chemically activated mixture «MNA-1» in the amount of 15-20% as an active mineral additive and a regulator of setting time instead of natural gypsum stone, its large-scale introduction is recommended.

Keywords: cement, additive, ash and slag, phosphogypsum, activation, mixture, strength, heat resistance.

Today, with the development of the construction industry, the demand for cement is also increasing. In increasing the volume of construction, cement is one of the resources available at the price of finished objects is achieved through cost reduction due to the use in the construction of modern high-quality building materials and products with lower energy consumption and with improved characteristics. Of particular importance is the production of effective cements based on industrial waste. On a global scale, special attention is paid to the development of new compositions of cements that increase the fire resistance of building structures and the most important task of research in this direction is the development of compositions based on industrial waste for Portland cement. When developing composite additives and based on them new compositions of highly effective composite Portland cement, in this direction it is necessary to substantiate a number of the following scientific solutions, in particular: development of new methods for the production of effective types of building products based on composite additives; development of new compositions for the production of nanocements with the participation of secondary raw materials; increase of concrete strength indicators on sulfate-resistant cements; optimization of the composition of raw materials in obtaining energy-saving clinkers and cements; modernization of production technologies for white and decorative Portland cement; to increase the production of auxiliary cements, the use of alternative sources of active mineral additives and filler additives.

In the Republic of Uzbekistan, large-scale measures for the production of high-quality cements are carried out, aimed at meeting the demand for cement, modernization of the economy and the creation of new production capacities are achieved. The Strategy for the Development of the Economy of the Country defines the tasks «development of production sectors, modernization and diversification of industry, in practice, apply methods of low-energy-saving technologies, production, modernization and diversification of industry, in practice, apply methods of low-energy energy-saving technologies, the development of the cement industry, the manufacture of import-

substituting and export-oriented products. «In this matter, scientific research aimed at the development of new compositions of composite additives based on industrial waste and new compositions of effective cements with their use is of great importance. Fire resistance is the ability of building structures to limit the spread of fire, as well as maintain the necessary performance at high temperatures in a fire [1].

Heat-resistant concrete is a special type of material that, under the influence of high temperatures (up to 1800 ° C), is able to maintain its own physical and mechanical characteristics within established limits. Heat-resistant mixtures are successfully used in all areas of industrial construction, in no way inferior to small-sized refractory materials. For example, heat-resistant concrete GOST 20910–90, in comparison with conventional refractory materials, do not need special preliminary firing. Heat treatment (firing), heat-resistant concrete, takes place during limits. Heat-resistant mixtures are successfully used in all areas of industrial construction, in no way inferior to small-sized refractory materials. For example, heat-resistant concrete GOST 20910–90, in comparison with conventional refractory materials, do not need special preliminary firing. Heat treatment (firing), heat-resistant concrete, takes place during the first heating of the finished structure, at the time of the start-up of the thermal unit [2].

Data on the limits of fire resistance and fire spread are used in the design of buildings and structures. The latter, according to regulatory documents, are divided by degree of fire resistance into five groups. For them, the required limits of fire resistance (minimum) and the spread of fire (maximum) of the main building structures are established. Depending on their type, the indicated limits of fire resistance vary from 0.25 to 2.5 hours, the limits of the spread of fire from 0 to 40 cm. The increase in fire resistance is achieved by fire protection methods.

To improve the structure of the cement composition and increase the strength of structures, mineral components (battled magnesite or fireclay bricks, andesite, blast-furnace granulated slag, loess like loam, fly ash, etc.) are added to the binder, which have the necessary fire resistance. When heating reinforced concrete structures, destructive processes occur not only in cement binders, but also in the used aggregates. The occurrence of these reactions is explained by the uneven thermal expansion of the mineral aggregates. Therefore, you need to carefully approach the issue of choice of aggregates for a particular brand of heat-resistant concrete. We conducted studies to determine the possibility of the integrated use of mechanically chemically activated additives of the YuUT series based on the ash and slag of the Novo-Angren TPP (thermal power plant) and the phosphogypsum waste of Maxam-Ammofos OJSC.

The SO₃ content is 21.89% and 13.36% in YuUT-1 and YuUT-2, respectively, the results of chemical analysis of the mechanically chemically activated additives of the YuUT series indicate the possibility of their use as active mineral additives, and possibly a setting time regulator in return gypsum stone for fire-resistant and heat-resistant cements, concrete and building structures. According to table 2, in the initial stages of hardening, the strength of cements PYuUT-2-15, PYuUT-2-20, at the age of 7 days amounted to 26.8 MPa and 24.1 MPa, respectively, which practically does not differ from the strength of the control cement PC-A0 (26.8 Mpa). The chemical activity of the mechanically chemically activated additive «YuUT» in the absorption of lime was 54.5 mg, which corresponds to the minimum permissible activity characteristic of the group of artificial (technogenic) aluminosilicate hydraulic additives. Therefore, the YuUT additive is a chemically active mineral additive, and is classified by its origin (manufacture) as an artificial additive of technogenic origin, acidic in chemical composition, and hydraulic in chemical activity. Despite the presence of many modern and interesting construction solutions with the «YuUT-1» on the basis, traditional monolithic flat still has numerous followers. This is caused by a few different reasons. First and foremost, when building home flat and flooring, there is no need to use heavy equipment. Besides, construction materials necessary for building it can be acquired without problems – steel bars and concrete can be bought easily, while planks can be later used to build the roof. Furthermore, monolithic flat can be built in a variety of shapes, also including atypical, with the «YuUT-1». That and it is not too thick (from a few to a dozen or so centimetres) and is characterized by good acoustic and thermal insulation characteristics. If it is building according to

the best construction practices, reinforced concrete flooring forms a smooth and even surface on both sides that is the floor and the ceiling. Unfortunately, they also have some disadvantages. First and foremost, they are relatively heavy and building them is labor-intensive with the «YuUT-1», since they require full formwork and complicated reinforcement, constructed by a professional. Furthermore, there should be no stoppages during the works – after setting up the formwork and reinforcement with the «YuUT-1», concrete should be poured immediately, of course while remembering to vibrate and cure it properly. Unassisted construction with the «YuUT-1» of such flooring is impossible and thus help of excellent professionals should be employed during the mentioned works.

The results of electron microscopic analysis of the YuUT additive confirm the formation of a crystalline structure during the autoclave treatment of a mixture of phosphogypsum and ash and slag, and that it is similar to the structure of hardening cement paste in the early periods of hardening and is represented mainly from hydrated sulfate-containing minerals and neoplasms in the form of hydrosulfoaluminate and low basic hydro silicate compounds.

When «YuUT» additives are introduced into the cement, these hydrated neoplasms play the role of crystalline seeds — «crystallization centers», which initiate the emergence of new nuclei of the hydrosulfoaluminate and hydrosilicate type neoplasms, accelerate their crystallization and the formation of the crystalline skeleton of the hardening cement dispersion, and as a result intensify the processes of hydrolysis and hydration of aluminate and silicate minerals of clinker PC.

To study the effect of the additive «YuUT-1» on the physic-mechanical properties of the PCs of JSC «Bekabacement», blends were prepared including «65-85% PC clinker + 15-35% «YuUT-1», and for comparative tests – «95% PC clinker + 5% gypsum stone. The additive «YuUT-1» was introduced into the raw material charge taking into account the content of 8.56% SO₃. It has been established that in the presence of «YuUT-1» additive, the grindability of mixtures is increased compared to grinding clinker PC with 5% gypsum stone: with a constantly fixed time (40 min), the fineness of grinding cements with «YuUT-1» determined by the residue on sieve No. 008, varies within (2-6)% compared with 10% of the remainder of PC-D0. Cements with the addition of «YuUT-1» meet the requirements of GOST 10178 on the content of SO₃ (2.33-3.80%), because for ND, the optimal SO₃ content in the PC should be at least 1.0% and not more than 4.0% by weight. The rates of initial reactions of cements with the addition of «YuUT-1» with water are little different from the rates of reactions of a non-additive PC. The process of starting the setting of cements PC-F15, PC-F20, PC-F 25 is extended by (15-30) min.

The increase in water demand of additional PCs is explained by the increased content of aluminate phases in them and a finer degree of grinding in comparison with PC-D0 cement. In accordance with the data in table 4, the strength of cement with the addition of 15% «YUT-1» (PC-F15), both at the age of 28 days of normal hardening, and with longer curing (3 months) practically do not differ from the strength of cement PC-D0.

Constructions with a new fire additive all over the world rely on concrete as a strong material that provides fire safety and is easy to handle. It can be found in almost all building types – residential, oil and gas reservoirs storage, multi-flat and even in municipal infrastructure. Despite its wide range of use, many of its users still do not know about the fire materials with the «YuUT-1» directly connected to ensuring the endurance and high quality of concrete. The term «concrete strength class» means the endurance of concrete against compression, no more, no less. It determines the amount of stress the material can take. Concrete strength is determined by measuring the crushing strength of cubes or a cylindrical sample made from a pre-prepared mixture. After the measuring and strength determining, concrete is assigned a strength class.

Based on the studies, a technology has been developed to produce effective composite additives from industrial waste – a mechanically-chemically activated mixture of ash from the Novo-Angren TPP + phosphogypsum. Taking into account the double effect on the cement of the mechanically chemically activated mixture «YuUT-1» in the amount of 15-20% as an active mineral additive and a regulator of setting time instead of natural gypsum stone, its large-scale introduction is recommended.

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