

EFFECTIVENESS OF PROFESSIONAL ACTIVITY OF RESCUE DIVERS EVALUATION AND ENHANCEMENT STUDIES

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Abstract. *The research work presents the data obtained on the results of the research on preventing the negative consequences of existing risks affecting the activities of rescue divers, evaluating and improving the efficiency of their professional activities. As a result of the conducted research, proposals were developed for the theoretical prognostic evaluation and improvement of the effectiveness of rescue divers' activities, as well as for improving the methods of ensuring their safety during their professional activities.*

Keywords: *rescue diver, risk, health, working conditions, occupational group, compressed air, mental state, negative factors.*

It is known that the professional activities of rescue divers are carried out in extreme conditions that threaten their health and life. A number of important qualities necessary for activity in extreme conditions (emotional stability, physical fitness, flexibility, etc.) are important in determining and forecasting the professional activity of rescue divers [1].

In the research work, by studying and influencing the qualities that rescue divers should have in order to carry out their activities, that is, by conducting certain types of practical training and theoretical research, it was possible to evaluate and increase the efficiency of their professional activities and improve existing methods.

At the initial stage of research, in order to evaluate and improve the efficiency of rescue divers, local natural and a number of experiments were periodically conducted in artificial water bodies. In this, tests were conducted by rescue divers on the performance of 3 different types of tasks, i.e., swimming under water with a breathing apparatus, carrying cargo under water, and searching for an object under water along a directional cable in a certain time interval [2]. Including

Exercise 1: method of swimming under water with a breathing apparatus. In this method, the diver first checks the air breathing apparatus, puts on a half mask and starts breathing. According to the instructions, the diver will have to swim 500 meters underwater. Execution time was calculated from the start of the instruction to the arrival of the target. The test results are presented in Table 1 (*Time: excellent - 20 minutes, good - 25 minutes, satisfactory - 30 minutes*).

Table - 1

Carrying out the exercise of swimming under water with a breathing apparatus results

Rescue diver	Age	With breathing apparatus swimming under water (minutes)
1- RD	42	25
2- RD	28	18
3- RD	34	20
4- RD	33	19
5- RD	22	18
6- RD	24	19
7- RD	23	17
8- RD	29	21
9- RD	23	19
10- RD	24	25
11- RD	25	31
12- RD	22	24
13- RD	23	23
14- RD	23	26
15- RD	34	28
16- RD	22	25

Exercise 2: How to carry cargo under water. In this method, the respiratory apparatus is first examined, a half-mask is put on and breathing is started. According to the instructions, a pre-prepared 10 kg load under water

It will have to be transported to a distance of 200 meters. Execution time is the time from the start of the instruction to the arrival of the target. The test results are presented in Table 2 (*Time: excellent - 10 minutes, good - 12 minutes, satisfactory - 15 minutes*).

Table - 2

Carrying out the exercise of carrying the load under water results

Rescue diver	Age	Transportation of cargo under water (minutes)
1- RD	42	14
2- RD	28	9
3- RD	34	10
4- RD	33	10
5- RD	22	8
6- RD	24	7
7- RD	23	9
8- RD	29	12
9- RD	23	8
10- RD	24	14
11- RD	25	16

Rescue diver	Age	Transportation of cargo under water (minutes)
12- RD	22	12
13- RD	23	11
14- RD	23	14
15- RD	34	15
16- RD	22	12

Exercise 3: searching for an underwater object along a directional cable. In the implementation of this task, the area of the water surface is 10,000 sq.m. was chosen as equal. First, the respiratory system is checked, a mask is put on, and the exerciser begins to breathe. Based on the instructions, the water is lowered and the search for the previously placed item begins. The execution time was calculated from the time the instruction was given to the time the diver reached the water surface and exited the designated location. The test results are presented in Table 3 (*Time: excellent - 30 minutes, good - 40 minutes, satisfactory - 50 minutes*).

Table - 3
The results of the exercise of searching for an underwater object along the route

Rescue diver	Age	Submersible directional cable search across (minutes)
1- RD	42	40
2- RD	28	28
3- RD	34	26
4- RD	33	30
5- RD	22	29
6- RD	24	28
7- RD	23	25
8- RD	29	32
9- RD	23	27
10- RD	24	35
11- RD	25	51
12- RD	22	36
13- RD	23	38
14- RD	23	42
15- RD	34	45
16- RD	22	40

During the studies, all 3 different types of exercises were performed periodically. It was repeated for 15 days and 6 months, and during this period, they were given tasks to perform additional loads to improve their physical performance, and their performance indicators were recorded. Exercise load in water under 2 different condition and performed under anhydrous

conditions. As a result, the rescue divers' productivity during diving has increased. The initial and 6-month indicators of the obtained results are presented in the diagrams in Fig. 1 and Fig. 2.

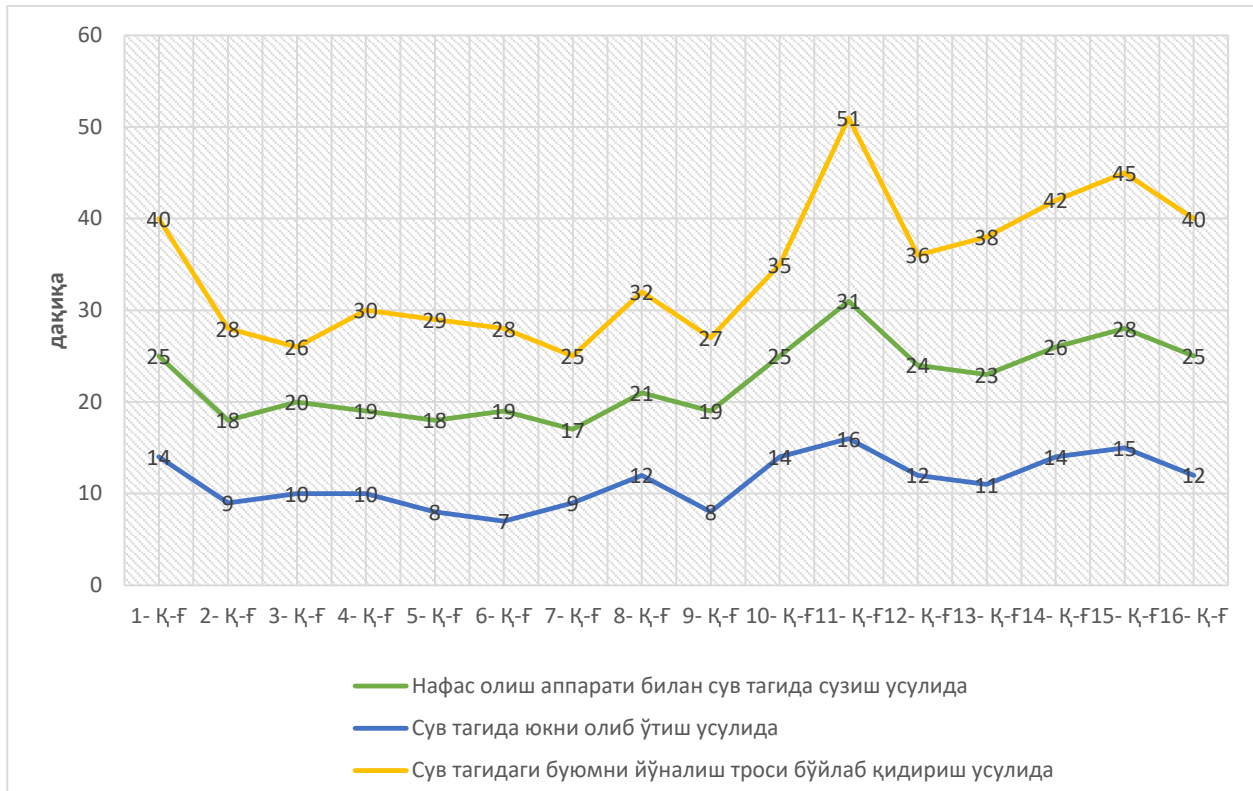


Figure 1. Diagram of evaluation of the efficiency of rescue divers (preliminary).

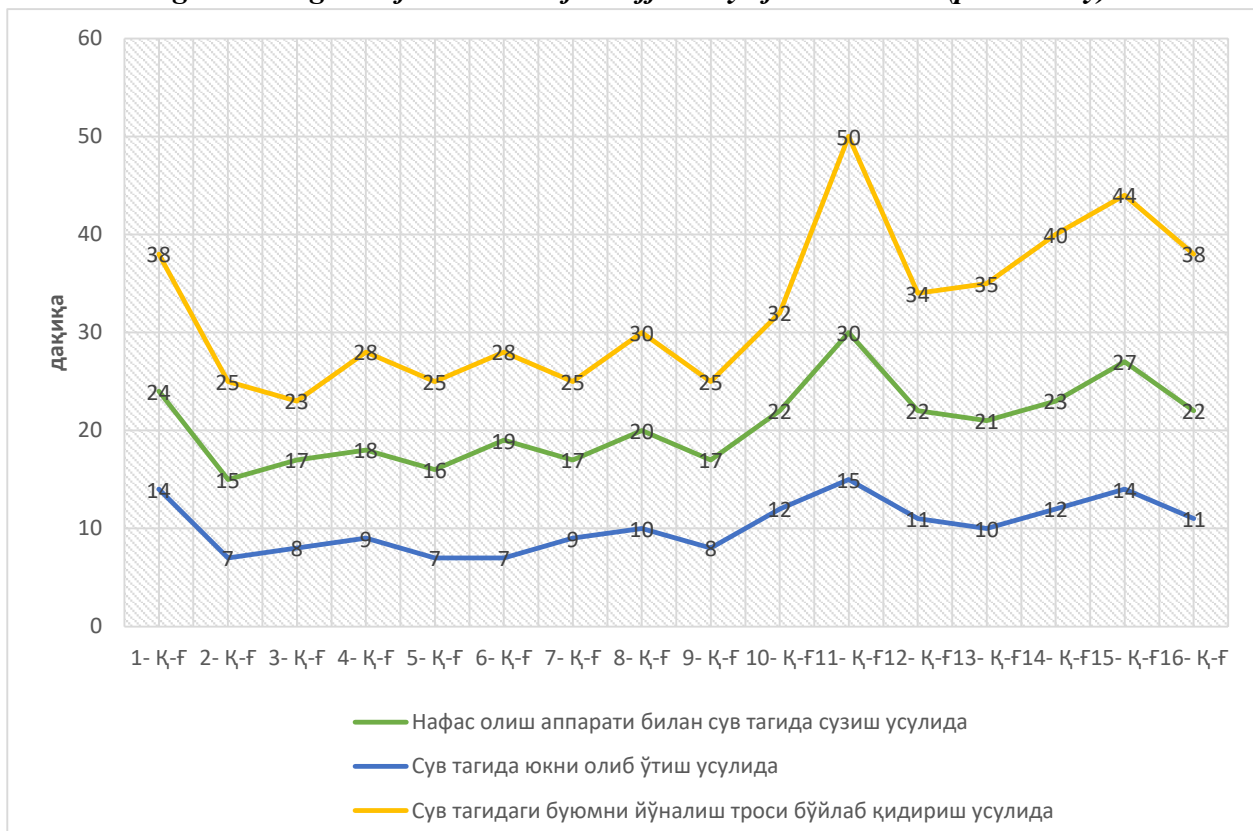


Figure 2. Diagram of evaluation of the efficiency of rescue divers' activities (6 months).

As can be seen from the above diagrams, there are positive changes in the test results at the initial and 6 months, that is, as a result of regular training with rescue divers, the time to complete the training in

proportion to their age has decreased to 5 minutes, it has been observed that their mental and physical fitness has increased, their skills and confidence have increased.

Factors directly related to the activities of rescue divers:

1. The living capacity of the lungs - the living capacity of the lungs is equal to 3000-4000 ml3 [3].
2. The state of physical fitness - the state of physical fitness of rescue divers was rated 2-5 [4].
3. Blood pressure - the average blood pressure in adults is 120/80 mmHg [5].
4. Water pressure - 0.1 Mpa (1 kgs/cm²) absolute pressure per 10 meters affects the human body [6].

Based on the results of the conducted research, a formula for determining the efficiency (safety) of rescue divers was developed and based on this formula, the results of activity forecasting were determined by conducting theoretical calculations.

The formula for determining the efficiency (safety) of rescue divers:

$$k_c = V_{lc} K_{pf} / P_{bp} + L_{wd}$$

k_c – performance (safety) indicator (in percent);

V_{lc} – lung capacity indicator (normally 3000-4000 ml3);

K_{pf} – physical fitness indicator (grade 2-5);

P_{bp} – The sum of normal blood pressure 120/80 (200);

L_{wd} – water depth indicator (1-60 meters).

Example: $k_c = 3000 \times 2 / 200 + 10 = 28,6 \%$

$k_c = 4000 \times 2 / 200 + 60 = 30,8 \%$

$k_c = 3000 \times 5 / 200 + 10 = 71,4 \%$

$k_c = 4000 \times 5 / 200 + 60 = 76,9 \%$

Through the theoretical studies carried out through this formula, it was possible to pre-estimate the efficiency of the professional activity of rescue divers. This gives us the opportunity to use rescue divers effectively and purposefully by evaluating their performance. Also, in this study, we can see the compatibility of the results obtained as a result of practical exercises with the results obtained by performing theoretical calculations.

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