Training of specialists in the field of occupational safety and ecology based on professional standards

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Abstract. The constantly deteriorating global environmental situation, the emergence of new enterprises and the rapid development of new technologies require the development of new approaches to personnel training in the field of technosphere and environmental safety. The current topical issue is the formation of a mechanism for predicting the future needs of enterprises in the implementation of new labour actions within the generalised labour function of employees in the field of ecology and occupational safety. For this purpose, it is necessary to implement the so-called "anticipatory" retraining of personnel in order to ensure the effective implementation and development of new technologies. The article describes one of the approaches to solving the problem of such advanced retraining in the field of labour protection and ecology.

Key words: Ecology, environment, technology, health, safety, labour protection, security.

1 Introduction

Today, the environmental problem is becoming one of the key issues determining the conditions of human life. Due to climate change, huge losses are incurred both by the population of countries affected by natural disasters (floods, fires, hurricanes or droughts), and by businesses and governments of these countries, which are forced to spend more and more money to combat abnormal natural and climatic processes and to overcome their consequences. By the middle of the 20th century mankind faced the emergence and rapid development of the ecological crisis on the planet Earth. Global environmental problems associated with anthropogenic impact on the natural environment cause climate change, depletion of the ozone layer of the atmosphere, etc. In this regard, overcoming the negative consequences of climate change and their prevention becomes one of the main problems for the world community. Therefore, the issue of training of highly qualified specialists in the field of ecology and labour protection (technosphere safety) is of particular relevance. Rapid technological changes in industrial production, associated with the transition to Industry 4.0, contribute to the emergence of new technologies and equipment [1-4], which is a prerequisite for "ahead of the curve" training in the field of technological and environmental safety. There
are two issues that require constant attention of specialists: 1) study of the impact of new technologies on the environment and health of industrial workers providing it; [5-6] 2) development and implementation of new cleaning technologies in the industrial chain.

2 Problem statement

It should be noted that the pace of scientific and technological progress is so high that by the time of graduation students - future ecologists or occupational safety specialists - no longer fully possess the competences required specifically for today [7-30]. As a consequence, there is a "chronic" deficit of qualified specialists in this field in the labour market. In this regard, the problem of organising advanced training in the field of ecology and technosphere safety is urgent. Under advanced training we will mean the formation of necessary professional competences in the field of introduced, emerging or planned to be introduced means of production, techniques and technologies [31-33]. Advanced training should be introduced both in the training of students in higher education institutions and in the implementation of additional professional programmes, namely: advanced training, professional retraining of existing specialists of enterprises / organizations).

3 Research tasks

In order to solve the above problem, it is necessary to find answers to the following questions:

1) what normative acts regulate the content of training of specialists in the field of ecology and labour protection;

2) what mechanisms can be used to forecast the need of employees for certain new ("advanced") competences.

4 Research objective

The aim of the study is to identify effective approaches for training qualified personnel in the field of environmental and occupational health and safety.

5 Research methods

The research method used is analysis of literary sources and normative acts, generalisation and synthesis.

5.1 Requirements of the Federal State Educational Standards (hereinafter referred to as FSES)

Let's consider what educational standards are currently available in the field of ecology and labour protection.

FSES 20.03.01 Technosphere Safety (approved by Order No. 680 of the Ministry of Science and Higher Education of the Russian Federation dated 25 May 2020). This educational standard contains the requirements for training in bachelor's degree programmes. General Professional Disciplines (hereinafter referred to as GPD), which must be possessed by a graduate of the university:

GPD

1. Able to take into account modern trends in the development of techniques and technologies in the field of technosphere safety, measuring and computing equipment,
5.2 Professional standards requirements

On 7 September 2020, the professional standard "Environmental Safety Specialist (in industry)" was approved by Order No. 569n of the Ministry of Labour and Social Protection of the Russian Federation. The standard contains requirements for the knowledge and skills of specialists who plan, organise, control and improve environmental protection activities in organisations in various industries (environmental technician, laboratory technician, environmental safety department technician, environmental engineer, ecologist). The standard contains 4 generalised labour functions of qualification levels 4 to 7. The labour
function "Organisation of environmental safety training for the organisation's personnel" (code C/06.6, qualification level 6) involves performing the following labour actions: "Determination of the need for training of managers and specialists of the organisation in the field of environmental protection and environmental safety", "Determination of the need for training in the field of environmental safety in waste management operations for persons allowed to handle waste". Possible job title - Environmental Protection Engineer (Ecologist) II category. Thus, this specialist should assess the conformity of knowledge and skills of employees in the field of environmental protection and ecological safety with the labour actions performed by them. The specialist carrying out the assessment, according to the requirements of the specified professional standard must possess the following knowledge and skills: "Be able to select an educational organisation of additional professional education to conduct training of the organisation's personnel in the field of environmental safety"; "Be capable of selecting an additional educational programme of additional professional education to train the organisation's personnel in the field of environmental safety". However, it should be noted that the criteria for selecting an educational organisation and an additional educational programme are not specified.

18.04.2022 № 219n approved the professional standard "Specialist in the development of measures to protect the environment of capital construction projects". The standard is developed for the type of professional activity: "Development of measures for environmental protection in the design of capital construction projects". Occupation group: "Environmental protection engineers".

The Russian Ministry of Labour has also prepared a Draft Order of the Ministry of Labour and Social Protection of the Russian Federation "On Approval of the Professional Standard "Specialist in Environmental Engineering Protection" (dated 27.07.2022) for the type of professional activity "Ensuring engineering protection of the environment during economic activities". The main objective of the professional activity, according to the draft professional standard, is "Improving the environmental quality of production and technological processes, minimizing the negative impact on environmental components in the course of economic activities associated with these processes". The draft professional standard includes 4 generalized labour functions of qualification levels 6 and 7:

1) "Implementation of accounting, systematization and control of data on the impact of economic activities on environmental components, as well as data on the technical condition of treatment facilities and the quality of technologies that minimize and (or) prevent negative impact on the environment" (code A, qualification level 6);

2) "Preparation of proposals for engineering solutions to minimize the negative environmental impact of the organisation's business activities" (code B, qualification level 6);

3) "Organizational and methodological support of the organisation's activities to minimize and prevent negative environmental impact" (code C, qualification level 7);

4) "Development and implementation of engineering solutions minimizing and (or) preventing negative environmental impact" (code D, qualification level 7).
5.3 Requirements of qualification guides

According to the Order of the Ministry of Education and Science of the Russian Federation of 1 July 2013 N 499 "On Approval of the Procedure for Organisation and Implementation of Educational Activities in Additional Professional Programmes", the content of an additional professional programme should take into account the requirements of professional standards or qualification directories. Let us consider the Unified Qualification Directory of Positions of Managers, Specialists and Other Employees (hereinafter - UQD) (2019), Qualification Directory of Positions of Managers, Specialists and Other Employees - Sections "General Industry Qualification Characteristics of Positions of Employees Employed in Enterprises, Institutions and Organisations" and "Qualification Characteristics of Positions of Employees Employed in Research and Development Institutions, Design, Technological, Project and Survey Organisations", approved by the Decree of the President of the Russian Federation of the Republic of Belarus. The UQD contains requirements for the position of "Environmental Protection Engineer (Ecologist)". The mandatory requirement is higher professional education. The UQD lists job duties, knowledge and skills that an ecologist should possess.

5.4 Development of additional professional programmes based on professional standards and qualification guides

Advanced training by increasing and updating the knowledge of graduated specialists can be achieved through additional education. Professional development programmes and professional retraining programmes oriented to the requirements of current professional standards and their drafts will help to fill the gaps in the knowledge of specialists and orient them to new and promising technologies in solving their professional tasks. The most effective is the formation of the content of additional professional retraining programmes on the basis of the modular principle. According to the modular principle, the disciplines included in the retraining programme are methodologically complete blocks and can be implemented as separate professional development programmes. The content of the retraining programme can vary within 30-50% of disciplines. The set of disciplines depends on the level of initial training of the trainees and on the training objectives. The content of the disciplines is formed on the basis of labour functions from the selected professional standard. The training programme includes topics that form the knowledge and skills specified in the occupational standard for the respective job function. If a qualification handbook is used instead of a professional standard, the content of the programme should form the knowledge specified in the UQD for the respective position. It should be noted here that professional development and retraining programmes for occupational safety and environmental specialists should certainly contain a large percentage of practical training and/or internships at production facilities to practice the acquired knowledge and skills. It would be a great advantage to involve specialists from enterprises with advanced technologies in teaching, so that they could share their experience with the students.

5.5 Development of basic vocational training programmes based on professional standards and qualification guides

A large number of workers and employees are involved in the field of labour and environmental protection in addition to top-level specialists. In this context, advanced vocational training of workers/employees is relevant. Training programmes for such specialists are divided into the following categories: training programmes for
workers/employees, advanced training programmes for workers/employees and retraining programmes for workers/employees. Like additional vocational programmes, basic vocational training programmes should be oriented towards professional standards and qualification guides.

Let us consider a number of working professions involved in environmental and labour protection:

1) “Laboratory technician for gas and dust analysis” (2nd to 6th category according to the Unified Tariff and Qualification Directory of Workers’ Occupations and Professions (UTQD), 2019, Issue No. 1 of the UTQD, §§ 105-107);

2) “Laboratory technician for chemical and bacteriological analysis” (2nd and 3rd category according to the Unified Tariff and Qualification Directory of Workers’ Occupations and Professions (UTQD), 2019, Issue No. 1 of the UTQD, §§153,154);

3) “Laboratory technician-microbiologist” (3rd and 4th grade according to the Unified Tariff and Qualification Directory of Workers and Professions (UTQD), 2019, Issue No. 1 of the UTQD, §§99, 100).

When developing the content of basic vocational training programmes for these professions, it is necessary to provide for a theoretical and practical block. The practical block should constitute at least 40% of the total volume of the programme and preferably take place in the form of an internship at an enterprise. The theoretical block should contain information on advanced research in the field of labour protection and ecology. Training should preferably be conducted on the basis of profile universities that are research centres.

Positions of employees involved in the field of ecology and labour protection:

1) “Labour Protection Inspector” (Unified Qualification Directory of Positions of Managers, Specialists and Other Employees (UQD), 2019, Section “Qualification Characteristics of Positions of Employees of Nuclear Power Organizations” The section approved by Order of the Ministry of Health and Social Development of the Russian Federation dated 10.12.2009 N 977);

2) “Chemical Engineer” (Unified Qualification Directory of Positions of Managers, Specialists and Other Employees (UQD), 2019, Section “Qualification Characteristics of Positions of Employees of Nuclear Power Organizations” Section approved by Order of the Ministry of Health and Social Development of the Russian Federation dated 10.12.2009 N 977);


The practical block in the main professional training programmes should preferably be conducted with the participation of specialists from enterprises. An effective form of training in this case would be a round table format with discussion of problems and ways to solve them at various enterprises.

The organization of training of specialists in the field of occupational safety and environmental protection can be based on the existing regulatory documents: federal state educational standards and professional standards. At the same time, there is a need for a system of formation of “anticipatory” professional competences to organize “anticipatory” training of specialists in this sector. In this regard, the following algorithm can be proposed:

1) drawing up forecast models based on monitoring the labour market, strategies and programmes for the development of industries and individual enterprises and tracking changes in the professional and qualification structure of workers;

2) identification of new labour functions;

3) training and vocational retraining programmes for workers/employees, advanced training programmes for workers/employees and retraining programmes for workers/employees. Like additional vocational programmes, basic vocational training programmes should be oriented towards professional standards and qualification guides.

4) drawing up forecast models based on monitoring the labour market, strategies and programmes for the development of industries and individual enterprises and tracking changes in the professional and qualification structure of workers.
3) formulation of requirements for new (“anticipating”) competences of employees to perform new labour functions;
4) assessment of personnel needs in new specialists, drawing up a preliminary schedule of advanced training;
5) creation of mechanisms for transferring the obtained data to the system of higher education and additional education;
6) preparation of training schedules and educational programmes for “anticipatory” training;
7) creation of educational platforms;
8) establishment of interaction between enterprises and educational structures to develop the system.

Such a system of planning and organization of advanced training can be used both for training of young personnel and for retraining of existing personnel for new or modernized production facilities.

The formulation of requirements for new qualifications (competences) should be based on the methodological recommendations of the National Agency for Qualifications Development [9-11].

6 Conclusions

The environmental policy of the Russian Federation based on the relevant legislation is constantly changing. Legislation, is constantly changing. It reflects the needs of society and is influenced by a number of factors: public opinion, activities of public organizations, business interests, etc.

The Russian Federation has achieved certain successes in solving a number of environmental problems, but continues to face new challenges. In this regard, the issue of training qualified personnel is topical. It is promising to introduce elements of “advanced” training into the personnel training system, as well as to develop the system of additional professional education and vocational training of specialists in the field of labour protection and ecology.

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