

IMPROVING PROCEDURES OF TRAINING EMPLOYEES BY IMPLEMENTING GUIDANCE CARDS SAFE METHODS AND TECHNIQUES OF WORK

СОВЕРШЕНСТВОВАНИЕ ПРОЦЕДУРЫ ОБУЧЕНИЯ ПЕРСОНАЛА ПУТЕМ ВНЕДРЕНИЯ ИНСТРУКТИВНЫХ КАРТ ПО БЕЗОПАСНЫМ МЕТОДАМ И ПРИЕМАМ ТРУДА

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Abstract: Training and examination of working professions employees (further – workers) of the organisations, that are controlled by Federal department of ecological, technological and nuclear supervision in Russian Federation (further – Rostekhnadzor) of occupational Safety and Health and in the field of safety – it is one of the key factors in creating conditions for trouble-free operation of hazardous production facilities (further – HPF) and reduce industrial injuries at these facilities. This article provides an overview of the existing system of training and examination of workers on occupational health and safety and industrial safety, revealed its main gaps. The development and implementation of guidance cards safe methods and techniques of work are revealed, as a form of industrial instructions.

KEYWORDS: GUIDANCE CARDS, INDUSTRIAL INSTRUCTION, TRAINING, EXAMINATION, INDUSTRIAL SAFETY, OCCUPATIONAL HEALTH AND SAFETY, INDUSTRIAL INJURIES, EXTRACT, TRANSPORTATION, OIL

1. Introduction

Training and examination on occupational Safety and Health and in the field of safety of workers employed in the HPF takes an important role in the preparation of skilled and highly-qualified workers; it is a guarantee of trouble-free operation of the HPF and the absence of industrial injuries at these facilities. Therefore, training of workers begins from the moment of hiring and continues consistently during the employment.

2. Preconditions and means for resolving the problem

Analysis of Rostekhnadzor's statistical data on accidents and industrial injuries at the facilities of oil and gas industry of the Russian Federation from 2004 to 2015 shows that every third event occurred through the fault of human error associated with the violation of the requirements of the organisation and production of hazardous works. For example, in 2015, 17 accidents occurred only in oil and gas production facilities, of which 4 accidents were caused by human error.

In turn, the human error associated with the violation of the requirements of the organisation and production of the work, due to the following factors:

- Dismissive attitude to the demands of workers in the field of industrial safety and occupational Safety and Health;
- The absence or lack of knowledge and skills among workers in the field of industrial safety and occupational Safety and Health.

The number of occupational accidents with a fatal outcome on Russian oil and gas industry facilities in 2015 was 19 cases, 10 cases (53%) more compared to the same period in 2014 (see Figure 1).

In 2015, there was 7 groups of accidents that was 1 case more than in 2014.

Thus, the analysis of statistical data shows that the issue of training and examination of workers is urgent.

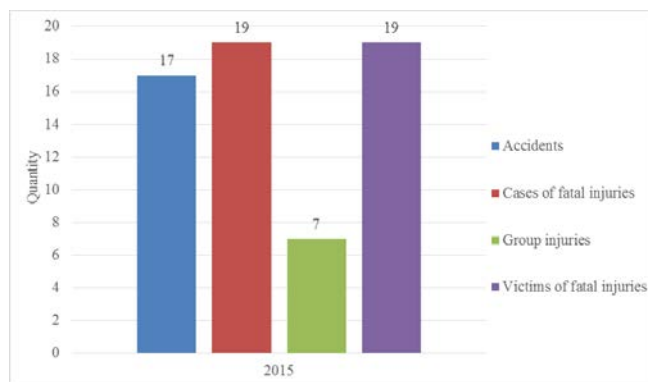


Fig. 1 - The data on accidents and injuries at the facilities of the oil and gas industry of Russia for 2015

3. The solution of the problem

In the Russian Federation the duty to provide training and examination of workers assigned to the employer according to the law [6, 7].

Organizational issues and requirements for the training and education of workers on occupational Safety and Health and industrial safety are specified in the Order training [3], GOST 12.0.004-90 [1] and RD 03-20-2007 [4]. Figure 2 shows the current system of training and examination of occupational health and safety of workers at hazardous production facilities.

As seen in Figure 2, the training of workers in safe methods and techniques of work carried out with the use of instructions on occupational Safety and Health and industrial instructions [5].

If now the development of instructions on occupational Safety and Health based on the Methodical recommendation [2], the development of industrial instructions, according to RD 03-20-2007 [4], carried out on the basis of accepted standards in the oil and gas company. It should be noted that there is no methodical recommendation for the development of industrial instructions neither in RD 03-20-2007 [4] nor in other normative-legal acts of the federal level. Thus, the content of the industrial instructions and their correctness depends on the knowledge, experience, competencies of employees who develop these instructions.

In this connection, it is proposed to use the instructional cards for training workers in safe and working methods. The main support and the basic elements of guidance cards are structured and visual means of presenting information.

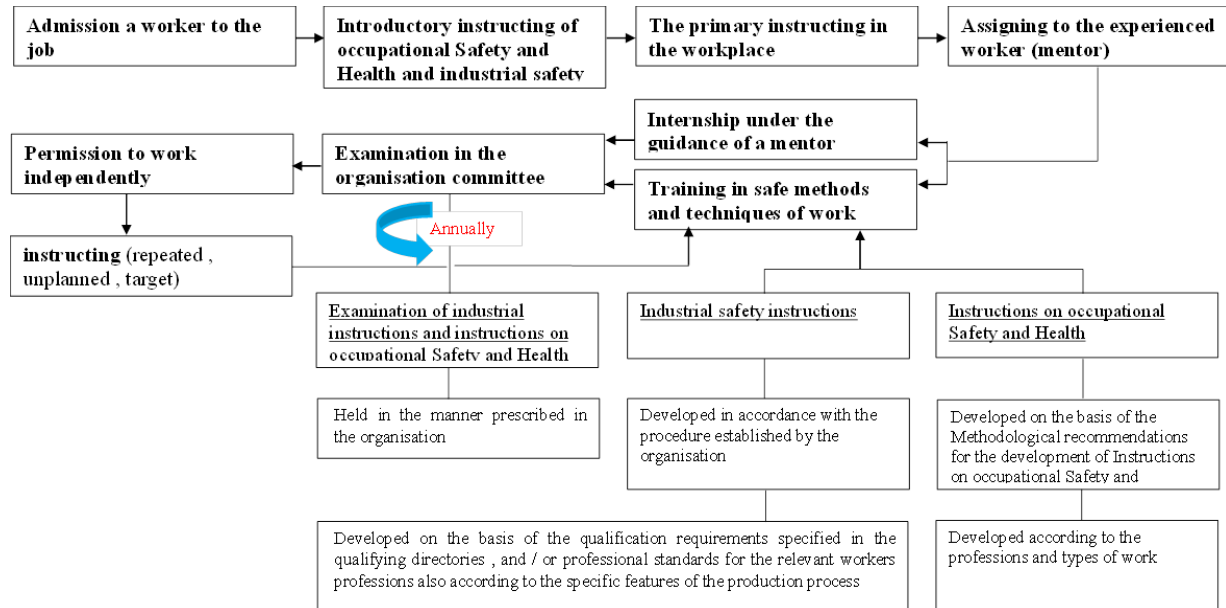


Fig. 2 - The current system of training and examination of occupational health and safety and industrial safety of workers at hazardous production facilities

4. Results and discussion

As a result of the research and practice of drawing up guidance cards, the template was formed.

Purpose of the guidance cards: prevention of accidents, incidents, industrial injuries at hazardous production facilities, including objects of oil and gas extraction and transportation.

Guidance card includes the information provided below.

Title: Guidance card safe methods and techniques of work with (specify the name of the type of work).

Part 1. Characteristics of the equipment (see Figure 3)

It consists of a description of the characteristics of the used equipment, technical devices. This section should briefly provide information on the equipment used with graphic materials.

1. Description and the purpose of the equipment and devices being used		
1.1. Characteristics of the pipeline		
Main technical characteristics of the pipeline «East Vozey field – End facilities» are shown in Table 1.1.1.		
Table 1.1.1 - Main technical characteristics of the pipeline		
№	Characteristic, dimension	Index, value
1	appointment	Transportation oil
2	The length, m	24250
3	Volume, m ³	784
4	Outside diameter, mm	219
5	Wall thickness, mm	8
6	Designed operating pressure, MPa	6,3
1.2. Characteristics of chamber for start clearing devices		
Technical characteristics of chamber for start clearing devices (further - chamber for start CD) are presented in Table 1.2.1.		
Table 1.2.1 - Main technical characteristics of chamber for start CD		
Nominal pressure, MPa		6,3
Designed pressure, MPa		8
Test pressure hydrotesting, MPa		10
Working temperature, °C		от -42 до +34
Calculated wall temperature, °C		50
Minimum allowable negative wall temperature, °C		-60
Name of the working environment		Oil, oil products

Fig. 3 - Example of Part 1 of guidance card

Part 2: Safety requirements for the performance of work (Figure 4, 5)

In the second part of the guidance card details the harmful and dangerous production factors are designed which can lead to an accident, incident or industrial injuries.

It is important to specify the methods for safe, trouble-free operation and techniques reduce or eliminate the impact of these factors on the workers. For clarity, it is desirable to accompany the text part with drawings.

This section also identifies the necessary and used special work clothes, safety shoes, personal protective equipment, respiratory protective equipment, tools, materials, etc. in the performance of work.




1. The safety requirements when working	
1.1. Harmful and hazardous production factors in the performance of work	
When carrying out the CD start-up in the pipeline, the employee is exposure to harmful and dangerous production factors. It is necessary to reduce or eliminate the impact of these factors for the safety of an employee.	
Table 2.1.1 - Harmful and hazardous production factors, and measures to reduce or eliminate the impact of these factors on the employee.	
Harmful and hazardous production factors	Measures reduce and / or eliminate the impact
Toxic vapors of oil	Measuring gas environment using a gas analyzer 
	The use of respiratory protective equipment (gas masks) 
	Being on the leeward side 

Fig. 4 - Example of Part 2 of guidance card




2.2 Tools, equipment, personal protective equipment needed for the work	
To perform work on the CD start-up worker must have the tools, materials, personal protective equipment, respiratory protective equipment specified in Table 2.2.1.	
Table 2.2.1 - Tools, equipment, personal protective equipment needed for the job	
Title	Picture
Special work clothes, safety shoes, protective helmet, PPE, in accordance with the approved norms of delivery of work clothes.	
Intrinsically safe tool (copper or thickly smeared with grease)	
Explosion Proof flashlight	

Fig. 5 - Example of Part 2 of guidance card

Part 3: Procedure for the performance of work (Figure 6, 7)

The main part of the guidance card, where a detailed operations algorithm is performed for the workers compliance with safe practices and methods of work.

This part of the guidance card is advisable to split into 3 sections:

I – the beginning of work, organisational activities. Specifies the procedure for admitting workers to perform work, the availability and the filling of the necessary documents, the requirements for protective clothing, personal protective equipment, respiratory protective equipment, tools and materials. While learning the section I of guidance card worker must learn how the admission to the works is carried out and which the necessary tools and materials he has to prepare prior to performing the works themselves.

II – execution of works. Main part. It specifies the order of the main part of the work.

III – completion of work. It determines the order of completion, to restore order in the workplace, filling in the necessary documents to complete the work .

All forums at the guidance card are issued in the form of a table with the following information:

a) The first column « Number of the operation».

Numbers are listed in chronological order of operations.

b) The second column: «The content and sequence of elements of the operations (the amount of the employees). Particular attention during the operation».

The column is the primary table and is divided into columns by the number of employees participating in the execution of works. The columns indicate the position (profession) of the employee.

This section describes the operations performed by the employees in chronological order. The section should be performed in the most concise, clear and intuitive way to the employees. Description of performed elements of operations must be uniformly understood and should not be interpreted by each worker in different ways.

At the same time it is also important to specify the place occupied by the employee during the operation.

In each cell the picture, describing these actions is attached with a description of the operation element.

Subject to the conditions, restrictions, warnings, to which the employee must pay special attention during the operation. These the conditions are described by the word «CAUTION» (It is drawn in red to indicate a particular importance of the operation and attract the attention of the worker to the item). We give photos or graphics for clarity and better understanding of working memory and information.

Conditions labeled «CAUTION» must be indicated before or after the description of operation, depending on the time period in which the employees must pay attention to them, i. e., in chronological order.


Procedure and safety measures when carrying out cleaning device start-up on an oil pipeline «East Vozey field – end facilities»		
Table 3.1 - Institutional work before starting the cleaning devices		
Number of operations	The content and sequence of elements of operations (The amount of the employees - 2 persons). Particular attention during the operation	
	Master	Operator
1	Conducts instructing in the workplace with an explanation of the duties and the order of operations to the operator participating in the start of cleaning devices .	Takes instructing and familiarisation with the order of operations.
		

Fig. 6 - Example of Part 3 of guidance card



Таблица 3.2 - Порядок проведения и меры безопасности при выполнении работ по пуску очистного устройства из камеры пуска		
Number of operations	The content and sequence of elements of operations (The amount of the employees - 1 person). Particular attention during the operation	
	Operator	
1	Analyses gas environment on the chamber for starting CD area.	
2	<p>Attention!</p> <p>During normal pumping of fluid the flow is directed through the bypass line bypassing the chamber for starting CD:</p> <ul style="list-style-type: none"> - Intersecting gate №139n , №143n closed - Drain valve №140n closed - Cranes №141n , №3 (vents) are closed ; - №144n valve is open. <p>Opens the drain valve № 140n the chamber for starting to release from the field and release the pressure in the chamber to atmospheric pressure.</p>	

Fig. 7 - Example of Part 3 of guidance card

5. Conclusion

Thus, guidance cards as a form of industrial instructions of safety have the following advantages:

- A clear idea and a detailed description of the performing each operation by employees;
- Emphasising employees' attention to important points in the works, affecting their safety and the safety of the facility;
- The formation of the visual memory of the employee while learning guidance cards;
- The exclusion of inaccurate definitions and operations that increase the chance of errors;
- Reduction of work time without reducing the level of safety of the facility and the employee.

Apart from the obvious advantages, guidance cards have disadvantages. The main disadvantages are:

- The impossibility of the maximum inclusion of all local regulatory documents of the Company in the Guidance card;
- The inability to specify and complete details of some types of work;
- Duplication of local regulatory documents of the Company;
- Labor-intensive;
- The need to involve experts in various fields;
- The impossibility of taking pictures of certain types of work.

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