

## HARMFUL AND DANGEROUS FACTORS IN OIL AND GAS PRODUCTION FACILITIES

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*Аннотация:* В статье рассматривается влияние опасных и вредных производственных факторов на работников нефтегазовой отрасли. Это физические, химические, биологические, психофизиологические факторы. Исходя из рабочих задач рабочих, большее или меньшее влияние этих факторов на работника основано на таблицах и рисунках.

*Ключевые слова:* физический фактор, химический фактор, биологический фактор, психофизиологический фактор, химреактивы, сероводород, меркаптаны, логистическая служба, оператор, бурильщик, монтажник, лаборант-сборщик.

*Abstract:* the article examines the impact of dangerous and harmful production factors on workers in the oil and gas industry. They are physical, chemical, biological, psychophysiological factors. Based on the work tasks of the workers, the more or less effect of these factors on the worker is based on the tables and pictures

*Keywords:* physical factor, chemical factor, biological factor, psychophysiological factor, chemical reagents, hydrogen sulfide, mercaptans, logistics service, operator, driller, assembler, laboratory technician-collector.

In oil and gas extraction, workers come into contact with dangerous and harmful production factors. They can vary significantly in terms of quality and quantity depending on the profession. The main negative production factors: physical, chemical, biological, psychophysiological.

Classification of dangerous and harmful production mass by professions is carried out in accordance with GOST 12.0.003-2015.

**Harmful production factor** is a factor that causes a decrease in working capacity or illness when it affects a person working under certain conditions [1].

A dangerous production factor is a factor that causes a sharp deterioration of health or injury under certain conditions.

**Physical factors** in the field of oil and gas production - the fact that the oil and gas fields of Uzbekistan are located mainly in desert areas, daily work of workers in open weather for 12 months, direct oil and oil products, chemical reagents, oil splash, explosion, fire risk, include dangerous and harmful production factors such as vibration, noise, moving and rotating mechanisms, oil and gas vapor poisoning [2].

In addition, the working conditions of workers are negatively affected by dust, gas pollution and rapidly changing weather conditions.

**Chemical production factors** are determined by the composition of oil. According to its chemical composition, oil is a complex combination of various hydrocarbons, which may contain sulfur, nitrogen, and others.

The main structural elements of oil are carbon and hydrogen, and the elemental composition varies within small limits: carbon 83-87%, hydrogen 11-14%). The share of other elements (sulfur, nitrogen and metals) is 2-3%. [3].

Crude oil vapors and by-products are released into the atmosphere. The most dangerous are oil sulfur compounds (hydrogen sulfide, mercaptans) and fuel combustion products (carbon monoxide, sulfur dioxide, metal compounds). [4]. In the course of work, due to improper organization of work, sometimes workers may be adversely affected by oil vapors and gases that form explosive mixtures with air.

Also, acute poisoning with vapors released from oil increases the excitability of the central nervous system, reduces blood pressure and the sense of smell. Symptoms of worker poisoning with these substances include dizziness, dry mouth, headache, nausea, memory loss [5]. The most common toxic substances, in addition to those listed above, are ammonia, methanol, and chlorine [6].

**Biological factors** are determined by (desert) insect bites and (desert) animal attacks. As a means of protection, it is recommended to wear a mask on the face and gloves on the hands.

**Psychophysiological factors** - (nervousness, stress, fatigue) - this is an emotional feeling associated with the risk of explosion and fire, emergency situations in almost all oil and gas production. [7]. Production processes in the field of oil and gas production are continuous and complex, facilities are far from housing and production bases, which also affects the psychological state of workers. In this regard, a 12-hour shift schedule will be introduced.

Based on the analysis of the conducted studies and evaluation of the work of oil and gas complex workers [8], it was determined that the level of damage corresponds to the 3rd class of the 1-4 level. Negative conditions and harmful factors affecting the occurrence of diseases among oil and gas workers are as follows: a combination of physical and chemical factors, heavy work and shift work processes, unfavorable microclimate, vibration, noise [9].

Many different jobs are needed to keep a hydrocarbon production platform running. Table 1 lists some of the working specialties that are required for the maintenance and repair of a drilling rig.

**Table 1** - Working specialties for servicing a drilling rig

<b>Speciality</b>	<b>Does the job</b>
<b>Driller</b>	Technological specialty for the extraction of oil and gas, and other minerals.
<b>Welder</b>	Engaged in welding work in the assembly and disassembly of drilling rigs, and other structures.
<b>Collector-laboratory</b>	Engaged in the preparation of drilling mixtures and supervises the laying of cores and drilling cement slurries.
<b>locksmith</b>	Engaged in the current repair and maintenance of pneumatic control systems for pumps on drilling rigs, the drive of the mechanism and the entire complex of devices.
<b>Electrician</b>	He is engaged in the repair and control of the state of electrical equipment on drilling platforms, as well as on drilling rigs.
<b>fitter</b>	Installation of drilling rigs, works as part of a rig assembly team. There are also positions of a rig-welder, a rig-electrician, a rig-dieselist, a rig-mounter-carpenter (at present, it is practically not found, because during the installation of modern drilling rigs, wood, as a material, is replaced by rolled steel) .

At each workplace that has a risk of harm to the health of an employee, it is necessary to provide personal protective equipment against harmful and dangerous factors - called special clothing.

Lagunova V.V. As part of the work carried out by [10], a risk rating was proposed according to the class of working conditions and the assessment of damage to the health of workers, which was formed on the basis of statistical analysis of data from manufacturers of special clothing

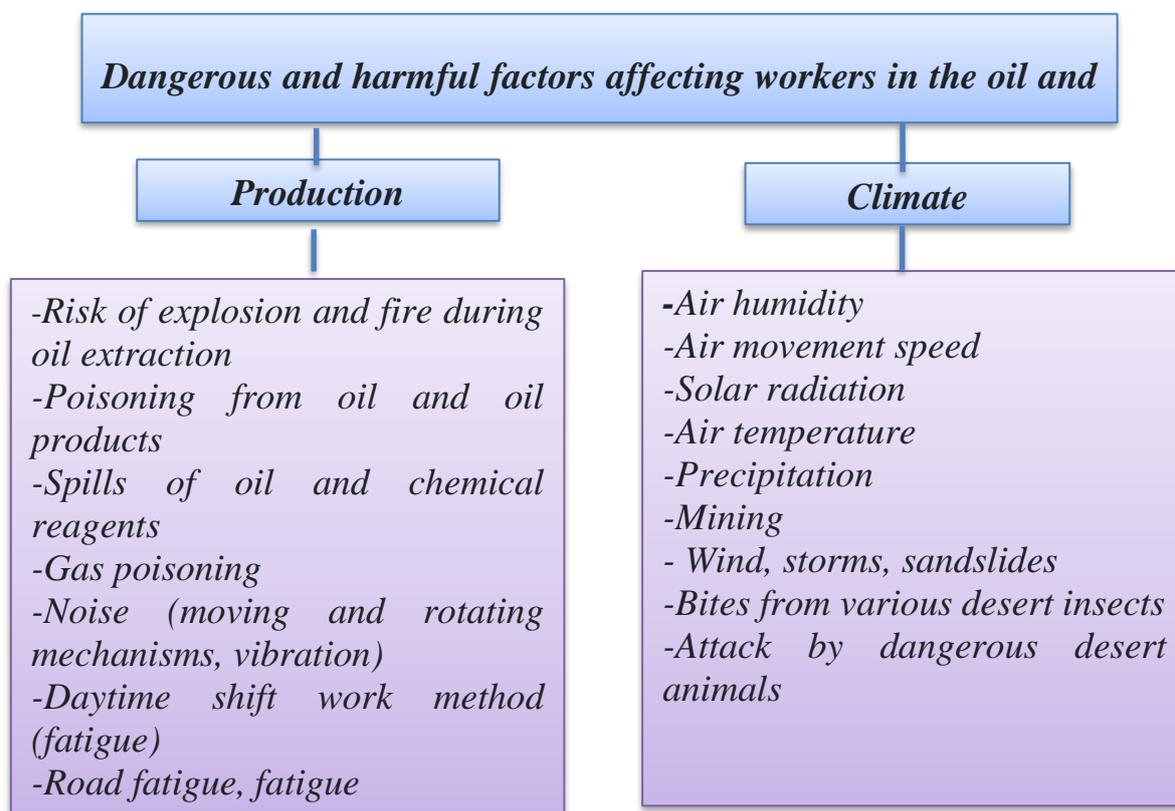
**Table 1.**Classes of working conditions of oil and gas production workers

<b>Working conditions Classes according to the manual R 2.2.755-99</b>	<b>Index of occupational diseases</b>	<b>Type of professions in the oil and gas industry</b>	<b>Oil and gas production industry occupational hazard category</b>
1	2	3	4
1- optimal	0	For logistics service	There is no danger
2- allowed	<0,05	For engineering service	The risk is not significant
3.1- harmful	0,05-0,11	For enterprise operators	Small
3.2- harmful	0,11-0,25	For drivers	Average
3.3- harmful	0,25-0,5	For Well Driller, Driller Assistants For the miner	High
3.4- harmful	0,5-1,0	For fitters-welders (fitters in high places)	Very high
4-dangerous (extreme)	~1,0	In case of explosion or fire	Very high

Table 1 lists 4 classes of working conditions formed according to working conditions (hygiene, etc.): optimal, permissible, harmful and dangerous. As a result of research conducted by the Medical Scientific Research Institute, it was determined that various occupational diseases are related to the hazards encountered in the work activities of workers.

For logistics service, engineering service, there is no risk or the risk is not significant, for operators in the enterprise - low, for machinists - medium, for drillers, driller assistants, and for oil and gas producers - high, for assemblers-welders (installers in high places) - very high, in the event of an explosion or fire - there are extremely high risks.

Figure 1 presents a systematized version of hazardous and harmful factors affecting workers in the oil and gas industry, including oil and gas production facilities.



**Picture 1.** Dangerous and harmful factors affecting workers in oil and gas production facilities

Thus, it was determined the negative impact of PPE on workers, the need to design special clothes that withstand real working conditions. In order to design special clothing that protects against heat, it is necessary to study the types of special clothing currently available in Uzbekistan, designed for working in open weather.

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