

Electrical Security Problems at the Enterprises of the Chemical Industry of the Northern Territories

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Abstract: *The article is devoted to the study of electrical safety problems at the enterprises of the chemical industry in the northern territories. The influence of the harsh climatic conditions of the for north and territories equated to it on production processes and working a condition is considered.*

Key words: Far North, electrical safety, oil and gas industry, problems

Introduction

Today, one of the leading industries in Russia is the oil and gas industry, the existence and development of which is inextricably linked with an equally important industry - the electric power industry. Stable production, transmission and sale of electricity are the priority tasks of the electric power industry, requiring the well-organized work of all elements involved in this industry, from a street lamp to the Talimarzhan hydroelectric power station. 115

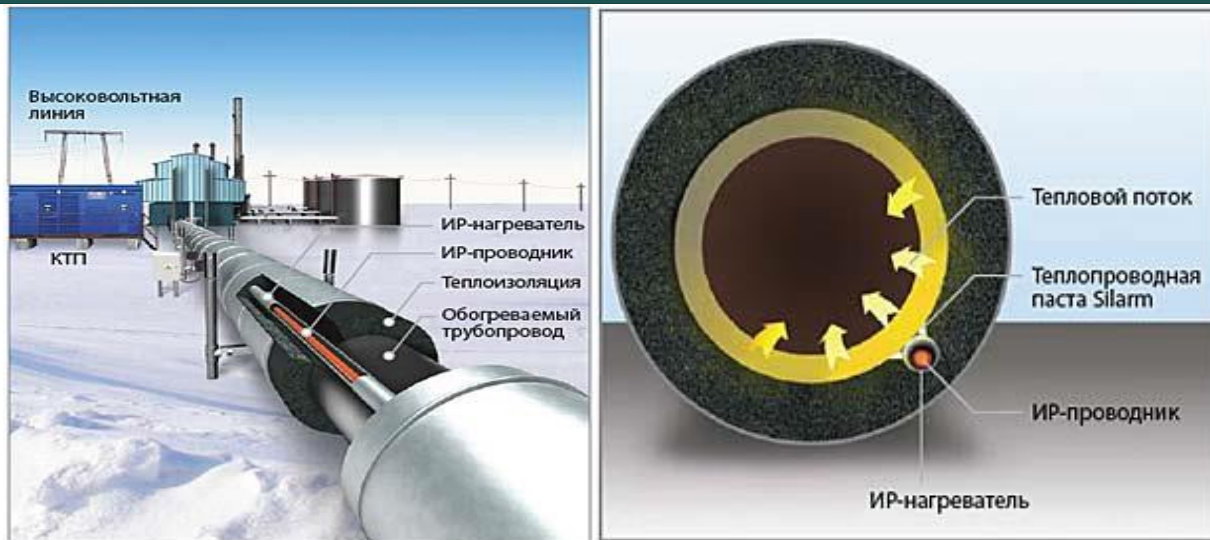
When introducing and improving innovative equipment in production, it is always worth considering the specific conditions of its operation and the influence of various factors on the work of the personnel servicing and operating this equipment.

The purpose of this study is to identify electrical safety problems at the enterprises of the chemical industry in the northern territories. The Far North is a part of the Earth's territory, located mainly north of the Arctic Circle and known for the severity of its climate. The Labor Code guarantees the provision of various benefits, payments, allowances, percentage allowances to wages, additional days off and vacation days to persons working in the northern territories. Organizations, in turn, provide their personnel with various personal protective equipment and the necessary equipment for working in low temperatures oblige personnel to undergo specialized medical examinations, carry out the necessary instructions and measures, the purpose of which is to eliminate all problems arising at work caused by weather conditions, provide personnel sanitary - household and medical - preventive services [1].

Materials and methods

Speaking about the electric power industry at the enterprises of the Chemical industry, it is worth noting the effect of low temperatures on both the service personnel and the electrical equipment in general.

The design, performance, purpose and principle of operation of any electrical equipment depend on many factors. When introducing a new element into the system, it is necessary to provide for all possible changes in its operating conditions, be it a change in load, an emergency, a change in temperature, etc. Consider the electric power component of the N-th enterprise of the Chemical industry in the N-th territory, equated to the Far North. Icing is one of the most common industrial problems. Icing of overhead transmission line supports is a common phenomenon that causes the need for special step-bolts and auto-hydraulic lifts to ensure the safety of personnel working at height. The electrical installation rules (hereinafter - PUE) pay special attention to overhead lines passing in the Far North. In such conditions, the rules require the product of protection against vibration of overhead lines according to a special project, and when approaching the choice of material for insulators, it is worth giving preference to glass, or, if there is an appropriate justification, polymers.



1-Fig. General view of the pipeline structure

In the regions of Western Uzbekistan and the Far North with parallel passage of 110 kV overhead lines and higher with technical corridors of aboveground and ground gas pipelines, oil pipelines, oil product pipelines and ammonia pipelines 116 the distance from the axis of the overhead line to the extreme pipeline is strictly regulated and must be at least 1000 m. This distance is provided under similar conditions for the transport of flammable liquids and gases [2].

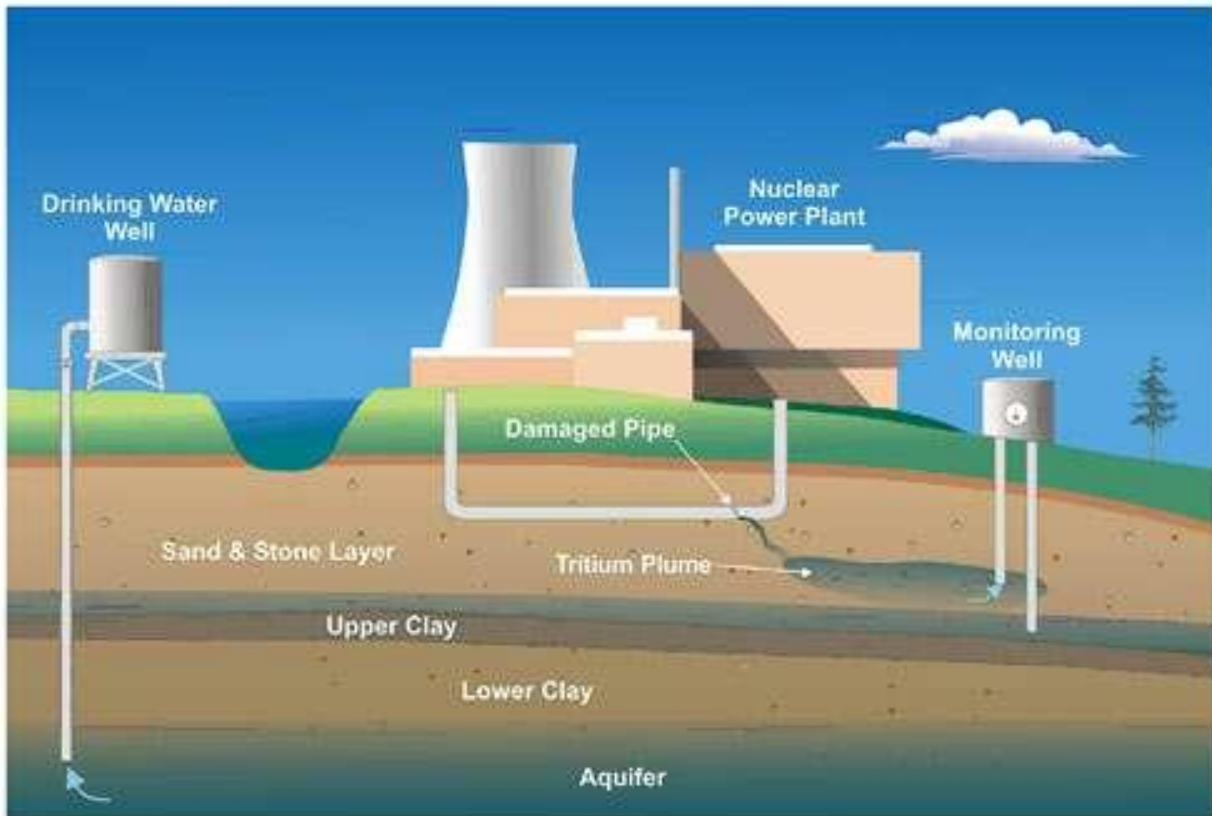
Result and discussion

The design, execution, installation method, class and characteristics of the insulation of the machines, apparatus, cables, wires, devices and other electrical equipment used must correspond to the parameters of the network, operating modes, and environmental conditions. The implementation of these requirements for the PUE in the Far North is quite costly in terms of economics, resources, labor costs. Low temperatures have a significant impact on the performance of electrical equipment. Cold affects and changes the structure of metals, the degree of their fragility; affects the viscosity of the oil, contributing to its thickening. Freezing of open pipelines, compression and expansion of metals and many other problems that arise in the Far North and in the territories equated to them require the development and improvement of methods to ensure optimal operating conditions for electrical equipment.

The interaction of low temperature conditions and solar radiation contributes to damage to the insulation of vacuum equipment, which leads to incorrect operation of the equipment and the risk of accidents. Freezing of the line disconnections can also lead to emergency operation. The danger lies in difficult switching operations and subsequent voltage drop. This problem is solved by improving the methods of sealing the equipment, however, this method does not exclude the possibility of condensation, which also adversely affects the operation of line disconnections. There is a reverse theoretical way to solve the problem, which is to increase clearances and backlash, which will reduce the risk of failure during switching, but it will also not be an ideal solution. The most optimal method today is the creation of closed rooms that provide protection from the effects of low temperatures.

The problem of heating on pumping units, which is directly related to the chemical industry, is that in a harsh climate, the controllers of control stations for pumping units sometimes do not work correctly. Previously, a heating system was provided on the pumping units, but today the problem of the effect of low temperatures on these controllers is urgent.

The need to confront the above and other problems contributed to the introduction of measures to prepare for the autumn-winter period, the construction of logistics for the use of transport (including specialized ones), the implementation of a liquidation plan 117



2-Fig. General view of the construction of pipelines from production to consumer.

Possible accidents for abnormal cold weather with a step-by-step and detailed principle of action, etc. Investigating the impact of the harsh northern climate on production processes, it is worth paying special attention to the well-being, equipment and working conditions of personnel who are in direct contact with electrical equipment. Often, scheduled preventive maintenance requires delicate work with small elements, and therefore the use of special protective warm gloves is inconvenient, but necessary. Previously, a similar problem affected not only protective gloves, but the entire set of work clothes as a whole. Over time, the equipment became more practical without losing its warming properties. Nevertheless, inconveniences arise when working in insulated, heavy clothing and mittens.

The conditions of the harsh northern climate force organizations to introduce special production breaks for rest and heating of personnel, but interruption of many work at low temperatures is impossible for technical reasons. Thus, the introduced breaks can have a negative impact on the process of carrying out scheduled preventive and other works.

Conclusion

The problems of electrical safety at the enterprises of the chemical industry of the northern territories exist when providing special comfortable, efficient and economically rational production conditions that exclude the possibility of accidents, damage to equipment necessary to maintain stable production, and harm to the health of service personnel and consumers. All elements of the production mechanism are dependent on climatic conditions and the failure of one of the elements affects the operation of the other.

Thus, overcooling of personnel serving electrical equipment can lead to poorly performed repairs and subsequently to malfunctions of this equipment, dangerous accidents, not to mention serious illnesses of the personnel themselves. Equipment installed openly and not protected from the influence of low temperatures does not work correctly, or even does not work at all. Its service life is rapidly decreasing.

Unreliable, low-quality and unstable equipment over time increases the level of production risk exponentially, which proves the need to find ways to optimize the existing power supply system in the chemical industry.

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