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AUTOMATED CONTROL SYSTEMS MICROCLIMATE FACILITIES, MONITORING AND AUDIT WITHIN OIL FIELDS INFLUENCE

Abstract. *Purpose. To achieve the main task of research it is necessary to achieve the following objectives: justify the scientific approach solving the problem of improving the quality of the monitoring and forecasting of microclimate for the performance of oilfield facilities; propose research methodology of microclimate, patterns of their formation and impact assessment microclimate on operational characteristics of the objects.*
Methods. The given article deals with the method of analyzing the previous studies localized within oil objects in Western Ukraine.
Findings. The given international experience and analysis of previous studies proved algorithm for Environmental Studies, through monitoring and forecasting of microclimate parameters during execution of manufacturing operations, to improve the environmental safety of the environment within the oil fields of influence objects.
Originality. The main research was made by author personally using special computer programs.
Practical implications. It has been analyzed: 1) a brief description of climate zone placement of oil fields; 2) methods of previous studies evaluating microclimatic parameters.
Keywords: *microclimate, automated control system, environment, oil fields, ecological monitoring.*

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Introduction

Among the key issues relating to the environmental assessment of the environment within the oil industry facilities allocated to lack of techniques and methodologies for evaluating the likely impact of micro-climatic parameters.

One method of determining such kind of changes is the method of assessment for the background and regulatory indicators. When conducting research examined the following methods and techniques: a comparative analysis of the methods and means of measurement of microclimate; methods of formalization, modeling, estimation and forecasting; method of hazard analysis and critical control points; methods for determining the size and concentration of aerosol particles, temperature and humidity of the surrounding air; methods of mathematical and physical modeling, including the method of expert estimates.

Modern development of oilfield facilities and introduction of new technologies and industry installations require high reliability, speed and precision of the operation control of the technological environment – namely microclimate.

In this regard, research and creation of reliable and effective systems of control of microclimate is important for the oil and gas industry [1-5].

This makes the urgency of the task of developing and implementing advanced and effective control systems microclimatic parameters on the basis of a systematic

approach to the development of methodology, measurement and control of microclimate, and technological support functional apparatus forecasting changes of microclimate parameters over time, taking into account the nature of relationships and processes within the technology environment, which in turn will ensure the quality of the performance of oilfield facilities.

The analysis of scientific literature has identified a number of outstanding issues related to the common goal of providing high and stable indicators of the performance of oilfield facilities by the control of microclimate. The quality of the technological environment in particular ensured strict compliance of microclimate. For this purpose, we offer to analyze the literature on the influence of microclimate on the performance of oilfield facilities, the estimation methods and means of control and formation of microclimate.

To achieve this goal it is necessary to achieve the following objectives:

• justify the scientific approach solving the problem of improving the quality of the monitoring and forecasting of microclimate for the performance of oilfield facilities;

• propose research methodology of microclimate, patterns of their formation and impact assessment microclimate on operational characteristics of the objects;

• establish methods of analysis and prediction of microclimate on the basis of physical and mathematical relationships, algorithms and methods of research;

• develop an automated system for the control of microclimate within oil field functioning facilities.

The main part of the article

Items oil fields in Western Ukraine are situated in the temperate zone; the climate is generally temperate continental.

The analysis of scientific literature has identified a number of outstanding issues related to the common goal of providing high and stable indicators of the performance of oilfield facilities by the control of microclimate. The quality of the technological environment in particular ensured strict compliance of microclimate within the specified class. For this purpose, we offer to analyze the literature on the influence of microclimate on operational characteristics of the objects, the estimation methods and means of control and formation of microclimate.

The measurement of microclimate and analysis of the results is made according to the international standard ISO 14644, the law of labor protection and sanitary norms [1, 2].

Dimensions of aerosol particles and their concentration in the indoor air oilfield objects (for example Bogorodchany production line) are measured only for the size of the particles that set technical requirements assembly process. Measurements can be made by proposed method for automated continuous air sampling. To finish the measurement results proposed to use a graphical method of sequential sampling [5].

To predict the state of microclimate asked to use the methods of interpolation and extrapolation function using cubic splines.

Calculation of the parametric reliability of the system is based on parametric methods for determination of the reliability of the circuit control system.

To assess the influence of microclimate encouraged to use the method of expert estimates. For evaluation of group average value estimates for each object:

$$x_i = \sum_{h=1}^{l} \sum_{j=1}^{m} q_h x_{ij}^h k_j (i = 1, 2, ..., n). \quad (1)$$

where m – the number of experts that perform evaluation n objects l on indicators; evaluation results are presented as a rank x_{ij}^h; j – number of experts; i – number of the object; h – index number (signs) comparison; q_h – weight ratio performance comparison sites; k_j – expert competence factor.

Odds competence of experts evaluated the degree of consistency with group assessment objects:

$$k_j^t = \frac{1}{\lambda^t} \sum_{i=1}^{n} x_{ij} x_i^t; \qquad \sum_{j=1}^{m} k_j^i = 1 \ (j = 1, 2, ..., m). \quad (2)$$

The method enables peer reviews to evaluate that performance in the process of preparation, depending on the room temperature, and assess the degree of dependence.

Using risk analysis and critical control points HACCP (Hazard Analysis and Critical Control Points) allows you to perform a comprehensive assessment process to identify the factors that are the most dangerous for the performance of objects and technological operations. However, an analysis of hazards and selected those that eliminate or reduce the negative impact which significantly affects the functioning of the study.

Conclusion

So, given the international experience and analysis of previous studies proved algorithm for Environmental Studies, through monitoring and forecasting of microclimate parameters during execution of manufacturing operations, to improve the environmental safety of the environment within the oil fields of influence objects.

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К.О. Радловська

АВТОМАТИЗОВАНІ СИСТЕМИ УПРАВЛІННЯ МІКРОКЛІМАТОМ ОБ'ЄКТІВ, МОНІТОРИНГУ І АУДИТУ В МЕЖАХ ВПЛИВУ НАФТОВИХ РОДОВИЩ

Анотація. Для досягнення основної мети дослідження необхідно вирішити наступні завдання: обґрунтувати науковий підхід, що вирішує проблему вдосконалення процедур моніторингу нафтопромислових об'єктів; запропонувати методологію дослідження мікроклімату.

Дана стаття присвячена аналізу попередніх досліджень, проведених в межах впливу нафтових родовищ в Західній Україні.

Міжнародний досвід і аналіз попередніх досліджень довели перевагу алгоритму екологічних досліджень за допомогою моніторингу та прогнозування параметрів мікроклімату під час виконання технологічних операцій, спрямованих на поліпшення екологічної безпеки навколишнього середовища в межах впливу нафтових родовищ.

Основне дослідження було зроблено автором особисто за допомогою спеціальних комп'ютерних програм.

Було проаналізовано: 1) короткий опис кліматичної зони в межах розміщення нафтових родовищ; 2) методи попередніх досліджень, що оцінюють мікрокліматичні параметри.

Ключові слова: мікроклімат, автоматизована система управління, охорона навколишнього середовища, нафтові родовища, екологічний моніторинг.

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