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HYGIENIC ASSESSMENT OF WORKING CONDITIONS AND HEALTH RISKS AMONG WORKERS OF A THERMAL POWER PLANT IN FERGANA

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Abstract: Occupational hygiene is one of the branches of medicine that studies working conditions and their specific characteristics in industries where work activities impose high demands on workers, involve hazardous and harmful factors, and are accompanied by high neuropsychological stress, which may lead to early morbidity and premature termination of employment. The comprehensive impact of unfavorable industrial factors negatively affects the functional state of the human body, which in turn leads to a decrease in the level of occupational health and reliability of professional activity. Ensuring high efficiency and reliability of occupational performance while preserving workers' health under such conditions remains a priority task of occupational hygiene.

Keywords: Occupational hygiene; Working conditions assessment; Occupational exposure; Physical workplace factors; Noise exposure; Vibration exposure; Non-ionizing electromagnetic fields; Microclimate parameters; Illumination levels; Occupational health risk;

Relevance of the Study

In recent years, rapid changes in the environment and social conditions, along with an increase in anthropogenic load on the human body, have led to a significant rise in morbidity and a decline in adaptive and compensatory capacities among various population groups. Under these conditions, one of the priority objectives of hygiene science has been to intensify comprehensive hygienic studies within the "environment–human" system and to expand scientific research aimed at identifying integral indicators of the impact of environmental, industrial, and social factors on human health.

Recent system-analytical studies have made it possible to clearly formulate the basic requirements for assessing the functional state of the body. To adequately characterize regulatory mechanisms, functional status, and vital activity levels, a multidimensional set of indicators is required that allows for effective identification and prediction of adverse conditions.

Objectives of the Study

The objectives of this study were: to provide a hygienic characterization of the production environment and working process conditions of workers in the main occupational groups of the Fergana Thermal Power Plant;

- to identify leading production factors and the specific features of their adverse effects on workers' health;
- to substantiate the classification of working conditions for major occupational groups in accordance with approved regulatory documents;
- to assess the nature and degree of the impact of working conditions on the health of thermal power plant workers;
- to develop practical recommendations aimed at improving occupational health protection systems and ensuring the reliability of professional activity in the electric power sector.

Materials and Methods

At the initial stage of implementing health promotion programs among workers of the Fergana Thermal Power Plant, a questionnaire survey was conducted. The study included 100 employees from the following main departments: administrative staff, boiler and turbine shop, fuel and transport shop, chemical shop, automated production control systems department,

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thermal automation and instrumentation shop, centralized repair workshop, electrical shop, and sanitary laboratory.

The age of employees ranged from 20 to 67 years (mean age: 39.0 ± 9.6), including 10 women and 90 men. All workers were divided into age groups:

- up to 30 years;
- 30–40 years;
- 41–50 years;
- over 50 years.

According to the classification proposed in the Rules for Working with Personnel in Electric Power Organizations of the Republic of Uzbekistan, all surveyed employees were divided into five categories:

1. managerial personnel and specialists;
2. operational personnel;
3. operational and maintenance personnel;
4. auxiliary personnel;
5. other specialists and employees.

Assessment of Working Environment Factors

Sanitary-hygienic parameters of the production environment at workplaces were studied, including:

- air temperature;
- air velocity;
- air humidity;
- illumination;
- noise;
- vibration;
- air ionization;
- chemical factors.

The hygienic assessment of working conditions was carried out in accordance with hygienic criteria for evaluating labor intensity based on the harmfulness and hazard of production environment factors, as well as the severity and intensity of the work process.

According to Guideline R 2.2.2006-05 *"Hygienic Assessment of Factors of the Working Environment and Work Process. Criteria and Classification of Working Conditions"*, working conditions are classified into four classes: optimal, acceptable, harmful, and hazardous.

Harmful working conditions (Class 3) are subdivided into four degrees depending on the extent to which hygienic standards are exceeded and the severity of health changes in workers.

Results and Discussion

The hygienic study of working conditions at the Fergana Thermal Power Plant showed that the main unfavorable factors of the work process were non-ionizing electromagnetic fields and radiation, electrostatic fields, high levels of noise and vibration.

The most hazardous and harmful working conditions were identified among the following occupations: boiler operator, senior power unit operator, maintenance foreman, electrician, electrical fitter, boiler cleaner, and head of the computing group within the administrative apparatus.

Microclimate parameters at workplaces did not exceed maximum permissible levels, indicating generally favorable microclimatic conditions. However, illumination levels in certain workshops did not comply with hygienic standards. Insufficient natural lighting contributes to reduced immunity, increased fatigue, decreased productivity, and higher risk of injuries, as well as the development of myopia and presbyopia.

Noise and vibration levels in several workshops exceeded permissible standards. Prolonged exposure to vibration above maximum permissible levels may lead to the development of

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vibration syndrome, while combined exposure to noise and vibration accelerates functional disorders and contributes to clinical pathology.

The intensity of work classified as Class 3 (harmful conditions) was most characteristic of managerial, operational, and maintenance personnel, whereas work severity classified as Class 3 was more typical of maintenance and auxiliary workers.

Conclusion

The results of the hygienic assessment of working conditions at the Fergana Thermal Power Plant indicate that the main adverse factors of the production environment include non-ionizing electromagnetic fields and radiation, electrostatic fields, noise, vibration, and excessive illumination.

From the perspective of physical factors, the most unfavorable working conditions were observed among operational and maintenance personnel, whose workplaces were predominantly classified as harmful (Class 3) for almost all measured physical factors.

References:

1. World Health Organization (WHO). (2012). *Guideline: Sodium intake for adults and children*. Geneva: WHO.

2. World Health Organization (WHO). (2015). *Guideline: Sugars intake for adults and children*. Geneva: WHO.

3. World Health Organization (WHO). (2020). *Healthy diet*. Geneva: WHO.

4. Mozaffarian, D., Fahimi, S., Singh, G. M., et al. (2014). Global sodium consumption and death from cardiovascular causes. *New England Journal of Medicine*, 371(7), 624–634.

5. Malik, V. S., Popkin, B. M., Bray, G. A., et al. (2010). Sugar-sweetened beverages and risk of metabolic syndrome and type 2 diabetes. *Diabetes Care*, 33(11), 2477–2483.

6. He, F. J., & MacGregor, G. A. (2009). A comprehensive review on salt and health and current experience of worldwide salt reduction programmes. *Journal of Human Hypertension*, 23(6), 363–384.

7. Te Morenga, L., Mallard, S., & Mann, J. (2013). Dietary sugars and body weight: systematic review and meta-analysis. *BMJ*, 346, e7492.

8. Qadirjanova F.N. Issiqlik elektr stansiyalari korxonalarida ish sharoitining ishchilar salomatligiga ta'siri. // Journal of Humanities and Natural Sciences. – 2025. – №24. – B. 20–22.

9. Qadirjanova F.N. Measures for the Safety of Labor Hygiene. // Galaxy International Interdisciplinary Research Journal. – 2024. – Vol. 12, №9. – P. 35–39.

10. Rahmatshoyev M. The importance of vitamins and minerals for athletes. // Ethiopian International Journal of Multidisciplinary Research.

11. Melibaeva B.K., Toshtemirova M.K. Pneumonia in newborn babies on ventilators. // World Bulletin of Social Sciences. – 2023. – Vol. 19. – P. 16–17.

12. Sanitary Rules and Norms of the Republic of Uzbekistan (SanPiN). Hygienic requirements for working conditions in industrial enterprises. – Tashkent.

13. Saidova K., Madraimov A., Kodirova M., Babarakhimov T., Zokirov K. Assessing the impact of invasive species on native aquatic ecosystems and developing management strategies. // International Journal of Aquatic Research and Environmental Studies. – 2024. – Vol. 4. – P. 45–51.

14. Ashurova M.D., Mo'ydinova Y., Atadjanova D., Muhammadova G., Ismoilov D. Pedagogical efficiency of integrated learning in the organization of hygiene classes in medical universities. // BIO Web of Conferences. – 2023. – Vol. 65. – P. 10016.

15. Saodat R., Nozimbek N., Muzaffarova N., Nematullokh F., Nargiza U., Bobojonov O., Tulkin E. Investigating the relationship between air quality index and daily variations in blood pressure among urban residents. // Revista Latinoamericana de Hipertension. – 2025. – Vol. 20, №3. – P. 242–247.

pISSN:2349-5707 Volume:13,Issue 4, April -2026 eISSN:2349-5715

16. Rahmatshoyev M. Hygienic and age-related factors in the development of arterial hypertension among the elderly. //ActaCAMU.