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## **GAS AND DUST CONSIDERATIONS AS A LEADING PRODUCTION FACTOR IN INDUSTRIAL ZONES**

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### **ABSTRACT**

The industrial zone is characterized by the variability of the chemical composition of the air, which contributes to the analysis of its main indicators. The purpose of this work is to study air pollution in industrial areas of industrial zones. The object of research was the working conditions of employees of enterprises located in the Kirguli industrial zone. The subject of research was the production factors of labor, quantitative and qualitative indicators of the chemical factor, professional risks. The study of the working conditions of workers in an industrial zone made it possible to identify the leading production factors - the chemical factor, in combination with high dust content. The working conditions of the studied industrial enterprises on the territory of the industrial zone, according to the indicators of harmfulness and danger of factors of the production environment, the severity and intensity of the labor process, were assessed as "harmful" - grade 3, grade 3 and 4, the levels of occupational risk - "above average" and "high".

**Key words:** workplaces, working conditions, workers, air environment, gas pollution, dustiness, professional risks.

### **INTRODUCTION**

One of the urgent problems for large enterprises is the study of the peculiarities of the influence on the body of working the most harmful factors

among occupational risks - gas pollution and dustiness of the working environment, especially with their prolonged exposure in combination with other factors. The deterioration of the ecological state in production areas leads to economic costs. The issues of rational placement on a single territory of an industrial zone of industrial facilities and industries, buildings and structures with technological processes, depending on their sanitary classification, have not been adequately covered in the available literature.

However, a number of researchers have shown that the air of industrial zones is characterized by a complex and multicomponent composition of various chemical pollutants, which has a combined effect on the organism of workers. Clinical studies have established a multi-vector professional effect of chemical reagents on the body of workers, depending on the direction of production. It was revealed that the most dangerous and harmful industries in industrial zones are emissions from oil refining and chemical industries. Thus, in the context of the development of small economic zones, providing for the unification of multidirectional industries in a single territory, as well as the prospects for the further development of this direction in the republic, a comprehensive study of the risk factors of production, taking into account their combined and combined impact on the body of workers are relevant and timely [1, 2, 3, 4, 5, 6].

**The purpose** of this work is to study air pollution in industrial areas of industrial zones.

**Materials and methods.** The object of research was the working conditions of employees of enterprises located in the Kirguli industrial zone. The subject of research was the production factors of labor, quantitative and qualitative indicators of the chemical factor, professional risks. To achieve the goal, sanitary and hygienic, laboratory, calculation and statistical research methods were used.

The study of working conditions was carried out with the identification of quantitative indicators of the chemical and dust factor at the workplaces of the main professional qualification groups. Thus, measurements of the dustiness of the air were carried out according to the methodological instructions "Identification of hazardous and harmful production factors in laboratory studies to assess working conditions" (Tashkent, 2013), the data obtained were evaluated in accordance SanNandR RUz No. 0294-11 "Hygienic standards. Maximum permissible concentration (MPC) of harmful substances in the air of the working area" and GOST 12.1.005-88 "General sanitary and hygienic requirements for the air of the working area". In order to determine the gas content of the air and its chemical composition, an ANT-3M analyzer-leak detector was used; the results obtained were evaluated in accordance with SanNandR RUz No. 0294-11 "Hygienic

standards for maximum permissible concentrations (MPC) of harmful substances in the air of the working area".

**Research results.** The study of the state of industrial zones showed the formation of unfavorable working conditions, created by a complex of harmful and dangerous factors, combined and combined impact.

The industrial zone includes objects of multidirectional production (an oil refinery, a production of mineral fertilizers and a facility for the generation of heat energy), where, because of the implementation of the main technological processes, chemical compounds are released and toxic waste is generated.

Studies of the chemical factor at an oil refinery on the territory of this industrial zone have shown that the chemical factor is represented by the content of the following pollutants in the air: carbon monoxide, sulfur dioxide, nitrogen oxide, ammonia, hydrogen sulfide, chlorine, toluene, benzene, acetone, hydrocarbons, kerosene, mineral oils petroleum, phenol, sulphurous oil, gasoline, caustic alkali, methyl ethyl ketone, diesel fuel. When studying the quality indicators, it was revealed that the actual content of nitrogen oxides (III hazard class) in the air of the workplaces of mechanics for the repair of technological installations, electricians and fitters for the repair and installation of submersible pumps exceeded the MPC by 2.0-3.1 mg / m<sup>3</sup>, and at the workplace of an electrician for the repair and maintenance of electrical equipment exceeded - by 4.6 mg / m<sup>3</sup> (MPC - 5 mg / m<sup>3</sup>). The content of sulphurous anhydride (IV hazard class) was detected only at the workplace of a mechanic repairing technological installations with an excess of 3.3 mg / m<sup>3</sup> (MPC - 10 mg / m<sup>3</sup>). It was found that the reasons for the excess content of nitrogen oxide, sulphurous anhydride and other chemical compounds are violations of the operation of technical installations and electrical equipment, insufficient control over the implementation of sealing measures, the lack of effective ventilation systems, as well as irrational organization of the labor process.

According to the generally accepted hygienic classification (SanNandR RUz No. 0141-03), the working conditions of the main professional and qualifying groups of the oil refinery were assessed as class 3 "harmful" grade 3 (3.3), and the most harmful workplaces were working conditions with chemical emissions and dustiness (manual electric welders welding, electric and gas welders, electricians for the repair and maintenance of electrical equipment) 3 class "harmful" 4 degrees (3.4).

The study of the gas content of the air in the production of mineral fertilizers showed that, depending on the technological process, the raw materials used and the methods of performing labor, the chemical composition of the air at different

workplaces of the production of mineral fertilizers differed significantly. So, at the workplaces of machine operators (absorption, desorption, granulation, evaporation, pumping units and neutralization), operators of pumping units, electricians for the repair of electrical equipment and repairmen, there is an excess of nitrogen oxide content by 2.2-2.9 mg / m<sup>3</sup> ( MPC - 5 mg / m<sup>3</sup>), and at the workplaces of apparatus operators (synthesis, absorption, desorption, granulation and evaporation) and electricians for electrical equipment - sulfur dioxide by 2.1 mg / m<sup>3</sup> (MPC - 10 mg / m<sup>3</sup>).

An enterprise for the generation of heat and electricity is characterized by the effect of dust, condensation aerosols, predominantly of fibrogenic action, and, in the warm season, significant excess ( $P < 0,05$ ) of the standard values for electric welders and electric gas welders was established:  $7.6 \pm 7.3$  and  $7.8 \pm 7.0$  mg / m<sup>3</sup> - respectively (MPC 6 mg / m<sup>3</sup>).

At the same time, during the cold season, the dust concentration did not exceed the MPC.

Dust identification showed that it belongs to the mixed type (organic and inorganic) in origin, condensation aerosols (electric welding) in the way of formation, and microscopic in fineness (more than 0.25 microns). It was revealed that the content of silicon dioxide (SiO<sub>2</sub>) impurities in the dust is less than 2%.

According to SanRandN RUz No. 0141-03, the working conditions of boiler drivers, boiler equipment maintenance locksmiths, turbine equipment maintenance mechanics, steam turbine operators, electric welders and electric gas welders at a combined heat and power plant are rated as 3rd class "harmful" grade 3 (3.3).

In general, when assessing the working conditions of workers in the production facilities of the Kirguli industrial zone, the combined impact of several risk factors of various origins was taken into account. Due to the fact that chemical substances of unidirectional action were determined in the air of working zones, we summed up the actual concentrations of nitrogen oxide, hydrogen sulfide, carbon oxide (according to Averyanov's formula) and the obtained value exceeded the norm.

To solve the problems of quantitative assessment of occupational risk in the context of the complex impact of risk-forming factors at the enterprises of the Kirguli industrial zone, the hazard index (HI) was determined. The index of harmfulness is the most adequate approach to quantifying the level of occupational risk based on the results of certification of workplaces by taking into account the total harmfulness of working conditions.

According to the method for determining the HI in accordance with the developed formula, it was determined as a percentage of the HI for each

production facility of the Kirguli industrial zone, respectively, 68% for the oil refinery, 62% for the production of mineral fertilizers, and 57% for the combined heat and power plant.

According to the value of the HI, the category of the suspected occupational risk was determined in accordance with the table.

**Table**

**Criteria for assessing occupational risk based on the results of workplace certification**

HI, %	Occupational health risk category
< 6	Acceptable (negligible, portable)
7 – 19	Small (moderate), possible restoring functional changes in the body
20 – 34	Medium (significant), an increase in occupationally determined morbidity is possible, the development of initial signs or mild forms of occupational diseases
35 – 79	High (intolerable), an increase in production-related chronic pathologies and the appearance of occupational diseases of mild and moderate severity are possible
> 80	Very high (intolerable), the development of severe forms of occupational diseases is possible, high levels of morbidity with temporary disability and a significant increase in the number of chronic pathologies

Based on the results of calculating the IW, the enterprises of the studied industrial zone are classified as “high (intolerable)”, which implies the growth and development of production-related chronic pathologies, occupational diseases of mild and moderate severity.

Since the working conditions in terms of the hazard and hazard of the factors of the working environment, the severity and intensity of the labor process were assessed as “harmful” - grade 3, grade 3 and 4 (3.3 and 3.4), the levels of occupational risk are assessed as “above average” ( 3.3) and "high" (3.4).;

### **Conclusions:**

1. One of the main problems for enterprises in industrial zones was the mutual air pollution.

2. Studying the working conditions of workers in the Kirguli industrial zone made it possible to identify the leading production factors - the chemical factor, combined with high dust content.

3. The working conditions of the studied industrial enterprises on the territory of the industrial zone, according to the indicators of harmfulness and danger of factors of the working environment, the severity and intensity of the labor process, were assessed as "harmful" - class 3, 3 and 4 degrees, the levels of occupational risk - "above average" and " tall".

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