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ANALYSIS OF ATMOSPHERIC AIR COMPOSITION IN NAVOI CITY IN 2015, CAUSES AND CONSEQUENCES OF AIR POLLUTION

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Abstract: This scientific article provides information about the changes in the atmospheric composition of Navoi city in 2015, including variations in gas concentrations and general levels of air pollution. The article also extensively analyzes instances where harmful gases exceeded permissible limits, highlighting their potential impact on human health and the environment.

Keywords: Navoi city, atmosphere, air pollutants, nitrogen oxides, sulfur dioxide, carbon monoxide, ammonia, phenol.

In recent years, environmental issues—particularly air pollution—have become urgent problems in various regions of Uzbekistan. This situation has worsened in some provinces due to the influence of large industrial enterprises and natural-geographical conditions. The Navoi region is not exempt from these environmental challenges. Industrial enterprises located in this area, especially the "Navoiyazot" Joint Stock Company, lime production plants, and other sources, emit large amounts of harmful substances into the air, posing serious threats to both human health and the environment. In daily life, the deterioration of air quality is becoming increasingly evident through the presence of coal smoke, dust, and other pollutants.

Therefore, this article analyzes the main causes of air pollution in the Navoi region, its impact on human health, and the measures aimed at reducing the problem. Within the scope of the study, the annual concentration of gases in the atmosphere was analyzed. The main sources of air pollution in the city are industrial enterprises and vehicles. Among the pollutants released by industrial facilities are dust, sulfur dioxide (SO_2), nitrogen oxides (NO_x), ozone (O_3), phenol, and ammonia. These substances degrade air quality and harm the environment.Dust consists of very fine solid or liquid particles suspended in the air. Dust particles can penetrate deep into the human respiratory tract, causing irritation, bronchitis, asthma, and other respiratory diseases. Long-term exposure to dust is also harmful to the cardiovascular system and increases the risk of illness. In addition, dust reduces visibility and decreases the amount of sunlight reaching the ground.Sulfur dioxide (SO_2) is a colorless gas with a pungent odor, mainly produced by industrial enterprises and during the combustion of coal or petroleum products. This gas irritates the respiratory tract, thereby aggravating bronchitis and asthma. In the environment, sulfur dioxide contributes to the formation of acid rain, which damages plants, aquatic organisms, and buildings.Nitrogen oxides (NO_x) are gases mainly emitted from vehicles and industrial processes. They inflame the respiratory system and worsen allergic reactions. In the atmosphere, nitrogen oxides contribute to acid rain and the formation of ground-level ozone, intensifying pollution and the greenhouse effect.Ozone (O_3) exists in two layers: in the upper stratosphere, it protects living organisms from harmful ultraviolet radiation. However, in the lower troposphere near the Earth's surface, ozone acts as a pollutant. Tropospheric ozone harms the respiratory system, exacerbates asthma and other lung diseases, slows plant growth, and negatively affects agricultural productivity.Phenol is a toxic chemical substance often released into the air from industrial waste. Phenol irritates human skin

and eyes, and at high concentrations, can cause poisoning. It also harms microorganisms in water and soil, disrupting ecosystem balance.Ammonia (NH_3) is a colorless gas with a strong odor, mainly produced by agricultural activities, fertilizer usage, and animal waste. Ammonia causes irritation of the respiratory tract and eyes, and at high concentrations, can lead to poisoning.

Table 1. Monthly Average Composition of Atmospheric Air in Navoi City in 2015

Average Monthly Concentration (mg/m³)									
No	**Months**	**Dust**	**Sulfur dioxide**	**Carbon monoxi-de**	**Nitrogen dio-xide**	**Nitrogen oxide,**	**Phe-nol**	**Ammonia**	**Ozone**
1	January	0.0	0.002	1	0.04	0.04	0.001	0.04	-
2	February	0.1	0.002	1	0.04	0.03	0.003	0.03	-
3	March	0.1	0.002	1	0.04	0.03	0.002	0.02	-
4	April	0.1	0.002	1	0.04	0.04	0.001	0.03	0.016
5	May	0.1	0.002	1	0.04	0.04	0.001	0.02	0.018
6	June	0.1	0.003	1	0.06	0.05	0.002	0.04	0.015
7	July	0.1	0.003	2	0.06	0.06	0.002	0.04	0.018
8	August	0.1	0.003	1	0.06	0.05	0.002	0.04	0.017
9	September	0.1	0.002	1	0.06	0.05	0.001	0.03	0.019
10	October	0.1	0.002	1	0.05	0.04	0.001	0.02	0.012
11	November	0.1	0.002	0	0.04	0.04	0.001	0.03	-
12	December	0.1	0.002	1	0.05	0.04	0.001	0.03	-
Annual Average		0.091	0.0022	1	0.048	0.0425	0.0015	0.031	0.0096

According to data observed in 2015, the monthly concentration of dust particles in the atmosphere was recorded at approximately 0.1 g/m³, with the amount of dust particles reaching zero in January. The concentration of sulfur dioxide did not show significant fluctuations, but an increase was observed during the summer months of June to August. Similarly, nitrogen dioxide levels also rose from June to September. The main reason for this is the high air temperature in Navoi city during the summer, which causes pollutants such as sulfur dioxide and nitrogen oxides to remain longer in the atmosphere. In hot weather, the temperature difference between air layers decreases, preventing pollutants from rising upwards and causing them to accumulate near the ground.

Table 2. Daily Average Composition of Atmospheric Air in Navoi City in 2015

Average Daily Concentration (mg/m³)									
No	**Months**	**Dust**	**Sulfur dioxide**	**Carbon monoxi-de**	**Nitrogen dioxide**	**Nitrogen oxide,**	**Phe-nol**	**Ammonia**	**Ozone**
1	January	0.15	0.05	1	0.04	0.04	0.001	0.04	-
2	February	0.15	0.05	3	0.04	0.06	0.003	0.03	-
3	March	0.15	0.05	3	0.04	0.06	0.003	0.04	
4	April	0.15	0.05	3	0.04	0.06	0.001	0.03	0.07
5	May	0.15	0.05	3	0.04	0.04	0.003	0.04	0.018
6	June	0.15	0.05	3	0.04	0.06	0.003	0.04	0.015
7	July	0.15	0.05	3	0.04	0.06	0.003	0.04	0.018

8	August	0.15	0.05	3	0.04	0.06	0.003	0.04	0.07
9	Septembe r	0.15	0.05	3	0.04	0.06	0.005	0.09	0.043
10	October	0.15	0.05	3	0.04	0.06	0.003	0.04	0.07
11	November	0.15	0.05	3	0.04	0.06	0.003	0.04	-
12	December	0.15	0.05	3	0.04	0.06	0.003	0.04	-
Annual Average		0.15	0.05	2.83	0.04	0.058	0.002 8	0.0425	0.025 3

Data observed throughout 2015 indicate that the monthly concentrations of atmospheric pollutants fluctuated over the months, with their maximum values varying as well. Specifically, exceedances of nitrogen dioxide (NO_2) standards were recorded twice in January, March, April, and October; 14 times in June; 4 times in July; 3 times in August; and 6 times in September. The increase in nitrogen dioxide levels negatively impacts human health and the environment. NO_2 irritates the respiratory tract, exacerbating cough, asthma, and bronchitis, posing particular risks for children and the elderly. It also contributes to acid rain, leading to soil and water pollution. Furthermore, under sunlight, NO_2 participates in smog formation, deteriorating air quality and visibility.

Several key factors contribute to the rise of nitrogen dioxide (NO_2) levels in Navoi city. First, large industrial enterprises located in the city, notably the Navoi Mining and Metallurgical Combinat and other industrial facilities, emit significant amounts of nitrogen oxides during fuel combustion and high-temperature manufacturing processes. Second, the high number of vehicles, combined with insufficiently developed road infrastructure and resulting traffic congestion, increases atmospheric nitrogen dioxide concentrations. Nitrogen oxides are generated during the combustion of automobile fuel, thereby contributing to air pollution.In 2015, the levels of air pollutants in the region were high. Navoi city, Konimekh, Karmana, and Tomdi districts stood out as the areas with the largest shares of pollution. The increasing number of industrial enterprises and vehicles has led to a rise in atmospheric air pollution. This situation demands serious measures to protect the environment and human health.

In conclusion, changes in air composition and the increase in pollutant concentrations in Navoi city in 2015 caused significant ecological problems. Analysis shows that the main harmful substances released into the atmosphere were nitrogen dioxide (NO_2), carbon monoxide (CO), sulfur dioxide (SO_2), and dust particles, which originated from industrial enterprises, vehicles, and fuel combustion processes. These gases pose serious threats not only to ecosystems but also to human health. In particular, the increase in respiratory diseases and the reduction of biodiversity are direct consequences of this situation. Based on the data presented in this article, it is substantiated that strengthening the environmental monitoring and control system across the region, as well as implementing clean technologies, is essential.

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