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AIR POLLUTION IN THE CITY OF NAVOI IN 2019 AND ITS ANALYSIS

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Abstract: This scientific article provides information on air pollution in the city of Navoi based on observations conducted in 2019 to study the composition of the atmospheric air. The article also briefly describes certain meteorological parameters observed throughout the year and their characteristics.

Keywords: Navoi city, atmosphere, pollutant gases, nitrogen oxides, sulfur dioxide, carbon monoxide, ammonia, phenol.

Air pollution is one of the most pressing environmental issues of our time. Public health, environmental quality, and sustainable development are often directly linked to air cleanliness. As one of the industrial centers of the Republic of Uzbekistan, Navoi city is not exempt from this problem. The main purpose of this article is to analyze the state of air pollution in Navoi during 2019, its causes, chemical composition, health risks, and the results of monitoring.

The article scientifically addresses the concentration levels of various air pollutants (such as dust, SO_2, NO_2, CO) identified in the atmosphere of Navoi city in 2019, their sources, and their socio-economic consequences. Data from the State Committee for Ecology, UzHydromet, and other official sources are used as the basis for analysis. Due to its location in a desert region, Navoi city has a sharply continental climate characterized by hot, dry summers and cold, dry winters.

Table 1.
Meteorological Parameters Observed in 2019

Average Annual Values	Long-Term Indicators	Year 2019
Number of days with precipitation	65	40
Average wind speed (m/s)	2,3	3,0
Frequency of wind speed 0–1 m/s, %	44,3	44,9
[Frequency of fog in cold months (%)	7,1	2

It is evident from the data that the number of days with precipitation in 2019 was significantly lower than the long-term average. This indicates that 2019 was a drought year. The main reason for this is the ongoing global climate warming, which leads to an increase in air temperature worldwide. Let us now examine the distribution of these values by months in 2019:

Table 2.
Meteorological Descriptions for the City in 2019

N	Meteorological Parameters	Months											
		1	2	3	4	5	6	7	8	9	10	11	12
1	Number of days with precipitatio	8	8	4	5	6	0	0	1	1	0	1	6
2	Frequency of foggy days (%)	1	0	0	0	0	0	0	0	0	0	1	0
3	Wind speed 0–1 m/s	16	11	1	1	1	7	18	14	18	15	14	13
4	Percentage of calm (windless) days (%)	32 13	10 4	1 8	1 4	2 9	16 7	20 8	26 10	36 16	28 11	35 11	68 27

Analyzing the table data, the highest precipitation was recorded in January and February, while almost no precipitation was observed in June, July, and October. The occurrence of foggy days was also minimal throughout the year, appearing only in January and November. Regarding wind characteristics, wind speeds reached their peak in July and September, whereas the lowest wind speed was recorded in July.

Atmospheric monitoring in Navoi city, which involves measuring the composition of gases in the air and their emissions, is conducted continuously at three stations. Now, let us focus on the analysis of observations carried out throughout 2019.

Table 3.

Characteristics of Air Pollution in Navoi City (in mg/m³)

№	Pollutant Gases	Average Values (mg/m³)	Maximum Values (mg/m³)	Number of Observations
01	Dust	0,10	0,5	912
02	Sulfur dioxide	0,005	0,028	1827
05	Nitrogen dioxide	1	4	912
06	Nitric oxide	0,05	0,10	1827
07	Ozone	0,04	0,10	912
10	Phenol	0,011	0,023	256
19	Ammonia	0,002	0,006	912

Let us consider the observed values of each pollutant gas throughout the year separately:

The annual average concentration of dust in 2019 was 0.1 mg/m³, which is 0.7 times lower than the sanitary standard allowable annual average concentration. The maximum one-time concentration reached 0.5 mg/m³, equal to the permitted maximum limit (1.0 times the allowed standard). This value was recorded at Station No. 1 during a dust storm. Over the year, 912 sample observations of dust concentration were conducted.

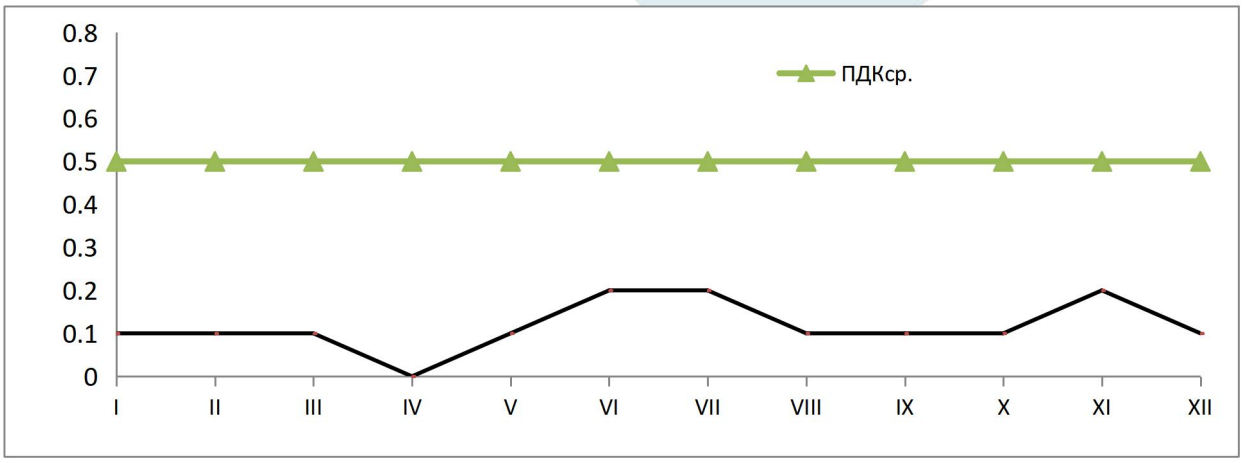

Figure 1. Monthly Variations of Dust Concentration in 2019.

Sulfur Dioxide (SO_2) Concentration. The annual average concentration of sulfur dioxide was evenly distributed across the city and amounted to 0.005 mg/m³. This value is significantly below the permissible annual average limit of 0.1 mg/m³ according to sanitary standards. The maximum one-time concentration was 0.028 mg/m³, which is 0.06 times lower than the permitted maximum limit. Throughout the year, 1827 sample observations of SO_2 were conducted.

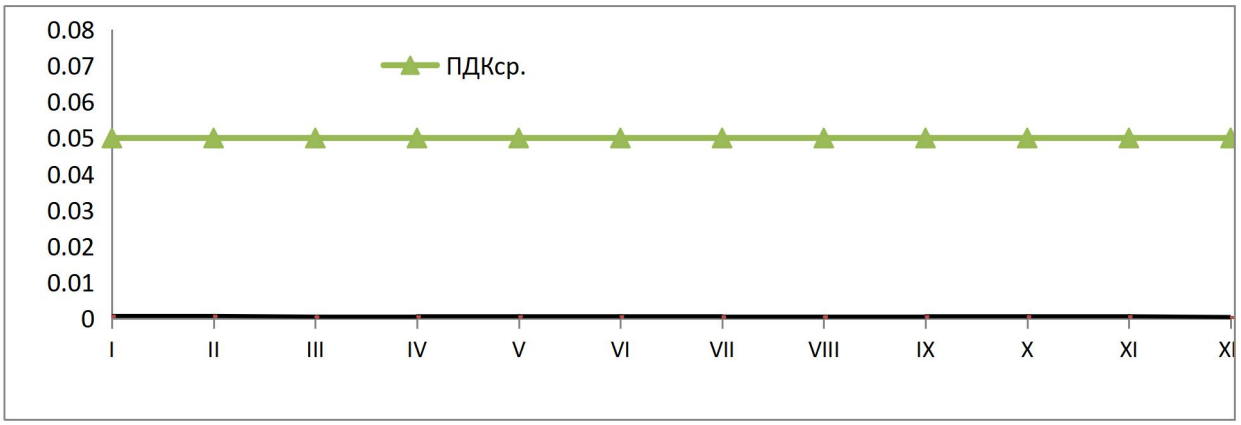

Figure 2. Monthly Variations of Sulfur Dioxide Concentration in 2019.

Carbon Monoxide (CO) Concentration.The annual average concentration of carbon monoxide was 1 mg/m³, which corresponds to 0.3 times the permissible annual limit according to sanitary standards. The maximum one-time concentration was 4 mg/m³, equal to 0.8 times the permitted maximum limit. During the year, 912 sample observations of carbon monoxide were conducted.

Nitrogen Dioxide (NO_2) and Nitric Oxide (NO) Concentrations. The annual average concentration of nitrogen dioxide (NO_2) was 0.05 mg/m³, which is 1.25 times higher than the permissible limit according to sanitary standards. The maximum one-time concentration was 0.10 mg/m³, exceeding the permitted maximum limit by 1.1 times. This situation was observed at Station No. 3, near industrial enterprises, influenced by transport and western winds. The NO_2 concentration exceeded the daily permissible limit in 1% of all observations. Throughout the year, 1827 observations were conducted.

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The annual average concentration of nitric oxide (NO) was 0.04 mg/m³, corresponding to 0.5 times the permissible annual limit. The maximum one-time concentration was 0.10 mg/m³, which is 0.25 times the permitted maximum limit. During the year, 912 sample observations were conducted.

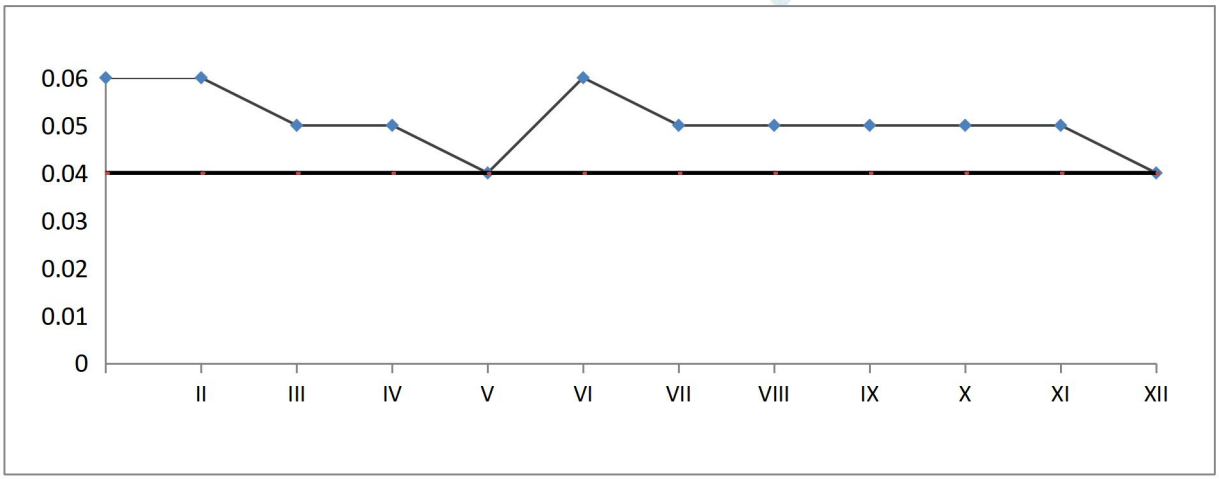

Figure 3. Monthly fluctuations of nitrogen dioxide (NO_2) concentration in 2019.

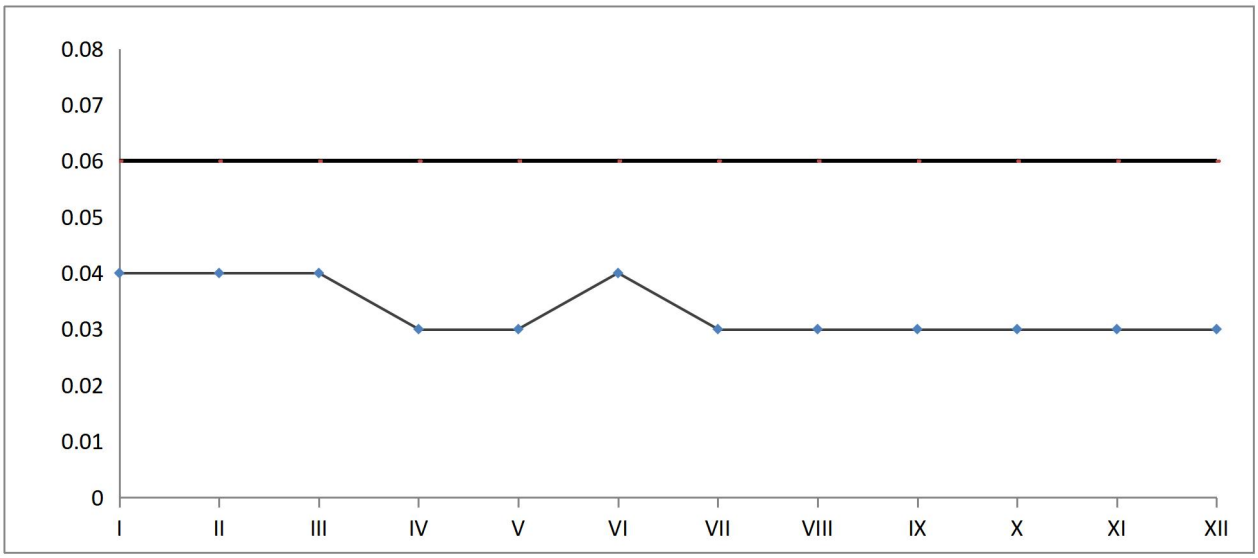

Figure 4. Monthly variations of nitric oxide (NO) concentration in 2019.

Concentrations of Ozone, Phenol, and Ammonia. Ozone (O_3). The annual average concentration of ozone was 0.011 mg/m³, which is below the sanitary norm limit of 0.2 mg/m³. The maximum one-time concentration was 0.023 mg/m³, also below the permitted maximum concentration (0.2 PDK m.r.). Throughout the year, 256 sample observations were conducted for ozone.

Phenol (C_6H_5OH). The annual average concentration of phenol was 0.002 mg/m³, corresponding to 0.3 of the sanitary norm limit (PDK s.s.). The maximum one-time concentration was 0.006 mg/m³, equal to 0.6 PDK m.r. In total, 912 observations of phenol were performed during the year.

Ammonia (NH_3). The annual average concentration of ammonia was 0.03 mg/m³, equal to 0.75 PDK s.s. The maximum one-time concentration was 0.08 mg/m³, which corresponds to 0.5 PDK m.r. Throughout the year, 993 ammonia observations were recorded.

Conclusion: The air quality monitoring conducted in Navoi city during 2019 shows that the concentrations of harmful substances in the air mostly remained within the sanitary norms. However, some exceedances were observed, particularly for nitrogen dioxide (NO_2) and dust particles. The highest pollution levels were recorded near industrial enterprises, areas with dense traffic, and during unfavorable meteorological conditions (western wind, calm weather). The annual average concentration of nitrogen dioxide reached 1.25 PDK s.s., and its maximum concentration was 1.1 PDK m.r., indicating an exceedance of the permissible limit. Other harmful substances such as sulfur dioxide, carbon monoxide, ozone, phenol, and ammonia remained below the permitted annual and one-time limits, indicating that they did not significantly pollute the air.

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