SOME ISSUES OF STUDYING THE IMPACT OF THE ALMALYK MINING AND METALLURGY COMBINE ON ATMOSPHERIC AIR

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Abstract: This article is dedicated to the impact of the Almalyk Mining and Metallurgical Combine, one of the largest centers of non-ferrous metallurgy in our republic, on atmospheric air. It provides information on the sources of pollutants released into the atmosphere as a result of the activities of AMMC in 2022, 2023, and 2024, substances processed in treatment facilities and released into the atmosphere.
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INTRODUCTION.

It is known that as the impact of human society on the environment increases, geoecological problems of various scales arise. According to the data, a person can live without food for up to 5 weeks, without drinking water for up to 1 week, and without breathing for up to 5 minutes. Therefore, the purity of atmospheric air and its absence of various harmful compounds are important. To date, a number of regulatory legal acts aimed at solving these problems have been adopted.

For example, the Law of the Republic of Uzbekistan "On the Protection of Atmospheric Air" adopted on December 27, 1996, the Decrees of the President of the Republic of Uzbekistan No. UP-5863 "On Approving the Concept of Environmental Protection of the Republic of Uzbekistan until 2030" dated October 30, 2019, No. UP-60 "On the Development Strategy of New Uzbekistan for 2022-2026" dated January 28, 2022, which define a number of tasks, require research in each region.

The object of the research work is the middle part of the Akhangaran basin, where the Almalyk Mining and Metallurgical Combine is located. The subject of the research is the study of the harmful effects on atmospheric air during the development and processing of deposits in the region.

The purpose of the work is to determine the quantitative and qualitative indicators of the harmful impact on atmospheric air during the development of deposits of the Almalyk Mining and Metallurgical Combine and to develop recommendations aimed at reducing the impact.

METHOD AND METODOLOGY.

In general, the natural geographical features, geosystems, and geochemical conditions of the Akhangaran basin were studied by Y.A. Skvortsov (1964), Sh.S. Zakirov (1972), V.A. Gorokhovsky (1980-1984), Sh.Kh. Abdullaev (1985), A.A. Rafikov (1988), N.G. Mavlyanov (1989), N.E. Shukurov (1999), M.M. Miraslanov, M.M. Zakirov (2003), Z.A. Amanbayeva (2004), A.N. Nuradilov (2004), Sh.E. Shukurov (2011, 2021), Sh.M. Sharipov (2011, 2022), B.M. Kholmatjonov (2019), M.A. Petrov (2021), A.A. Ni (2021), F.F. Fayziev (2022), A.S. Fozilov (2023), M.Kh. Bekmukhamedova (2023) and others.

In Uzbekistan, a number of studies have been conducted in this area. *N.E. Shukurov* conducted research on the topic "Ecological Geochemistry of Technogenic Distribution Areas (on the example of the Almalyk Mining and Metallurgical Combine)". In his scientific work, he studied that technogenic halos of the distribution of ore-forming elements in the soils, vegetation, and natural waters of the Almalyk industrial zone reflect the composition of processed ores of a mining and metallurgical production enterprise, the maximum content of heavy metals in soils near pollution sources is mainly associated with their sparsely soluble mineral forms in the form of fragments of sulfides, carbonates, oxides, silicates, etc.,

as well as technogenic new formations in the form of spheres.

Z.A.Amanbayeva (2004) in her dissertation "Geoecological situation of the middle reaches of the Akhangaran River basin and ways to optimize it" compiled maps of a new type reflecting the geoecological situation of the middle reaches of the Akhangaran River basin. He determined the inextricable link between natural and socio-economic relations and their quantitative indicators. Criteria for assessing ecological situations by landscape and ways to optimize them have been developed.

B.M. Kholmatjanov (2019) conducted research on the topic "Regional atmospheric circulation, features of its influence on climate change in Central Asia and air pollution in the mountainous regions of Uzbekistan".

A.S.Fozilov (2023) "Assessment of the influence of the Almalyk Mining and Metallurgical Combine on the groundwater resources of the Akhangaran Basin". In his scientific work, for the first time, based on GIS technologies, he created a map of the earth's surface (landscapes) of the Akhangaran basin at a scale of 1:600,000, showing the changes that occurred in 2012-2022.

M.Kh. Bekmukhamedova (2023) in her scientific work "Distribution of chemical elements in the middle part of the Akhangaran Valley and their impact on public health" studied the impact of industrial enterprises located in the middle part of the Akhangaran Valley on the environment. Based on GIS technologies, he created 24 medium (1:200000) and large (1:50000) scale maps of the distribution and accumulation of hazardous chemical elements in the middle part of the Akhangaran Valley.

DISCUSSIONS AND RESULTS.

The site is located in the northwestern foothill zone of the Kurama mountain range, which is part of the Eastern Tian Shan mountain range. The area is located in the middle part of the Akhangaran River basin. The climate of the Akhangaran Valley, where the deposits are located, is sharply continental, similar to the Chirchik-Akhangaran district. The geographical location, relief, and orography of the valley are important factors in the formation of this climate. In the southwestern plain part of the valley, the influence of cold air masses coming from the north and warm and humid air masses coming from the west is significant, and in the mountainous part, the influence of these air masses is also felt.

In the Akhangaran Valley, especially in the southwestern foothill plain, the summer heat lasts a long time. The average air temperature in July is 26-27°C in the plains and 20-24°C in the mountainous regions. In summer, the highest air temperature on the plain can rise to 42-44 °C. Winter in the valley is not very harsh.

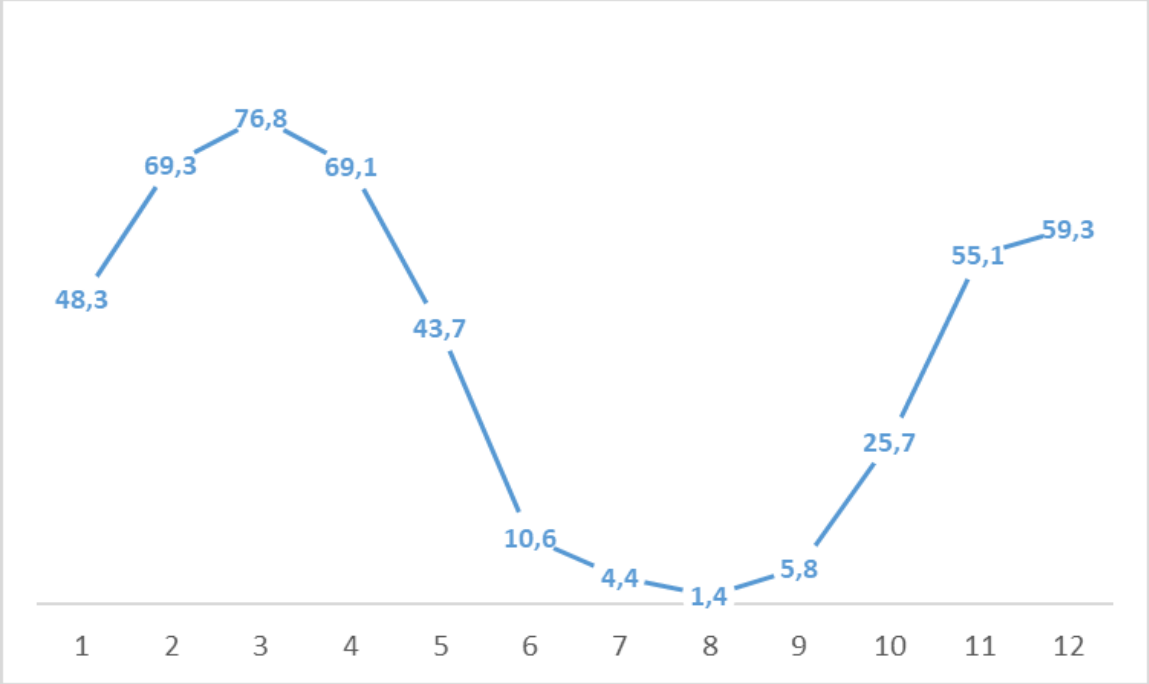

Figure 1. Distribution of annual atmospheric precipitation in Almalyk, mm

The Akhangaran River originates in the Chatkal Range near the Kengsoz Pass. The river receives water from the Akhangaran plateau on the southern slopes of the Chatkal Range and the northern slopes of the Kurama Mountains. The river is fed by snow and rainwater. Therefore, its water level increases in April-May, and 51% of the annual flow occurs during these months. The long-term average water discharge of the Akhangaran River near the village of Turk is 22.8 m3/s, and with all its tributaries - 43 m3/s.

As a result of mining, one of the most damaging components is air. In the process of ore extraction, a large amount of dust and gases is released into the air. In addition, during the smelting and processing of ores, toxic substances are released into the atmosphere. For this reason, the atmospheric air in all areas of heavy industry is contaminated.

Wind speeds in the region will vary from 1.9 to 3.5 m/s. The highest wind speed is observed in March, and the lowest in September. The average annual temperature is 14.9°C, the minimum temperature is -28°C, and the maximum temperature is 40°C. The amount of precipitation is high in winter and spring (Fig. 1). When studying the impact of AMMC on the atmosphere, based on the location of deposits and the characteristics of processing enterprises, it was divided into 3 industrial zones.

The I industrial site of AGMK includes the following facilities:

1) Sari-Cheku quarry;
2) Technological Transport Department (TTD);
3) Explosive Materials Plant;
4) Dairy farm

In the first industrial zone, one of the largest deposits of AGMK, Sariq Peak, is located, and copper-molybdenum ores are extracted from the quarry by open-pit mining. In 2022, the quarry's productivity was 3,262 thousand m3. It turned out that this industrial zone emits 26 types of pollutants into the atmosphere. Here, a single dust cleaning device operates, contributing to the reduction of harmful substances. The proportion of substances released into the atmosphere is as follows: rock dust - 60.2%; ore dust - 23.7%, carbon monoxide - 5.3% and other substances.

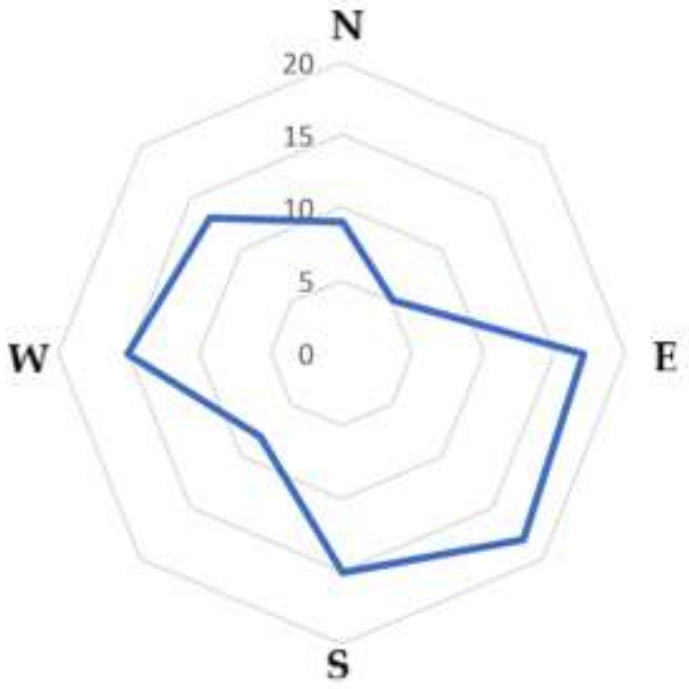

Figure 2. Windy days observed at the I industrial site of AMMC ("wind rose")

In the region, the number of days with winds exceeding 6 m/s is 5%.

The annual precipitation distribution is characterized by the highest humidity in the winter-spring period and the lowest in the summer period. The maximum monthly precipitation is observed in March and April, while the minimum occurs in September. The average annual rainfall is 465.8 mm. The number of fogs is very rare, the average annual number of days is 11, the maximum number of days is 24. Most often, districts are observed in the winter months, the average frequency of districts does not exceed 0.5%.

The main source of ore supplies is the Sari-Cheku deposit. The Sari-Cheku quarry extracts copper-molybdenum ore by open-pit mining. The design capacity of the quarry is 5.0 million tons of ore per year.

The quarry's capacity in 2022 amounted to 3,262 thousand m3 of rock mass (8,481.2 thousand tons), including 5,360 thousand tons of ore.

Amount of pollutant emissions into the atmosphere formed on the territory of AMMC, *t*

No	Years	Amount of generated pollutants	Pollutants released into the atmosphere
1	2022	439125,5	157810,8
2	2023	467195,4	186134,5
3	2024	666850,4	167173,2

As can be seen from the data in the table, with an increase in ore extraction from the deposits of AMMC, the amount of pollutants also increases. The remnants of the substances entering the treatment facilities are released into the atmosphere. Due to the construction of a treatment plant in 2023, the amount of pollutants released into the atmosphere has decreased.

According to the amount of substances identified in 2022, 2023, and 2024, the amount of sulfur dioxide, nitrogen dioxide, and nitrogen oxide was higher in 2022. The share of hydrocarbons was high in 2024.

CONCLUSIONS.

In conclusion, it can be said that by studying the impact of the Almalyk Mining and Metallurgical Combine's activities on atmospheric air, it is possible to choose appropriate environmental measures for the region, including the appropriate plant species, and reduce the spread of substances that negatively affect public health in the external environment. In this case, the use of advanced foreign experience yields good results.

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