

Analysis of the Condition of Formation of the Modern Hydrogeoecological Processes in Baku and its Surroundings Territories

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Abstract

The article is dedicated to the analysis of the modern condition for the hydrogeoecological processes formation in Baku and surroundings. An impact of the technogen load on hydrogeoecological condition was studied, the physico-geographical and hydrogeological situation of the region, the hydrodynamical and hydrochemical regime of the subsoil waters were investigated, the pollution sources of the subsoil and surface waters were revealed in the city and surroundings. An ecological state of the underground waters was evaluated and the measures for the water farming state stabilization were looked through.

Keywords: hydrogeological condition, geological system, regime, underground water, urbanization, hydrogeoecological processes, mineralization, rocks.

Introduction

Today the problems with a negative impact of technogenesis on subsoil waters-water resources pollution, subsoil waters quality deterioration are available in Baku as all the ecologically developed cities of the world. From this point of view an investigation of the perspective problems in hydrogeological development, looking through the new methods development in the solution of the practical problems form the problem actuality. The underground hydrosphere under an influence of the natural and technogen factors in Baku and surroundings was selected as a research object. The research subject is technogen processes for the subsoil waters formation. The research aim is an investigation of the change under an impact of the various factors in underground hydrosphere in Baku and suburbs and corresponding suggestions. A modern hydrogeoecological condition was analyzed, the components of ecosystem in a mutual relation: atmosphere-aeration zone rocks-underground waters were looked through on the collected and analyzed factual materials in Baku and suburbs.

Analysis and discussion

1. The hydrogeological condition of Baku and its surroundings territories

At first let's glance at hydrogeological condition. The underground waters widely spread in Baku and suburbs. These waters are found in the different stratigraphic and genetic rocks of the various areas in the zone. We should note that the underground waters are connected with the Absheron deposits, but in the central part they are connected with the 4 th period deposits. An absolute value of the water level changes by 90- (-28) m. The subsoil water flow is directed to the sea. A slope depth of the subsoil waters changes 60-70 m and abates towards the center in a large diapason. In connection with the change of the lithological structure on the watery rocks, filtering characters, watery rocks salinization, nourishment sources, drainage features and etc. the underground waters possess different mineralization and chemical composition. A total mineralization degree of these waters changes from 0,5-1,0 g/l to 25-50 g/l.

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The zones with a total mineralization degree expand in the eastern and north-eastern regions of the Absheron peninsula -Bina-Hovsan -Turkan - Zira, Mashtaga - Buzovna, Mardakan-Shuvalan - Zira in the direction of Absheronirrigation and Baku. But the subsoil waters with more mineralization degree than 10 g/l surround the zones along H.Z. Tagiyev-Masazir-Binagadi-Balakhani-Sabunchu-Bulbula-Surakani-Zig settlements. There are many large and small salty lakes along the peninsula, a total mineralization degree of their waters is 140-160 g/l. The waters are chlorine-sodium.

Generally, the areas with the subsoil waters which of mineralization degree is 0,5-2 g/l in 1077 km² of the zone surrounded by a regime observation net environ 30% of the total zone, but the areas with 2-10 g/l subsoil waters surround 50% and the areas with more than 10 g/l underground waters environ 20%.The Samur-Absheron and Absheron irrigation canals play an important role in hydrochemical composition of the subsoil waters and decrease of the total mineralization degree in subsoil waters at the expense of water losses in the canal. A total mineralization degree of the subsoil waters sufficiently gets reduced and reaches 1,2-1,5 g/l, while it was 40,0-43,0 g/l near the Jeyranbatan settlement till 2000.

An impact of the filtering subsoil waters on hydrochemical regime in the canal was clearly indicated from Sumgait to Kurdakhani. Decrease of the total mineralization degree in the subsoil waters at the expense of water losses from the water equipment systems was observed in Baku and Sumgait for a long time.A serious change didn't happen in biochemical structures of the underground waters in long-term ceasing, in the centralized water intakes and their suburbs.

A total mineralization degree of the subsoil waters with the chlorine-sulphate composition is 1,0-1,4 g/l in the wells of the centralized water-intakes near Zira. A total mineralization degree of the subsoil waters with sulphate-chlorine, magnesium-sodium composition is 1,3- 1,6 g/l in the centralized water- intake zone of Shuvalan. A total mineralization degree of the underground waters in the wells of the Bina-Hovsan settlement changes by 0,7- 2,2 g/l. The wells possessing weak mineralization are situated in the irrigative areas. So, a total mineralization of the subsoil waters in the wells from other areas is 1,5-2,2 g/l and chemical composition is sulphate-chlorine-sodium. Decrease of the average weight value to a total mineralization degree was observed on all the zone because of evaporation increase till 8-10 %, decrease of the atmospheric deposits quantity till 3% in Baku and Absheron during last 20 years. Their composition changed from sulphate-chlorine-hydrocarbonate-magnesium-sodium to chlorine-sodium. We should note that 40% of the country population and 80% of the industrial potential gather in Baku and Absheron, therefore a majority part of the ecological problems exists in this zone.

2. The hydrogeoecological condition of the city and surroundings.

It is known that Baku and Absheron are situated in the arid climatic zone. For a long time a regime of the underground waters is formed under an influence of the climate factors, i.e. the subsoil waters nourishment occurs at the expense of the atmospheric deposits, but their discharge happens at the expense of evaporation. But economically intensive development of the city causes increase of the more artificial factors role in subsoil waters nourishment and this negatively affects the hydrogeoecological condition of the city and surroundings.

2.1. The pollution of the subsoil hydrosphere in Baku and suburbs.

The observations show that the subsoil hydrosphere pollution in Baku and suburbs occur by the rocks of the atmosphere, surface waters and aeration zone. Thereby the sweet and less mineralized underground waters are distributed unequally and their exploitation reserve was limited and formed 241000 m³/day in Baku and Absheron. The main nourishment sources of these waters are atmospheric precipitations and condensation. According to the information of the Ministry of Ecology and Natural Resources 66000 tons of pollutants (gas-smoke products and etc) are thrown in to the atmosphere by the industrial and transport areas in the Azerbaijan Republic, 88 kg/year falls per person's share, but 7 tons/year falls per each quadratic meter. An increase of the noxious substances amount in the atmosphere causes atmosphere contamination because the transport means quantity rises at the expense of the old automobiles and the life refuses are burnt in the polygons. The polygons which act officially for burning the life refuses fall short of the accepted norms and standards.

One of the other problems is soil contamination in Baku an Absheron peninsula. Pollution of these waters at the expense of the wastes and tubes transporting oil products is observed in the large industrial areas and zones where the subsoil waters are naturally unprotected.

During the oil deposits exploitation the environment radioactive pollution happens because the ecological rules aren't obeyed. Otherwise, a main reason of the ecological problems formation is contamination of the soils with the oil and layer waters during the oil-gas output and boring works, creation of the artificial lakes and ponds polluted with oil because of uncontrolled layer waters, wastes collection created during the oil-processing. Pollution of the underground waters with the oil-products is especially observed. So, the lakes nourishing with the oil products and situating in the Absheron peninsula are considered radioactive pollution sources for the subsoil waters. The other problem is a state of the communication systems.

If we take into account that the pipelines for the water provision of the city and surrounding zones, including sewerage systems have been exploited for a long time, an existence of the losses from the communication systems of the basic factors affecting the underground hydrosphere ecological state is approved at present. The urbanization process intensively develops in Baku and it is clear that this process is accompanied by the town-building complex enlargement. If there were approximately 2,0 million population in an official registration of the city till 2000, today this number is noted 2,5 million. If half-million growth was observed in population's quantity for last 20 years, then, the same population was provided with the new flats and the water and sewage lines of the new flats were connected to the previous old system, and this causes the supplemental loading, damaging. The losses occurring from the damaged communication systems are expended for directly nourishment of the subsoil waters.

On the other hand 536 million m³ waste waters are formed in Baku for a year. 144,5 m³ million waste waters from it are floated into the Caspian Sea and inner water canals. The oil products, dependent substances, sulphate combinations, chloride salts, surface active substances, fend and different heavy metals with the waste waters are thrown into the water canals. An impact of the same lakes on the environment and underground waters consists of floating noxious substances with the infiltration waters into the underground waters, throwing of carbohydrogens and other noxious matters into the atmosphere.

There are many salty lakes in the Baku city and Absheron peninsula, the largest among them is Boyukshorlake. Much sewerage waters are floated into the lake from the various industrial enterprises and surrounding settlements. Such pollution source of the Boyukshorlake negatively affects not only surrounding areas, but also an ecological condition of the largest part in the Baku city. The lake water level is regulated by the tube installations and the sewerage waters are floated into the Caspian Sea by the Hovsan canal. Last years a great part of the sewerage waters amount floated into the lake by the government was prevented and the measures of the lake drying were performed. Till the nearest years an amount of the oil products reached 40 g/l. If we take into consideration that a slope depth of the subsoil waters around the lake forms 0,0-2,0 m, then we can clearly imagine that this case causes a change of the available hydrogeological condition in the negative direction. The abovementioned ecological problems negatively affects the environment and underground hydrosphere. So, if we consider that the subsoil waters settle near the surface in Baku and its surrounding zones, they are nourished with the infiltration waters, but they become free at the expense of the plants transpiration, so an increase of the average weight of the subsoil waters mineralization degree as a result of the intensive evaporation, a qualitative deterioration as a result of nourishment with the noxious substances are inevitable.

3. Measures to prevent contamination of subsoil hydrosphere.

Sanitating the ecological state is reflected as one of the priorities about a social-economical development in all the state programs of Baku and surrounding settlements. Provision of Baku and surrounding settlements with the sewerage systems, construction of the available installations again, building the new ones, erecting the verdure zones are realized within the same programs frame work. At the same time cleaning the lakes and soils polluted with oil, moving the industrial enterprises to the surrounding zone and the serious ecological requirements are yielding positive results in order to prevent from the factors which negatively affect an ecological state of Baku.

228 hectares of the oil-polluted zone were recultivated, 1,3 million trees were planted in the area with 1350 hectares, 408 hectares were renovated, 53 new cultural and rest parks were built.

One of the most important ecological projects organized in Azerbaijan last years is to build a factory based on the new technologies for burning the life garbages in Baku. The factory which of the annual power is 500000 tons in

20 hectares of the Balakhany zone is in a force of 231,5 million kvh/hour energy output in the wastes burning process. The smoke ash which is a burning product is caught by the special filtraters and doesn't contaminate the environment. Construction of this factory is an important advance in a direction of the solution of the serious ecological problems appeared as a result of burning the life refuses in the open air and throwing to the empty rones.

Thereby the abovementioned measures are directed towards the environment and underground hydrosphere and its positive result is observed.

Conclusion:

1. Enlargement of the town-building, economical development of the city, increase of the industrial areas day by day cause growth of the technogen factors role in underground waters nourishment, and this is affecting hydrogeoecological condition; 2. An influence of technogenesis on underground hydrosphere is mostly negative, it is accompanied by the problems as the water resources pollution, subsoil waters quality deterioration and this is very dangerous and requires an application of the new ecological projects.

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