The Structural-Hydrogeological Analysis of Formation of Underground Waters

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ABSTRACT

In the clause the structural-hydrogeological analysis of formation of underground waters is given.
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Keywords: Groundwater, water exchange, tectonic faults, groundwater regime, hydrodynamic and hydrochemical regime, formation, nutrition, aquifer, artificial factor, mineralization, regime, hydrogeological processes, groundwater monitoring.

Introduction

The problem of studying the formation of groundwater resources in the Nurata-Turkestan Mountain range is becoming the most relevant. Since mountain ranges, foothill plains and a deposit of fresh groundwater complicated by plicative and discontinuous structures are the only place where sources of domestic and drinking water supply for settlements located here are located.

One of the main sources of groundwater formation in the Zaaminskoye field is the surface waters of Zaaminsu and Achchisu. In general, for the foothill plains, the formation of groundwater occurs as follows. Falling atmospheric precipitation, infiltrating into fractured carbonate and karst rocks, is unloaded in thrust structures bordering the Malguzar mountains. Moreover, the unloading of underground occurs at different absolute levels, this is evidenced by the outlets of springs with different flow rates. The northern slope of the Malguzar Mountains is complicated by regional faults (South-Tamdinsko-Katransky and others). They can be traced at various hypsometric marks, differ from each other in genesis, morphology, depth and time of initiation, renewal and other geological and tectonic features. Hydrogeological processes proceed in different ways. The outflow of groundwater occurs along the zones of feathering faults, in most cases coinciding with the channels of watercourses.

Materials and methods

Groundwater is confined to boulder-pebble deposits of the Neogene-Quaternary age, formed due to infiltration of atmospheric precipitation, filtration of water from temporary watercourses of the river. Zaaminsu and irrigated fields in the northern part. The depth of the level varies from 130-142 m in the south to 1.0-2.5 m in the north.

Mineralization of underground waters of deposits is from 0.5 to 3 g/l, hydrocarbonate-sodium and sulfate-sodium in composition. Observations are carried out at 16 observation points of the regional network. Of these, 6 single wells, 7 hydrochemical clusters, consisting of 15 wells, as well as water gauges DN-1 DN-II, DN-III. In addition, water intakes Zaamin I, II, Kurak, Dashtabad and others were studied.

On the territory of the field there is a water intake Zaamin I, II, Kurak, Dashtabad. The groundwater regime here depends mainly on the operation of wells. The amplitude of seasonal fluctuations amounted to 0.4-1.8 m, compared to previous years, significantly decreased by 0.5-1.5 m. Water withdrawal at water intakes Zaamin-I, II, Kurak, Dashtabad is: Zaamin I-7.5 thousand m3 / day, the total number of wells is 10, 4 are in operation, Zaamin-II, -8.2 thousand m3 /day, the total number of wells is 18, 4 are in operation, Kurak is 11.52 thousand m3/day, the total number of wells is 13. , 4 wells are in operation, Dashtabad-2.85 thousand m3/day, the total number of wells is 10, 5 wells are in operation.

It should be noted that for the water intakes of Kurak and Dashtabad, the calculation of operational groundwater reserves and their approval in the State Reserves Committee have not been made. In this regard, it is necessary to organize observation wells for a complete study of all factors affecting the state of IW in the field.

It is also necessary to organize and equip observation wells on the territory of the Yam and Bolshevik water intakes.

The Ravat underground water deposit is located on the territory of the Jizzakh and Zarbdar fogs. The northern border is YuGK im. Sarkisov, in the south the border runs along the adyr, which is traced parallel to the Ravat-Zaamin highway, in the east it borders on the Zaamin, and in the west the Sanzar (lower) deposits. Groundwater is confined to proluvial Neogene–Quaternary deposits. Water-bearing are the thickness of pebbles, sandstones with interlayers of loams, forming several aquifers, hydraulically interconnected. The underground waters of the deposits are formed by filtering the waters of temporary streams flowing down from the northern slopes of the Malguzar mountains, irrigation canals and irrigated fields. The main irrigated area is under the command of machine channels DM-I and DM-II. Groundwater occurs at various depths from 0.5-1.5 meters in the peripheral parts of river fans, in irrigated areas, up to 100 m within the foothills (non-irrigated).

Observations are carried out at 10 observation points of the regional network. Of these, 4 single wells and 6 pads, consisting of 15 wells. The formation of the groundwater regime is mainly subject to natural and climatic factors in the southern and central parts of the field and artificial (channels, drainages, etc.) factors in the northern part of the field.

Within the zone of formation and transit, HP varies from 04-08 g/l, and within the zone of wedging out, it changes from 0.7-1.8 g/l.

The water intake facility Zarbdor was built on the territory of the deposit, where the total number of wells is 17, of which 7 are in operation. with a total water withdrawal of 3.6 thousand m3/day, the rest of the wells do not work due to the lack of equipment. Mineralization of underground waters is within the norm and meets the requirements of OzDSt-950 (drinking water).

Ravat water intake. Approved reserves in the amount of 11.5 thousand m3 / day.

The total number of wells is 11, 4 are in operation. with a total water withdrawal of 8.64 thousand m3/day. The water level within the water intake varies within 8.6-9.9 m. The composition of the water meets the requirements of OzDSt-950 (drinking water).

There is no regional network at all in this field in the formation and transit zone.

The Severo-Nurata groundwater field is located on the foothill plain of northern Nuratau, the northern boundary is Aydarkul - Tuzkan - Arnasay man-made object, in the east along the riverbed. Kly, in the south, the North Nurata Range, in the west, the border of the province. Groundwater monitoring observations within the field cover proluvial - gravel - pebble deposits, merged alluvial fans of temporary watercourses and their peripheral part, composed of alluvial rubbly and sandy deposits of Neogene - Quaternary age.

The discussion of the results

Within the mountainous part of the area under consideration, where the runoff is formed, tectonic blocks are distinguished - Tangisay, Ilanchisay, Asmansay, Ustakhansay, Amandarasai and Suluklin. They determine the abundance of water in Paleozoic rocks, as well as their articulation by foothill hydrogeological structures.

The Tangisai block is located in the western part of the territory and is limited: in the south - by a watershed, in the north - by the Yangikishlak fault, in the west and east - by a submeridional transverse fault.

The Tangisai block is composed of shale deposits of the Proterozoic at the watershed, conglomerates and sandy-shale deposits of the Cambrian-Ordovician-Silurian and carbonate deposits of the Devonian and Carboniferous, contacting through tectonic faults (Besapano-South Fergana, etc.), the geological and hydrogeological descriptions of which are given above.

The formation of groundwater in the block under consideration occurs as follows. Infiltrating atmospheric precipitation at the outcrops of water-bearing rocks are collected in the fault zone and diverted to the lower parts of the mountain range, to permanent sayas coinciding with transverse faults. In the zone of intersection of longitudinal and transverse faults, water-bearing reservoirs are formed, especially at the contact of carbonate and sandy-shale rocks. The underground runoff of this block is directed to the west, and within the basin of the Tangisai river, groundwater is discharged.

The Ilanchisai block is demarcated: in the south - along the watershed, in the north - along the Yangikishlak fault, in the west and east - along the submeridional transverse fault. The block is composed of shales and sandy-shale deposits PR-C-O-S and carbonate deposits of the Devonian and Carboniferous.

The formation of groundwater in the Ilanchisai block also occurs due to infiltration of atmospheric precipitation and filtration of water streams. Underground runoff is directed to the west and is completely accumulated in the zone of the Besapano-South Fergana fault and partly by transverse faults, is diverted to the foothills, and part overflows to the neighboring Tangisay block.

The Asmansay block is demarcated: in the west and east - along the submeridional transverse, in the north - along the Yangikishlak faults, in the south - along the watershed.

It should be noted that this block is divided into two parts along a submeridional fault, which begins in the upper reaches of the Amandarasai and extends to the village of Asmansay.

The formation of groundwater in this block occurs as follows. The first part of the block is composed of sandy-shale deposits of the Proterozoic, Cambrian, Ordovician and Silurian. Here, in the watershed part, atmospheric precipitation is completely discharged in the watershed part due to the screening effect of the fault separating the Proterozoic deposits from the Ordovician and Silurian, and form the surface runoff of the Asmansay. The remaining parts of the block are composed of Devonian carbonate deposits and Ordovician and Silurian sand-shale deposits. The emerging underground runoff, due to infiltration, is directed to the east, unloads in the Chiganaksai basin and is diverted to the foothills by a transverse fault.

The Ustakhansai block is demarcated: in the west - along the Asmansai block, in the north - the Egarbelitau fault, in the south - along the watershed and in the east - along the Amandarasai block. It is composed of shales, PR-C-O-S sand-shale deposits, Devonian and Carboniferous carbonate deposits, and is covered with Quaternary pebbles in the north. Groundwater is formed due to the infiltration of water streams. Underground runoff is directed to the north, collects in the zone of the longitudinal fault (Besapano-South-Fergana), accumulates in the zone of the transverse fault (in the east), is diverted to the neighboring Amandarasai block, since the northern part of the block is elevated by 100 - 150 m. This is indicated by almost waterless deposits (Wells 20, 23).

The Amandarasai block is demarcated: in the northeast - along the Egarbelitau fault, in the northwest - along the Ustakhansay block, in the south - along the watershed and in the southeast - along the Suluklin block. It is composed of shales, sandy-shale deposits PR - C - O - S and is covered with Quaternary pebbles in the north.

The formation of groundwater occurs as follows: infiltrating precipitation and filtering waters of temporary streams are mainly collected in the fault zone and are partially discharged in the watershed parts of the mountain range, and the rest goes through the feathering faults to the north and is lost in the Quaternary pebbles.

The Sulukla block is demarcated: in the south - along the watershed, in the southeast - along the border of the work area, in the northwest - along the Amandarasai block and in the northeast - along the fault (Besapano-South-Fergana). It is composed of sandy-shale deposits, PR-C-O-S shales, and Devonian carbonate deposits.

The formation of groundwater occurs as follows. Infiltrating atmospheric precipitation and filtering waters of temporary drains are collected in the zone of the Besapano-South Fergana fault. Some of them are diverted to the northeast, and some - to the north.

It should be noted that not all fault zones are characterized by increased water abundance due to the fact that the host rocks are sandy-shale deposits.

Of particular importance in the process of formation of the advancement and consumption of groundwater are mainly the zones of discontinuous faults, renewed in the Alpine and N + Q time.

A characteristic feature of the latter is that, as a rule, they outline Paleozoic rocks, while smaller ones diverge from the main regional faults in different directions, which, in all likelihood, quickly fade, and thereby contribute to the formation of a powerful crushing zone in the regional fault zone. When the enclosing rocks are carbonate, which are characterized by increased fracturing and karsting, they provide greater water abundance. This, in particular, explains the penetration by wells of water of anomalous quality (fresh) and the high productivity of wells not only when crossing the fault plane, but also close to it. Examples include the section of the village of Archa, the village of Amandara, the village of Zernovoy, etc.

A large Besapano-South Fergana fault stands out here. The width of the fault ranges from 200 to 3000 meters. The lithological composition of the host rocks intersected by the fault is different in each identified block. In the Severo-Nurata mountain range, a fault intersects Devonian carbonate rocks, which in the Asmansay block are replaced by sandy-shale deposits of the Ordovician and Silurian, and in the Ustakhansay and Suluklisay blocks are again composed of Devonian carbonate rocks

The underground waters of the deposit are fed mainly by filtration of the waters of temporary streams flowing down from the mountains and underground inflow from the Nurata mountains and by the discharge of fissure-karst waters of the carbonate complex of the Pistalitau and Khanbandytau mountains. The depth of the groundwater level is from 3.5 to 20.5 m from the surface of the earth. Water consumption from 0.5 to 5 l / s with a level drop of 0.5-12 m.

For the Severo-Nurata field, the groundwater regime is studied at 15 points of the regional network, consisting of 10 wells, 5 wells, departmental for group and single water intakes. The deep position of the level is confined to the middle and elevated parts of the foothill sloping plain, which have merged into the alluvial fan of the watercourses Asmansay, Amandarasai, Kelvasai, Medzherumsay, Kattasay, Ukhumsay. The shallow position of the GWL is confined to the backwater zone of the coastal part of Aydarkul. The groundwater regime in narrow mountain valleys is determined by natural, climatic and hydrogeological features. Here, the amplitude of seasonal level fluctuations is observed from 2.0 to 12.5 m (col 149).

The mode of springs in the mountainous zone of the region is also controlled by natural-climatic, geological-structural and hydro-geological factors, an increase in flow rates was noted during winter and spring precipitation and snowmelt. Seasonal fluctuations in the flow of springs are within 1-5 l / s (native Ukhum), 1.5-2.5 l / s (native Kelvasay), 1.1-5.7 l / s (native Usma).

Monitoring continues at 8 water intakes (Koytash, VU-I, II, Oktom, Devon, Uchkulach, Mikhin, Uzunkuduk, Issykul). Groundwater abstraction at water intakes Koitash, VU-I (Irani) - 10.5 thousand m3 / day, from VU-II 10.0 thousand m3 / day, Oktom - 0.97 thousand m3 / day, from Issykul - 5.05 thousand m3/day, water intake Uchkulach - 1.7 thousand m3/day, water intake Devon - 1.0 thousand m3/day, water intake Mikhin - 2.0 thousand m3/day, water intake Uzunkuduk - due to lack of equipment does not work.

In 8 water intakes, groundwater mineralization is within the norm OzDSt (drinking water), at some water intakes, an increase in mineralization and hardness is observed (water intake Koytash II (irani).

A distinctive feature of the deposit is that there are objects of pollution, the Uchkulach mining enterprise, Oktom quarries, agricultural facilities for growing cotton and onions, livestock complexes and flocks. This requires the organization of new observation posts to assess the impact of these objects.

In geological and structural terms, this deposit is divided into two parts: the watersheds of the Malguzar and North Nurata mountains. The lower part of the deposit (the alluvial fan of the Sanzar River) is located in the Golodno-steppe hydrogeological region and administratively belongs to the Jizzakh fog. The upper part of the field is located within the Bakhmal fog and has other geological and hydrogeological conditions for the formation of groundwater. The underground waters of the Sanzar deposit are confined to the Middle-Upper Quaternary deposits and are ubiquitous. Water-bearing complexes are represented by boulder-pebble and sand deposits.

The groundwater of the head part of the alluvial cone is free-flowing, and as it moves to the periphery, the groundwater acquires pressure. The mineralization of groundwater increases with the distance from the feeding area (0.6 g/l) to the periphery (3.0 g/l). The thickness of aquifers ranges from 10 to 80 m. The main source of groundwater supply for aquifers is seepage losses of the Sanzar River, irrigation network and irrigated fields. Groundwater occurs at various depths from 1.3 to 26 m.

Observations are carried out at 20 observation points of the regional network, of which 16 are single wells and 4 hydrogeological clusters consisting of 9 wells. The level was measured with a frequency of 3 times a month.

The average annual GWL value ranges from 12-16.5 m (K-25) to 0.8-2.0 m (K-3 Sanzar). The amplitude of seasonal level fluctuations is 0.1-2.0 m. The maximum is confined to winter-spring water inflows in the head and middle parts of the alluvial fan, and as you move towards the peripheral part to summer vegetation irrigation Mineralization of groundwater in the head and middle parts of the alluvial fan is in the range of 0.7-1.2 g/l, and in the peripheral parts of 1.0-2.5 g/l.

Monitoring of the state of 7 water intakes, consisting of 5 observation wells, is carried out.

Groundwater is withdrawn from water intakes below the established amounts due to the incomplete capacity of the water intake. Water intakes work at 30-50%. The total amount of groundwater withdrawal from the water intakes of the deposit is 70-100 thousand m3/day.

Mineralization of underground waters is within the limits of OzDSt-950 (drinking water), but some components exceed the norms (hardness, Cd).

On the territory of the field there are the Jizzakh reservoir, the regional oil depot, treatment facilities, district chemical depot, gas stations in the amount of 50 units. and other objects of pollution. According to the above, on the territory of the field it is necessary to additionally organize an observation network with 4 hydrochemical and 3 single wells of Ch. 25, 50, 100 m. The hydrogeological features of this territory are that the aquifer complex consists of several layers and today it is necessary to study their relationship. This leads to the organization of new points for the study of this phenomenon.

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