

LAWS OF GROUNDWATER FORMATION IN KAZAKHSTAN CONFIRMS TECTONIC LITHOSPHERE PLATES THEORY

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The groundwater of the arid region of Kazakhstan with exploitation resources of more than 1300 m³/sec or about 40 km³/year is a source of water supply, district heating cogeneration, recovery of dissolved components, and non-traditional energy; it is possible to establish greenhouses and glasshouses on the basis of this for recreation and rehabilitation complex, and to organise irrigation. The following types of underground waters are investigated: artesian water, Devonian-carboxylic structures, granite massifs, alluvial sediments, fissure water of palaeozoic and pre-palaeozoic types. Short valleys in rolling plains, sandy upper paleological sediments, ejection sediments, all these types of waters are well investigated and in both quantitative and qualitative respects are a reliable source of water supply and irrigation. A number of promising artesian basins identified of the intermontane and platform type. Those studies are unique with respect to the temperature (about 100°C), chemical composition (sodic) and mineral features of the underground water (of seawater type with specific microelements). The irrigation massifs established on the basis of high-capacity water abstraction points permit study of the regime and resources of artesian water under conditions of exploitation. The parameters of boreholes show the stability of the yield, pressure and water quality during the period of exploitation. The groundwater regime and resources are determined by atmospheric precipitation and autumn-spring floods. Formation of water is initiated by tectonic and paleogeographical features of this or other territories. The water temperature varies in accordance with the temperature gradient in the earth, and the chemistry is determined by the lithological-mineralogical composition of the water-bearing rock. A clearly-expressed localisation is established in the location, distribution and changes in the mineralisation and chemical composition of the water. The water-bearing horizons of the artesian basins are an independent pressure-system. Multi-factor analysis of the development of tectonic lithospheric plates shows that on the territory of Kazakhstan spreading and subduction took place and finished in the Caledonian and Hercynian periods. The rising of the Tien Shan and Dzhungarian took place in the Oligocene. In connection with these questions of formation of underground water there is a single conclusion - they are of vadose origin, that is formed from atmospheric precipitation. There are no juvenile waters as formed according to E. Zyuss. Formation of thermal waters is initiated and determined according to the temperature gradient of the earth. Thus experience of study in Kazakhstan and the obtained results of scientific work on the formation of groundwater and assessment of their resources can be used in other similar arid regions.