SURFACE WATER AND THE CASPIAN SEA

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The Caspian sea is the world's largest closed reservoir occupying the space about 436 thousand of sq.m. It is in a zone of semi-deserts and deserts of the moderate and subtropical belts. The territory of TCO settles down on the north - east coast of the Caspian sea which is the western border of this territory. The territory directly adjoining the Caspian sea in the location of the Tengizsky deposit, is a component of Near-Caspian lowland. High-rise marks of the earth surface in this zone fluctuate from-25m to-16m the. East half of the territory represents the raised plain formed by low sandy dunes and hills, towering on 5-10м over level of the Caspian sea. The territory crosses some drying up streams. Waters of a superficial drain flow in general in the parties of the Caspian sea. The basic waterway of the region, the river Ural, runs into the Caspian sea approximately in 100 km to the north of the Tengizsky deposit. Thus, a prepotent water surface in immediate proximity to considered area includes numerous quarrels and the Caspian sea. Litters or playas represent low sites of desert in which water quickly accumulates during rains then slowly evaporates, leaving mud plains, pools, saline soils or the salted sites.

The Caspian sea shares on three natural physical-geographical region: the Northern, central and the Southern Caspian sea. Territory of TCO is located at coast of Northern region. Though on the area the Northern region is approximately equal to the Southern and Central regions, in it contains only about 1/100 volumes of waters of the Caspian sea. That is connected with its primary with shallowness – depths make no more than 10-12 m. thus about 68 % of the area of Northern region it is necessary on the sites having depth of 0-5 m.

As the sea is internal, the important role for its water balance is played by the running rivers. Over 130 rivers flow down to the Caspian sea, but from distribution on a coastal line is non-uniform. The most important rivers of the north – east part of the sea are Volga, Ural and Emba. Presumably in connection with increase in deposit volume since 1978 the sea level height increases.

On the territory of a coastal line of Caspian sea there passes the dam system in the extent about 40 km. Initially the dam has been constructed for protection of the western road round the Tengizsky petrocraft. Before the construction of a dam territory of TCO was periodically flooded with inflow of the Caspian sea and wind surge and historically is in essence a part of a bottom of the Caspian sea. For this reason the understanding of features of the Caspian sea and its influence on territory of TCO is the extremely important for understanding of existing ecological conditions. Over the last 50 years fluctuations of height of a sea level have made to 3 m. There are two types of fluctuations of height of

level of waters of the Caspian sea – long-term fluctuations in connection with change of a regional climatic mode, and the short-term fluctuations caused with the storm or wind surge.

In connection with wide prodeleting low, concerning the equal earths connected with the Northern region of the Caspian sea., even insignificant change of the height of the sea waters can lead to flooding of extensive areas. This phenomenon plays the important role in ecology of a coastal zone north – east part of the sea where rising of sea level on 10 sm can lead to territory flooding on 10 km. The coast of Northern region represents flat (soil – saline) accumulative plain with extensive shallows. In 1929 – 1977 level of Caspian sea has fallen to 3,2 m to a mark of 29 m concerning an average level of Baltic sea, having left the big areas of the bared sand. However, since 1977 the sea level rose with the average rate of 10 sm/year (1,8м) and now makes 27,2 m. Various explanations are offered these long-term fluctuations, beginning from changes of a global climatic mode and before topographical changes in region in connection with geophysical processes. Various attempts of the forecast of lifting of a sea level on the near future for the purpose of planning of protection of existing and prospective petroworkings out have been undertaken.

As a whole the northeast coast is characterised: 1) the small the slope of a shelf and coastal zone that excludes probability of influence of waves on coast; 2) absence of receipt of adjournment far from the rivers mouths; 3) the important role of wind currents in carrying over and hashing of adjournment. In Northern region of the Caspian sea storm surge, caused by strong winds, can conduct to considerable changes of a sea level for a short time interval. Primary winds during the winter period blow from the east and the Southeast, and in summertime – from the West, the northwest and the northeast. On east territory, from the river Emba and on the south to a bay the Member of the Komsomol (Karatonsky area), these winds cause storm surge in height 1,2-1,3 m (10 sm/hour) which proceeds days and conducts to flooding coastal a site depth of 35-40 km. During these surge events there can be superficial waves in height of an order of metre and the following with five-second intervals. During the winter period such wind surge usually bears blocks of ice which can damage the dams surrounding existing petrocrafts.

The mineralization of the Caspian sea waters as a whole averages about third of mineralization of ocean waters (12-13 %). A mineralization of thenear-surface layer in the Northern region of the Caspian sea from 5-10 % in the central part and more low around the delta of Volga river, to higher levels along east coast where receipts of river water the volume of deposits is insignificant, small and evaporation is strong. For thermal shelf waters the wide range of temperatures of the air, typical for the Northern region is characteristic. The average temperature of thener-surface the sheet of water makes 24ºC and more low 0 ºC in the winter in the summer that is accompanied by formation of ice fields during the period from December till March. Though on shallow sites of the Northern region the oxygen exhaustion, as a rule is not found out, it is observed in those places where is available rich with organic substance soft or where it is small mineralizations near-surface a layer. It creates the phenomenon of weak vertical displacement of water

weights on the where the benthonic layer becomes exhausted on oxygen. In these conditions hydrogen sulphide is often developed.

As the basic sources of pollution of the Caspian sea the operations conducting to dump in the rivers, the development of the shelf both coastal oil and gas deposits and industrial emissions of the coastal cities are defined. These sources of pollution have led to that the Caspian sea is recognised by one of the most polluted sea reservoirs of the former Soviet Union. The average level of the maintenance of hydrocarbons in coastal areas of northern region and east part of Caspian sea for the last 10-15 has grown concerning maximum permissible concentration (maximum concentration limit) to 4-7 maximum concentration limits. That has been connected with flooding of petrocrafts in Northern region of Caspian sea. The basic pollution is caused by industrial emissions, including arriving from oil refining factories and from the large rivers.

On different points estimations of a background state of environment on tests of a surface water were repeatedly spent. Tests have been analysed on the maintenance of metals and hydrocarbons for an establishment of background concentration of the water surface for the purpose of comparison with the analytical data on potentially amazed sites. This data shows that the water surface in territory of TCO is alkaline, highly mineralized and rather of poor quality (not potable water). The data on hydrocarbons testifies that in a surface water low levels of the maintenance of hydrocarbons are marked, and is possible as the result of oil-field operations.

The highest are the levels of the maintenance of hydrocarbons in the tests taken with east and West side of a dam.

There are three basic problems which should obtain the permit in programs of preservation of the environment in pool of the Caspian sea: 1) forecasting of lifting of waters levels of the Caspian sea; 2) an estimation of potential influence on quality of waters of the Caspian sea and 3) definition of presence of hydraulic communication between imbedded ground waters and waters of the Caspian sea. Level of waters of the Caspian sea is subject to considerable fluctuations, now the sea level rises. The program of the estimation of lifting of waters level of the Caspian sea is realised. For definition of influence on quality of sea water of direct emissions as the result of activity of TCO or other operations near to proceeding around the rivers, and also as a result of potential dump the estimation of waters of the Caspian sea is spent to ground waters. The program on monitoring of quality of waters of the Caspian sea consists in definition of types and distributions pollutes along that part of a coastal line of the Caspian sea which is the border of territory of TCO for an estimation of potential possibility of fatal ecological influence of these pollutants and the best definition of problems on protection of quality of waters of the Caspian sea. Besides, the tentative estimation of the sources which are settling down outside of territory of TCO to which influence the territory of a coastal line of the Caspian sea within territory of TCO can be exposed is spent.

Communication of ground waters with the Caspian sea for definition of existence of hydraulic communication between the Caspian sea and lying down ground waters is estimated also.

The West Kazakhstan territorial centre under the control of ecological pollution spends for TCO. The program of sampling for definition of water quality of the Caspian sea. The primary purpose of the given Program is the definition of types and distribution polluted along that part of a coastal line of the Caspian sea, which adjoins to territory of TCO to estimate potential of fatal biological effect pollute and it is better to define problems on protection of quality of waters of the Caspian sea.

The secondary purpose consists in definition of sources of potential influence from outside the operations which are carried out on small lie down « salt » deposits. The sampling program is under construction so that to provide comparison of a zone near coast of the Caspian sea, activity TCO adjoining to territories, with the zones of territory TCO adjoining to sites of activity on existing saltest petrocrafts.

Reference:

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ПОВЕРХНОСТНЫЕ ВОДЫ И КАСПИЙСКОЕ МОРЕ

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Минерализация вод Каспийского моря в целом составляет в среднем около трети минерализации океанских вод (12 -13%). Минерализация приповерхностного слоя в Северном региона Каспийского моря от 5-10% в центральной части и ниже в районе дельты реки Волга, до более высоких уровней вдоль восточного побережья, где поступления речной воды ничтожны, мал объём осадков и сильно испарение.

В качестве основных источников загрязнения Каспийского моря определены операции, ведущие к сбросу в реки, освоение шельфовых и Береговых нефтегазовых месторождений и промышленные выбросы прибрежных городов.

На разных пунктах неоднократно проводились оценки фонового состояния окружающей среды по пробам поверхностных вод. Пробы были проанализированы на содержание металлов и углеводородов для установления фоновых концентраций поверхностных вод с целью сравнения с аналитическими данными по потенциально поражённым участкам. Эти данные показывают, что поверхностные воды на территории ТШО являются щелочными, высокоминерализованными и сравнительно низкого качества (не питьевая вода). Данные по углеводородам свидетельствуют, что в поверхностных водах отмечаются низкие уровни содержания углеводородов, возможно в результате нефтепромысловых операций.