The Prospects for Using the Underground Cavities of the Jar-Bishkadak Brine Works of the Joint-Stock Company "SODA" (Bashkortostan) for Storage of Calcium-Bearing Slime.

A. Voronin[2],Ye.Karatygin[1], L.Markevitch[1], I.Okruzhnov[2] , A. Orekhov[2], V. Podoprigora[1],V. Starosterikov[1].

[1] JSC "GALURG " Saint - Petersburg, Russia
[2] JSC "SODA" Sterlitarnak, Russia

The Jar-Bishkadak Brine Works, which have been mining the rock salt deposits since 1950, is one of the largest enterprises in the world extracting salt by solution mining. Eighty five cavities having a depth of up to 1400 m. were drilled at the 285 hectares territory of the mine allotment of the brine works at various times.

The geological conditions of the deposit (the existence of thick anhydrite-clayey layers within rock salt strata) have brought about the usage of a tier-cavity mining system (fig 1).

Depending on specific conditions in the sector, the brine wells may be used individually or in combination. The volume of each underground cavity is 0.3- 3.9 millions cubic m.

In the cavities of some wells the productive rock salt stratum has been completely developed and they are temporarily closed. The total volume of abandoned cavities which could be used for the storage of different sorts of industrial waste is more than 24 millions m^3.

During the production of calcinated soda production by the Sterlitamak JSC "SODA", solid and liquid wastes are accumulated in the slime repository called "white sea".

Using this solid calcium-bearing slime for filling of the underground cavities would the decrease the risk of subsidence and consequent damage to engineering constructions and would furthermore increase the recovery of minerals.

For carrying out experiments the twinned wells N224-28 were chosen. They have the common underground cavity up to 3.9 millions m^3 and have a height of more than 300 m height.

On the whole the common cavity has a stretched ellipsoidal shape changing the profiles along the long axis from 150 to 230 m and along the short axis from 35 to 90 m.

The solid waste in the form of a slime suspension with a density of 1.28-1.30 kg/dm3 will be delivered with a capacity of 55-60 m^3/ h to one of the wells, the conditioned brine will be squeezed out down the pipes of the other well and removed for processing.

The experimental investigations have shown that the settling rate dependence of carbonized slime in the sodium chloride brine may be expressed by the following equation:

$$V = 0.07 \ln(R) - 0.02$$

where V is the rate of settling in mm/s, R is the quotient L/S, S is the solid phase, L is the liquid phase.

The duration of the consolidation of the slime is very important. Taking into consideration the experience of precipitation of the slimes carried out by the potassium enterprises, it may be expected that the suspension will reach the density of 1.98 t/m^3 in one year and in 8 - 10 years it will approximate to the density of the surrounding rock.

The period of filling of the cavity with the slimes is defined by the productivity of the installation, which at the experimental stage makes 100000 mm of carbonized slime, working continually 180 days a year. It is planned in the future to increase the productivity further.

It is planned to build near the cavities a technological complex including the pump station, slime discharging grounds, a slime suspension preparation section, pipelines and other technological equipment.

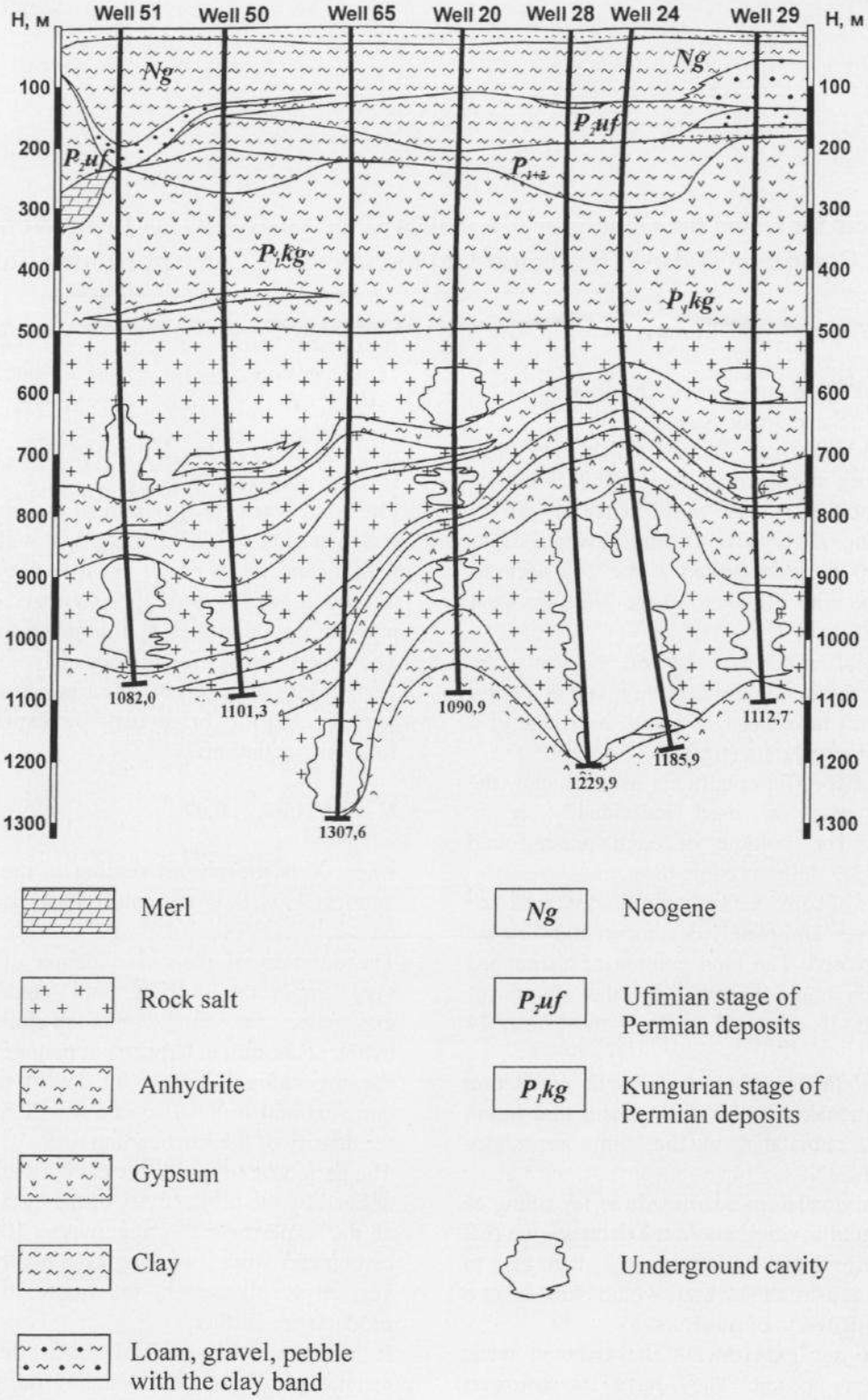

Figure 1. Geological section of the Jar-Bishkadak rock salt deposit