Brief geological information on Chiren UGS

Chiren UGS was built on the basis of a depleted gas condensate field, which by 1974 was exhausted and its transformation into a gas storage facility started. Currently 42 wells are drilled on the area of Chiren of which 24 exploitation (20 vertical and 4 deviated), 14 observation and other wells.

The initial water and gas contact (WGC) in the field is accepted for minus 1675 m (absolute value). At the end of storage facility operation, the formation pressure is 21 bar.

The current water and gas contact (WGC) in the matrix at minus 1575 m (absolute value). The same level is determined during the creation of the gas storage simulation model as well.

Chiren structure is brachianticlinal fold running from the northwest to the southeast with dimensions 15 x 7 km and amplitude of about 400 m. In the upper part of lower Jurassic (Toarcian) two local elevations along the isoline minus 1300 m have been outlined. The deepest closing contour of the structure is isoline minus 1700 m.

The structure has been formed as a result of overthrust processes in south-north direction, where fold was formed with steep, broken north side and squeezed along the thrust about 2 km to the north.

The gas field is of massive type and is located between late Pliensbachian (local and at the Toarcian) and the gas-water contact. The gas-saturated part of the reservoir is composed of sandstones and alevrolites at the age of lower Triassic, limestones, dolomites and tuffites - middle and upper Triassic, sandstones - Hettangian - Sinemurian and limestones - Pliensbachian.

Over the Pliensbachian, the Toarcian deposits lie (limestones, marls, argillites) of thickness ranging between 12 m and 103 m, which in some areas are part of the gas-saturated reservoir.

Seal rocks are represented mostly by argillites that are interbedded by alevrolites and marls of a middle Jurassic age and thickness 190-490 m (according to well data).

The upper horizons of Upper Jurassic-Lower Cretaceous age are composed of dense limestones, in separate layers - dolomitized, in some locations slightly to strongly clayey, in the shallower horizons - alternating with marls. They form a common aquifer complex with great thickness and abundance for the region and is considered the second shielding barrier of the gas reservoir.

Hydrogeological characteristic

Chiren UGS and the region around it are part of a common artesian basin, formed in the Mesozoic sediments of the Western Predbalkan. Only the aquifer in the Aptian sediments is exposed in the Southern part of the Chiren structure (Milinkamuk and Ponora - the water is used for drinking).

Aquifers

- Permian sediments-sandstones with variable height

Chlorine-calcium type with general mineralisation 51,8 gr/l

static level + 31,4 m (302,6 m from the drill head)

- Lower Triassic sediments - sandstones are water-saturated, such as pressure waters

Chlorine-calcium-calcium type with general mineralisation 54 gr/l; chlorine group; sodium subgroup;

- Middle-Upper Triassic

the aquifer is formed in carbonates according to deposit conditions, they are crack-karst according to dynamics - formation.

Mineralisation 57- 60 gr/l

Chlorine-sodium type; chlorine group; sodium subgroup;

Water are deeply metamorphosed, characteristic of closed-type structures;

- Lower Jurassic waters

Accumulated in sandstones (Hettangian-Sinemurian) and limestone (Pliensbachian) according to the deposit are crack-formation (Hettangian-Sinemurian) and crack-karst (Pliensbachian); according to dynamics - formation pressure.

Upper waterproof layer - argillites of the Toars and Middle Jurassic;

Lower waterproof layer - argillites of variable thickness of Upper Triassic at locations where Lower Triassic argillites lack;

General mineralisation 42- 54 gr/l;

Chlorine-sodium type; chlorine group; sodium subgroup;

In the mineralisation of Lower Jurassic waters, an increase from south to north is noticeable; Maximum mineralisation in P-7 -54 gr/l and minimum in P-15 -42 gr/l

- Upper Jurassic - Lower Cretaceous

The waters are accumulated in limestones and are karst and crack-karst, formation.

Upper waterproof layer - marls and clayey limestones (Hauterivian);

Lower waterproof layer - Middle Jurassic marls, siltstones and argillites;

Chlorine-calcium type with average mineralisation 17,5 gr/l;

- Waters in the Aptian

Connected to the Urgonian limestones - strongly cracked and calcined with exposure on the surface; karst pressure waters; in places they are partly self-draining.

The horizon has been tested in P-15, and self-draining water was generated

Chlorine - magnesium type, hydro-carbonate group, magnesium subgroup.