O5-2 WELL LOG TECHNIQUES THAT ARE APPLICATED FOR FORMATION PRESSURE ESTIMATING IN ALBANIA

RUSHAN LICO
Faculty of Geology and Mining-Polytechnical University of Tirana, Albania

In the formations of the Tortonian-Pliocene sections at Preadriatic Depression have been encountered abnormal pressure zones. Quantitative evaluation of these pressures restoration formation thickness has been the goal of several years' study. Formations with pressure higher than the hydrostatic ones vary in depth. The study of compassion and discovery of abnormally high pressure in thick sedimentary sections, from geological point of view are significant because the shale rocks serves as source formation, as covering and as environments of migration of water and hydrocarbons.

To accomplish this study is appreciated all geophysical information, where mains are: The resistivity logs recorded by conventional tool, the travel times recorded by sonic logs. For the purpose of this study are included: The self-potential logs, the mud resistivity logs, the temperature logs and well testing, also. The resistivity logs have been the only one to be used as in the old and at the new boreholes, it still remain as the main one. In the basis of a great quantity of resistivity logs recorded by several devices, was concluded that the lateral one with spacing 2 meters curve is currently on the most effective tool for in situ formation pressure estimation.

These studies suggest that resistivity and acoustic logs are the most effective in separation and evolution of formation pressure by an error of 10%.

The geophysical methods presently applicable in Albania are the principal ones for the study of compacting, discovery of abnormal pressure intervals and for quantitative evaluation to determine direction of fluid migration. For this aim are performed studies through relationships of physical properties versus depth, which lead to finding of formation pressure. In addition to well logs data, other studies are accomplished about lithological composite, rock and water densities and change of temperature for the solution of formation pressure. To draw an accurate conclusion on the nature and the spread of abnormal pressure, it was necessary to get acquainted with a wide drilling information. A part of the data is obtained by technological methods, where more important information obtained by well testing. These data have given possibilities to provide an advanced processing technique using as statistical and analytical approaches and have greatly increased the solution of formation pressures. The accurate calculation of formation pressure and the study of their spatial distribution, created possibilities to restore the formation thickness and to determine the direction of fluid removal towards sandstone beds.

In order to indicate the compactions was necessary to construct a series of curves of dependence of logs data versus of depth, the indexes of which depend from porosity. But for this aim was necessary to determined the coefficient of irreversible compression. Using the regional studies of irreversible compression was concluded that gradients of porosity of shale at intervals. 500-2500 m varies in 2-3 times. The value of this coefficient was determined for every region. Acquaintance of numerical values of coefficient of irreversible permitted the compaction to be studied and rocks with high abnormal pressures to be defined. For separation of rocks with abnormal pressure must determined boundary values. For average density of rocks and fluids 2.5 and 1.02 g/cm^3 respectively, boundary values are:

$$P_{amin}=0.013h \text{ and } P_{amax}=0.02h$$

While hydrostatic normal pressure is:

$$P_h=0.0102h.$$

Studies, which are performed, showed that mineralogical factors up to depth of 2500m have not had influence to geophysical measurements. The salinity of water, has a great influence on resistivity

has very small gradients. While temperature is taken consideration through the coefficient of increase resistivity which is calculated for different depths, assuming linear change of this parameter versus temperature.

The complete analysis of measurements indication that at first 800-900m. Resistivity does not obey to the trend of normal compression. This is explained by the washing of salinity from the rocks. A characteristic of these zones is that starting from southern up to the northern section of depression in the belt of the gas structures and from the east towards the west they maintain the structural shape of the regions. Formation pressure values and their gradient one are not presented as values, which continuously increase. More common values formation pressure gradients change from 1.4 to 1.7 Mpa/10m., while in the complete shale section, these value go up to 2.2 the trends of abnormal pressure increases towards the west and attempt to zero towards the east. The gradients of abnormal pressure on the western slopes of structural belt reach up to $2kg/cm^2/10m$. In the southern structural sections the abnormal zones emerge at depths, about 700-800m.

The interruption of normal compaction lines in some structures does not emerge to over pressures but to disjunctive faults. Based on the methodology of compression curves, the directions and fault levels are determined or are corrected.

From this study has been created an accurate imagine about the gradient of pressure which are in the same time an important element for prospecting and for technological purpose, too.

Knowing the accuracy of overpressure and pressure-depth relationships in our country, are improved drilling techniques casing programs, hydraulic fracturing and reservoir evaluations.

The occurring depth of this pressure starts from several hundreds meters down to 4000 m, but there are region where the depth of high-pressure manifestation is very shallow. Unknowing the abnormal pressure has caused the blow out in some wells, like in Divjaka and Povelca structures, and consequently they are abandoned. Not completing their geological tasks.

The performed of such study made possible coming to the conclusion that the main reason of abnormal foundation is compaction phenomenon.

For this reason it was necessary to define the ceiling of abnormal pressures and quantitative values of formation pressure and their mapping. To accomplished quantitative estimations of formation pressures are applied: The equivalent depth approach and the Normal compaction curves approach. Comparison of the result obtained by equivalent depth approach with those of normal compaction curves confirmed that second one is most accurate.

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The final objective of this study has been to provide an optimised, cost-effective solution for formation evaluation of abnormal pressures.