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Identification of Accumulated Hydrocarbon Based on Heat Propagation Analysis in Order to Develop Mature Field: Case Study in South Sumatra Basin, Indonesia

Authors : Kukuh Suprayogi, Muhamad Natsir, Olif Kurniawan, Hot Parulian, Bayu Fitriana, Fery Mustofa

Abstract : The new approach by utilizing the heat propagation analysis carried out by studying and evaluating the effect of the presence of hydrocarbons to the flow of heat that goes from the bottom surface to surface. Heat propagation is determined by the thermal conductivity of rocks. The thermal conductivity of rock itself is a quantity that describes the ability of a rock to deliver heat. This quantity depends on the constituent rock lithology, large porosity, and pore fluid filler. The higher the thermal conductivity of a rock, the more easily the flow of heat passing through these rocks. With the same sense, the heat flow will more easily pass through the rock when the rock is filled with water than hydrocarbons, given the nature of the hydrocarbons having more insulator against heat. The main objective of this research is to try to make the model the heat propagation calculations in degrees Celsius from the subsurface to the surface which is then compared with the surface temperature is measured directly at the point of location. In calculating the propagation of heat, we need to first determine the thermal conductivity of rocks, where the rocks at the point calculation are not composed of homogeneous but consist of strata. Therefore, we need to determine the mineral constituent and porosity values of each stratum. As for the parameters of pore fluid filler, we assume that all the pores filled with water. Once we get a thermal conductivity value of each unit of the rock, then we begin to model the propagation of heat profile from the bottom to the surface. The initial value of the temperature that we use comes from the data bottom hole temperature (BHT) is obtained from drilling results. Results of calculations per depths the temperature is displayed in plotting temperature versus depth profiles that describe the propagation of heat from the bottom of the well to the surface, note that pore fluid is water. In the technical implementation, we can identify the magnitude of the effect of hydrocarbons in reducing the amount of heat that crept to the surface based on the calculation of propagation of heat at a certain point and compared with measurements of surface temperature at that point, assuming that the surface temperature measured is the temperature that comes from the asthenosphere. This publication proves that the accumulation of hydrocarbon can be identified by analysis of heat propagation profile which could be a method for identifying the presence of hydrocarbons.

Keywords : thermal conductivity, rock, pore fluid, heat propagation
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