

Workflow to Design an Electrical Submersible Pump for Water Dump Flooding

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ABSTRACT

Field- L is a small field in Cambay basin which started to show decline in the reservoir pressure. It was recommended to go for secondary recovery methods. However the location and the size of the field could not economically justify the use of conventional water flooding. Water dump flood project was then proposed to maintain the reservoir pressure and improve oil production and recovery in a most cost effective way. Water dump flooding is a technique in which water is injected using an Electrical Submersible Pump (ESP) from an aquifer zone to a depleted reservoir using a single well. This novel technique saves the cost for drilling injector wells and also the expenses associated with building surface and water treatment facilities. This study involves the establishment of a dedicated workflow to utilize an ESP under water dump flood setup. The workflow comprises of three steps: Sand Prediction, Pressure Prediction and Final ESP design. Critical drawdown was first calculated for aquifer zone using logs and correlations. To avoid sand production, the flow rate was maintained below critical flow rate. In pressure prediction step, future reservoir pressures were estimated using Petrel PI software. The equations for Total Dynamic Head (TDH) were then derived for the special case of dump flooding. The TDH values were then determined using the equations derived for the future pressures. Finally, by using the results of first and second step, ESP was designed using DesignPro software. Number of stages of ESP and frequencies of Variable Frequency Drive (VFD) were calculated. The concept proved as a success and the client accepted the proposal. Also the workflow is established and will be used in future for the similar cases. Keywords: Water dump flood, ESP, Critical drawdown, Total Dynamic Head (TDH), Variable Frequency Drive (VFD) References: Design of ESP installations, Gabor Takos Artificial lift methods, Kermit Brown Production Technology, Heriot Watt Well Performance, Golan Michael Khaksar, A., Taylor, P.G. et. al, June 2009, Rock strength from Core and Logs: Where We stand and Ways to Go, SPE EAGE Annual Conference and Exhibition, Amsterdam. SPE-121972 Case study from cambay basin, Journal of geophysics and engineering, Rima chatterjee