Effect of Drilling Cuttings Transport on Pressure Drop in a Flowing Well

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Abstract

Cuttings transport has a major impact on the economics of the drilling process. It is one of the major factors affecting cost, time and quality of drilling wells. In spite of the many technological advances that have attempted to prevent the cuttings transport along the fluid, one significant challenge remains predicting the effect of cutting transport on pressure drop. Many interdependent variables affect cuttings transport and the complexity of the phenomena present challenges to the production engineer whose tries to determine how the cuttings transport affect the pressure in vertical flow.

Meanwhile, many correlations have been developed to determine the effect of cutting transport in vertical flow but there is little information related to effect of cuttings transport on pressure drop and cutting hold up along the vertical pipe.

This paper presents comprehensive details of effect of cutting transport on pressure drop and the detrimental effect of drill cutting hold-up on fluid flow along the vertical pipe.

Introduction

In the recent years, underbalanced drilling technique has been highly promoted because of its robustic benefits to the oil and gas industries. The

light fluids used in underbalanced drilling are usually air, gas; foam and aerated water. However formation fluid (oil and water) influx appears most time while drilling or cleaning the hole because formation pore pressure gradient are higher than hydrostatic pressure gradient.[1-5] When a well is drilled underbalanced, hydrocarbon production begins as soon as productive zone is penetrated5. It is possible to produce portion of the reservoir fluid while drilling or cleaning hole. With suitable processing equipments, some underbalanced wells may pay for their cost entirely from production before drilling operations were completed.[5] The technique requires the simultaneous flow of fine drilling cuttings and formation fluid (gas, oil and water). If the pressure profile in an underbalanced well can be predicted within reasonably accuracy, it would be possible to get good estimates of the power required to lift the accumulated cutting and formation liquid while drilling or cleaning the hole. Furthermore, the effect of injection rate, cutting transport and annulus sizes on these quantities can be evaluated before any design decision is made on the drilling, hole cleaning and operation of the flow string.

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