

## Scrutinizing the Effective Parameters on Cuttings Movement in Deviated Wells: Experimental Study

**Authors :** Siyamak Sarafraz, Reza Esmaeil Pour, Saeed Jamshidi, Asghar Molaei Dehkordi

**Abstract :** Cutting transport is one of the major problems in directional and extended reach oil and gas wells. Lack of sufficient attention to this issue may bring some troubles such as casing running, stuck pipe, excessive torque and drag, hole pack off, bit wear, decreased the rate of penetration (ROP), increased equivalent circulation density (ECD) and logging. Since it is practically impossible to directly observe the behavior of deep wells, a test setup was designed to investigate cutting transport phenomena. This experimental work carried out to scrutiny behavior of the effective variables in cutting transport. The test setup contained a test section with 17 feet long that made of a 3.28 feet long transparent glass pipe with 3 inch diameter, a storage tank with 100 liters capacity, drill pipe rotation which made of stainless steel with 1.25 inches diameter, pump to circulate drilling fluid, valve to adjust flow rate, bit and a camera to record all events which then converted to RGB images via the Image Processing Toolbox. After preparation of test process, each test performed separately, and weights of the output particles were measured and compared with each other. Observation charts were plotted to assess the behavior of viscosity, flow rate and RPM in inclinations of 0°, 30°, 60° and 90°. RPM was explored with other variables such as flow rate and viscosity in different angles. Also, effect of different flow rate was investigated in directional conditions. To access the precise results, captured image were analyzed to find out bed thickening and particles behave in the annulus. The results of this experimental study demonstrate that drill string rotation helps particles to be suspension and reduce the particle deposition cutting movement increased significantly. By raising fluid velocity, laminar flow converted to turbulence flow in the annulus. Increases in flow rate in horizontal section by considering a lower range of viscosity is more effective and improved cuttings transport performance.

**Keywords :** cutting transport, directional drilling, flow rate, hole cleaning, pipe rotation

**Conference Title :** ICOGPE 2017 : International Conference on Oil, Gas and Petrochemical Engineering

**Conference Location :** Venice, Italy

**Conference Dates :** February 16-17, 2017