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Performance investigation of an experimental shale shaker infiltration of low concentration slurry

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Drilling fluids are used in oil-well drilling operations to carry drill cuttings to the surface, to lubricate the drill head, and to manage the fluid pressures inside of the borehole. Drilling fluids are designed with specific properties and are a significant cost of the drilling operation. To optimize the economics of drilling operations the drill fluids are treated at the surface and recycled to the drilling operation. Effective removal of sand and granular drill cutting particles from drilling fluid is the most important step in the treatment of the drilling fluid for re-use. The most common device to separate sand and granular particles from the drilling fluids is the vibrating screen, also known as a shale shaker. In this research, the performance of a small scale shale shaker made by M-I SWACO (a Schlumberger Company) in different operational conditions is investigated. Separation efficiency of the shaker depends on a number of factors including motor amplitude, frequency of vibration, flow rate deck angle, sand concentration, and type of particles and screen. In this work experiments were run with an XR 120 screen to separate sand from water. The shaker was operated at different frequencies, accelerations, and angles to determine the operating envelope. The operating envelope shows the shaker functioned best in a frequency range of 80-120 Hz. The envelope is plotted similar to a phase diagram to show conditions that the shaker produces a uniform surface cake, ribbons or balls, or conditions when the shaker channel plugs. This work is unique in that screen operations are typically not investigated on a small scale shaker.

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