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A new version of manometric method of brine-insolvent boundary depth determination from well head

Introduction

Two general groups exist for interface monitoring methods. The first one assumes allocation of measurement transmitters in a borehole or a cavern nearby the proposed interface level. The following transmitters are the most common: hydroacoustic, that measure induced sonic or ultrasonic wave reflection from the interface; electric contact, that use brine-to-nonsolvent electric conductivity variations; and a capacitance method that employs sensing the differential electric permeability of liquids on the interface.

This group also incorporates liquid wellhead pressure measurements in a nonsolvent column and a reference one located between casing and a water tube when its shoe is located at the predefined nonsolvent depth. When the nonsolvent level varies, the associated pressure drop helps adjust the interface level.

The second group of methods is essentially a "subshoe" monitoring method that implies regular nonsolvent injections into a hole - in volumes that exceed a requirement for isolation of cavern roof - following its controlled release through a water string.

Higher well depths, unfavourable operating conditions and necessary tripping operations - all make the first group of methods unreliable. Disadvantages are mainly attributed to special devices, such as cables, to transmit signals from sensors to the surface. Cable protection, during the tripping operations in particular, needs much effort, substantial time and costs, on the one hand, and years of continuous sensor operation in the hole due to high tripping costs and long idle time of brine wells, on the other.

Despite their wider use, the second group of methods also have some disadvantages. For instance, the "subshoe" monitoring method requires additional injection of large nonsolvent volumes. This interrupts on-line monitoring and causes process violations.

Taking into account these considerations, a new method was proposed and partly tested some years ago. This interface monitoring method is built around the measurement of a

wellhead differential pressure in operating holes when solvent injection is terminated. The method enables dissolution control without long process shutdowns, use of special borehole transmitters and dedicated, costly cables to bring data to the surface.