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DETERMINING THE INJECTION POTENTIAL OF GEOLOGIC FORMATIONS USING FIBER OPTIC SENSING TECHNOLOGY

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Abstract

Among the fluid management options available for the natural gas storage industry, disposal of Class II wastewater in deep saline aquifers is rapidly becoming the preferred option. Geologic formations containing saline aquifers and depleted reservoirs must be carefully evaluated and characterized to determine suitability for disposal of waste fluids. Among the tools available for evaluating the injection potential of geologic formations is fiber optic technology especially slickline distributed temperature sensing (SL-DTS). The use of SL-DTS technology is becoming prevalent due to its ease of operation and ability to acquire meaningful downhole temperature data.

This paper presents a case study where SL-DTS data was acquired and analyzed for evaluating injected fluid distribution in geologic formations, for a disposal well located in Texas, USA. The case study presents the results of the SL-DTS measurements for the injection of produced brine from leaching operations of salt cavern development. Time-lapse temperature traces were taken along the whole length of the wellbore during injection and shut-in periods. Time-lapse temperature traces during the injection period identified the zones that took fluid. The temperature profiles of the permeable zones stayed close to the baseline temperature profile, in comparison with the rocks above the reservoir rocks. Time-lapse temperature traces during the shut-in period further delineated the most permeable zones. The results not only identified the most permeable zones but allowed for the quantitative determination of the contribution of each specific zone in the field test.

The case study presented in the paper will encourage increased use of the SL-DTS technology in waste fluids disposal in the solution mining industry for gas storage field development.

Key words: Slickline Distributed Temperature Sensing, Fiber Optic, Disposal of Class II Wastewater, Underground Injection.