

GeoWell: Real Time Well Integrity Monitoring Using Fiber Optic Distributed Sensing

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In order to extend the lifetime of geothermal wells and to improve safe operation, the thermo-mechanical integrity of casing and cement was analyzed. In geothermal wells, especially those with high temperature and pressure changes during production/injection in addition to shut-in cyclic periods lead to strong variations of the thermal and mechanical load onto the well architecture. To study the cement placement and the behavior of casing and cement during varying load conditions, our work focused on real-time well monitoring technologies to identify processes influencing the well integrity status. Therefore, distributed fiber optic sensing technologies were developed and tested to simultaneously measure temperature, strain and acoustic noise within the cemented annulus of a geothermal well. Fiber optic data from one low temperature and two high temperature geothermal wells were analyzed and compared to conventional well logging information to evaluate the well integrity status.