

### **Differential Temperature Survey – May 10, 2016**

A Differential Temperature Survey was performed on May 10, 2016. Weatherford Wireline Services (Weatherford, located in Oklahoma City, Oklahoma) provided wireline, logging tools, and pressure control services for the Differential Temperature Survey. The well had been shut-in for 178 hours prior to commencing the Differential Temperature Survey. The downward velocity of the temperature tool was approximately 35 feet per minute from the surface to 6,790 feet. A copy of the survey is included in Appendix B.

The Differential Temperature Survey depicts a natural temperature gradient from the surface to a depth of 6,790 feet. A cooling effect on the survey identifies the majority of the long-term injection to have exited the wellbore in the upper perforations in the Pawhuska Formation from 4,566 feet to 4,950 feet. Lesser injection intervals within the Pawhuska Formation are identified from 6,120 feet to 6,230 feet, 6,292 feet to 6,320 feet, 6,410 feet to 6,500 feet, and below 6,770 feet to the top of the fill in the wellbore. Figure 1 is a plot of the 2016, 2011, 2007, and 2001 Differential Temperature Surveys. The Differential Temperature Survey confirms there is no evidence of vertical fluid movement out of the permitted injection interval into an underground source of drinking water through vertical channels adjacent to the wellbore.

