

Developments in Swellable Elastomeric Technologies for Isolation
in Deep and Medium-Deep Geothermal Applications



Introduction

- Swellable packers can provide cost-effective and flexible isolation tools, allowing both simplicity of use and a reduction in overall well construction and completion costs.
- Reactive Downhole Tools is a well-established provider of high-performance swellable rubber technology.
- By building on past success and continuous, strategic investment in facilities and infrastructure, Reactive have evolved to be positioned to offer bespoke solutions for open and cased hole applications.
- Rapidly converting concept to completion with perhaps the shortest lead times in the market.
- This presentation serves to outline Developments in Swellable Elastomeric Technologies for Isolation as they relate to Deep and Medium-Deep Geothermal Applications

High Temperature, Water Swellable Compounds

- Broadly speaking, Geothermal Temperature ranges can be defined as follows:
 - Low Temperature up to 90°C
 - Medium Temperature 90°C to 150°C
 - High Temperature over 150°C
- Both Low and Medium Temperature applications are within the range of Reactive's longstanding water-swellable compounds.
- For High Temperature applications, compounds are currently in the latter stages of development to extend into the following ranges: 151-160°C and 151-200°C.
- Additional development may also be driven by High and Ultra High Temperature Oil and Gas needs.

Groundwater Isolation

- Concerns over water contamination may exist in Geothermal applications, where wells pass through the Water Table.
- A common solution is to place a cement (grout) barrier across Groundwater, however; typical oilfield slurry recipes could pose a risk of contamination.
- A water-swellable, elastomeric swell packer could provide an alternative to placing cement (grout) across the well-water interface.
- Packers can be run independently or in support of cement (grout). The latter is often referred to as Cement Assurance.

Straddles and Swellable Elements

- When drilling Minewater Geothermal bores, the well's trajectory may intersect mine works at a shallower depth than those targeted.
- In such cases, it could be common practice to repeatedly 'blob' cement (grout) until a column of adequate height is formed, such that drilling can continue through the resultant stack.
- As with Groundwater Isolation application mentioned previously, this could pose concerns over water contamination. Additionally, there might be little control over where this cement (grout) is being positioned.
- An alternative to this practice could be to use an Anchor to suspend an assembly – complete with appropriately sized tubulars and swellable elements – to provide an Isolation Sleeve.
- An Anchor of this nature can be positioned accurately and pressure ratings of the sealing components calculated.

Dual String Swell Packers

- Some Geothermal applications require multiple bores to inject and produce from different depths.
- Dual String Swell Packers may make it possible for the number of boreholes to be reduced by having independent tubular strings within the same hole, leading to possible cost reduction through reduced well count, fewer wellheads, less in-well instrumentation, reduced surface infrastructure, etc.

Instrumentation and Control Lines

- Increasingly, well owners desire well data – such as Pressure and Temperature – to be made available. As a result, wells may be completed with fibre and/or electrical control lines.
- Designs exist to facilitate the feed-through of control lines by a couple of methods; either a portion of the line is built into the Swell Packer at manufacture, with dry-mate connectors above and below the element or where the line is installed on-the-fly in a channel through the element, as the Swell Packer is run-in-hole.