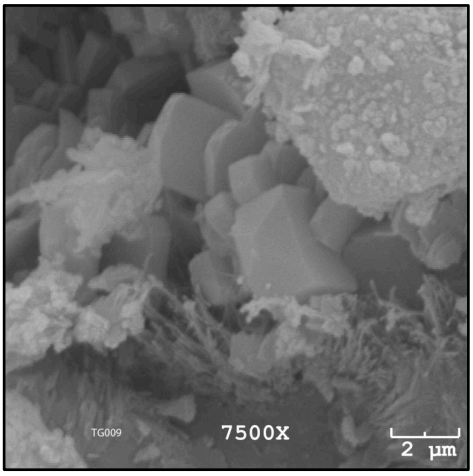
Improved Cement for Geothermal Wells

Zeolite-Containing Cement Performs Well in Harsh Geothermal Conditions and is Easy to Use

After an oil, gas, or geothermal production well has been drilled, the well must be stabilized with a casing (sections of steel pipe that are joined together) in order to prevent the walls of the well from collapsing. The gap between the casing and the walls of the well is filled with cement, which locks the casing into place. The casing and cementing of geothermal wells is complicated by the harsh conditions of high temperature, high pressure, and a chemical environment (brines with high concentrations of carbon dioxide and sulfuric acid) that degrades conventional Portland cement.[1]

During the 1990s and early 2000s, the U.S. Department of Energy's Geothermal Technologies Office (GTO) provided support for the development of fly-ash-modified calcium aluminate phosphate (CaP) cement, which offers improved resistance to degradation compared with conventional cement. However, the use of CaP cements involves some operational constraints that can increase the cost and complexity of well cementing. In some cases, CaP cements are incompatible with chemical additives that are commonly used to adjust cement setting time. Care must also be taken to ensure that CaP cements do not become contaminated with leftover conventional cement in pumping equipment used in conventional well cementing.

With assistance from GTO, Trabits Group, LLC has developed a zeolite-containing cement that performs well in harsh geothermal conditions (thermal stability at temperatures of up to 300°C and resistance to carbonation) and is easy to use (can be easily adjusted with additives and eliminates the need to "sterilize" pumping equipment as with CaP cements). This combination of properties reduces the complexity/cost of well cementing, which will help enable the widespread development of geothermal energy in the United States. Trabits Group is currently seeking to commercialize the new cement.



Microscope Image of a Zeolite used in Trabits Group's Cement

[1] *Advanced Cements for Geothermal Wells*, Brookhaven National Laboratory (2006), http://www.bnl.gov/isd/documents/35393.pdf

Overview

- Developed by Trabits Group, LLC, with assistance from the University of Alaska Fairbanks.
- Completed a 1,000-ton production run of interground clinker and zeolite cement, and tested the cement in six low-temperature wells.

Applications

Can be used to secure steel casings in geothermal wells, thereby providing structural stability to the wells.

Capabilities

- Allows for density adjustments within a single blend without adversely affecting cement slurry properties.
- Eliminates the need for separate blends for lead and tail slurries.
- Maintains accurate down-hole densities throughout the job without significant changes in viscosity.

Benefits

Cost Savings

Reduces the time and complexity of well cementing, which reduces the overall cost of well completion.

Ease-of-Use

Provides compatibility with all common additives (e.g., retarders and accelerators) and minimizes the effect of down-hole temperature fluctuation on setting time.

Environment

Reduces greenhouse gas emissions compared with Portland cement production by using naturally occurring pozzolanic zeolites.

Contact Information:
George Trabits
Email: george@trabitsgroup.com
Phone: (907) 357-9850
Trabits Group, LLC
P.O. Box 870404
Wasilla, Alaska 99687-0404
Website: http://www.trabitsgroup.com/