

Motivation/Challenges

Sandstone and coalbed formations have the ability to inject gas at high pressures into the cement when it is transitioning from a liquid to a gelled state near the groundwater zone, compromising the integrity of the curing cement. Incomplete removal of drill mud from the wellbore prior to cementing can also facilitate the development of gas-flow paths along the wellbore annulus. These phenomena have occurred in a number of Pennsylvania's Marcellus wells and can lead to problems such as groundwater contamination or even explosions.

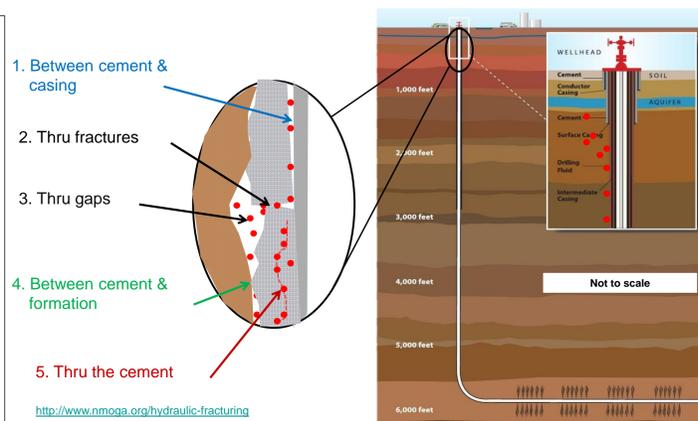
Technology/Capability Overview

Methods are being developed to quantify the potential for gas flows from shallow formations containing groundwater aquifers to affect the integrity of wellbore cement during hydration.

The project approach is as follows:

1. Develop a database (geographical conditions, drilling operation, cementing operation, etc.)
2. Preliminary data mining
3. Establish initial borehole conditions
a.) Experimental and b.) Theoretical
4. Establish long-term borehole conditions
a.) Experimental and b.) Theoretical
5. Final data mining
6. Products

1. Between cement & casing
 2. Thru fractures
 3. Thru gaps
 4. Between cement & formation
 5. Thru the cement
- <http://www.nmoga.org/hydraulic-fracturing>



Industry Significance

PA DEP regulations require oil and gas well operators

- "to prevent the migration of gas or other fluids into sources of fresh groundwater" (78.81 (a)(2))
- "to ensure an adequate cement bond between the casing and the formation via wellbore conditioning" (78.83 (c) and 78.83c.(a))

Although industry recognizes the deleterious impact of gas injection, the corrective actions taken appear varied and their effectiveness unclear.

Benefits to Partner

- Provide guidance on beneficial enhancements in current regulations
- Provide better risk assessment tools
- Provide situation-specific risk mitigation guidance

Opportunity

- Provide a better understanding on how gas migration manifests
- Quantify risk based on the critical combination of conditions present
- Provide site specific guidance on the prevention of gas migration

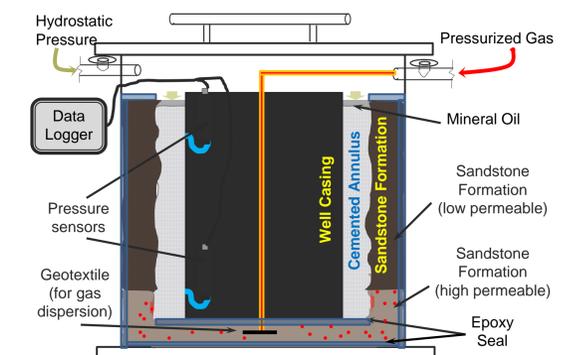
Development Status

Development of in-situ wellbore simulation chamber

- In-situ pressure/temperature
- Gas injection details/pressures

Development of testing protocol

- Considerations of factors such as cement characteristics, formation characteristics, geological conditions, wellbore construction techniques used, etc.



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