

SentinelCem™ Cement

CURING SEVERE AND TOTAL LOSSES

OVERVIEW

Lost circulation is reported as one of the most costly problems during drilling operations. Costs for this problem range from several thousand dollars due to moderate loss of fluids to tens of thousands of dollars for sidetracks or relief wells resulting from severe losses. If remediation solutions are ineffective, significant financial setbacks occur due to bypassed reserves or even cancellation of development projects.

SentinelCem cement is specifically designed to cure losses and enable further drilling and help achieve zonal isolation by accomplishing intended top of the cement. The solution is applicable for any type of losses and is very effective for severe to total losses where particulate materials alone are ineffective.

Fractured, vugular, cavernous or highly-porous formations can accept considerable volumes of drilling fluid. If fractures and voids are large, they will not be plugged by the particulate materials that are typically used. When this occurs, further drilling can be impeded and this may necessitate setting additional casing strings or well abandonment. In addition, cementing operations are susceptible to the same severe losses as encountered during drilling. SentinelCem cement is designed for such situations, helping stabilize the wellbore architecture for continued drilling.



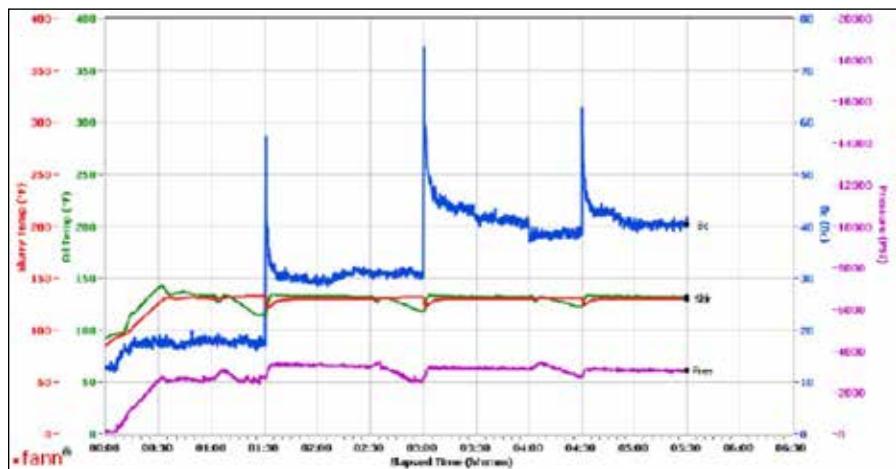
SentinelCem cement helps mitigate costs involved with replacing drilling fluid due to losses, enabling drill ahead by stabilizing loss zones.

BENEFITS

- » Shear-rate dependent rheology during pumping helps SentinelCem cement enter the thief zone readily.
- » Buildup of gel strength when shear is reduced helps prevent the slurry system from flowing into the thief zone continually.
- » Rapid static gel strength coupled with early compressive strength helps plug thief zones and mitigate further lost circulation.
- » Decreases the need for remedial cementing operations.
- » Minimizes lost fluids and maintains drilling efficiency thus helping manage operational costs.
- » Acid solubility enables optimally oriented perforations and stimulation treatments.

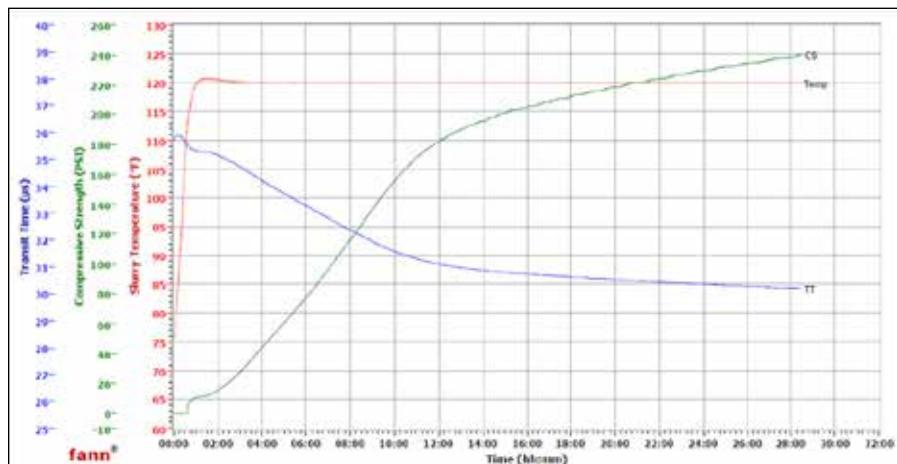
SENTINELCEM™ CEMENT – LABORATORY-PROVEN PROPERTIES

Halliburton has developed a lightweight cement system specifically for lost circulation treatment. This cement system contains selected components that impart the needed rheological and mechanical properties to help cure losses. SentinelCem cement can be made acid soluble and hence can be used across producing zones. SentinelCem cement is very easy to mix, has a low viscosity to aid in full-coverage placement while pumping, and develops early static gel strength and compressive strength. These properties help in curing losses when the slurry enters the fractures and small or medium vugs. As the slurry enters the loss circulation zone(s) the slurry velocity is reduced and the slurry begins to gel due to the reduction in shear rate. The slurry can become liquid again, for a few cycles, if the shear is re-applied. The features such as thixotropy, bonding to the formation, and long dynamic pumping time increases the probability of curing the losses with this cement system.

On-Off Cycle – SentinelCem Cement

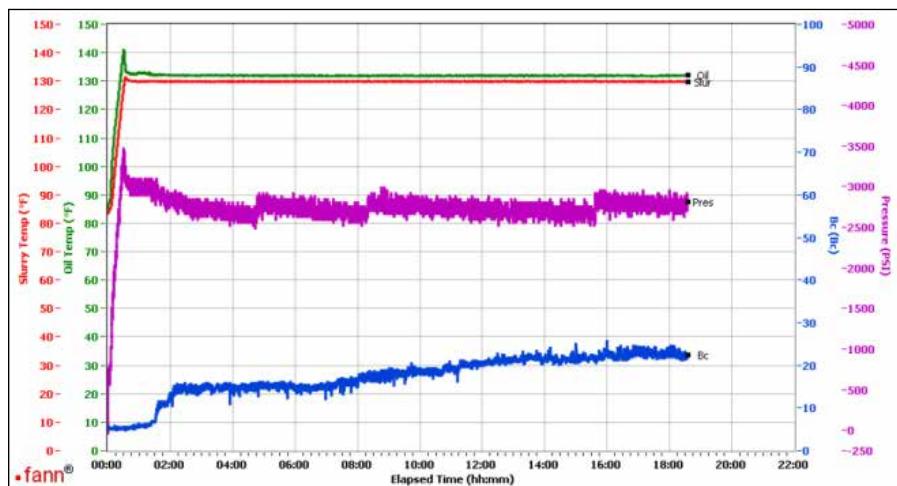
This test indicates that SentinelCem cement achieves a gel state and then regains fluidity for circulation when shear is applied. When the shear rate is high, the viscosity is low and the slurry flows easily for placement. When the shear rate is reduced, the slurry thickens and gels, resisting slurry flow back, fall back or formation influx.

Compressive Strength - SentinelCem™ Cement



SentinelCem Cement achieved 10-second gel strength of 42 lbf/100ft² and 10-minute gel strength of 105 lbf/100ft², reaching compressive strength of 50 psi in ~4 hour.

Thickening Time – SentinelCem Cement



SentinelCem cement did not pump-off during this test and had a viscosity of ~ 30 cP even after 20 hours at 130°F (55°C) indicating optimum viscosity for full-coverage placement.

For more information, contact your local Halliburton representative or visit us on the web at www.halliburton.com

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