

Study to Evaluate the Effect of Using Expansion Materials with Cement Slurry for High Pressure High Temperature Wells

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ABSTRACT

Objectives/Scope: The objective of this research is to evaluate the changes in set cement properties after adding the expandable material with different percentage of the cement weight. High resolution CT and Micro-CT imaging will be used to detect and evaluate the structural changes or cracks in set cement rings, cubes and cylinders **Methods, Procedures, Process:** Expansive additives are introduced in the cement slurries to increase the bulk volume of set cement in order to reduce or eliminate a gap at an interface. As per the current industry's criteria, the requirement of expansive additives in cement slurries is selected by the resultant linear expansion acquired (without exceeding the limit of maximum linear expansion) after curing the set cement samples at well conditions as per API RP10B-5. The current methodology doesn't allow to examine the impact of volumetric increase of set cement verses stress generation in the set cement. In this study, Micro-computer tomography (MCT) will be used to investigate the structural changes in set cement cured with various concentration of expansive additives. **Results Observations, Conclusions:** Based on the results from mechanical experiments and MCT imaging the comparison of various expansion additive's concentration with the two densities (normal and weighted system) and curing conditions (temperature/pressure) will be presented to produce conclusive outcome to analyze expansion impact on the set cement. **Novel/Additive Information** The paper will introduce a new concept of evaluating expansion requirement in the cement slurry and will help the industry to achieve long term well integrity objectives in harsh environments