Chemical Admixture for Sulfate Resistance of Hydrated Oilwell Cements: Part II,

Conclusion of Study

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Abstract

This paper continues to explore the feasibility of using chemical admixture to give hydrated oilwell cements resistance to sulfate attack, and presents final and favorable results of tests performed with the admixture. Results observed after 1 year of exposure to sulfates indicate that treating cements with 1% of the admixture by weight of cement (BWOC) helps improve their resistance to sulfate attack.

Light microscopy, environmental scanning electron microscopy (ESEM), expansion bars, and compressive-strength measurements were used to study sulfate attack on several hydrated-cement designs. Samples were aged in a 5% sulfate solution at 39°C, and were removed periodically over 12 months for measurement and evaluation. The paper reports findings of the study and shows (1) photomicrographs of samples and (2) the physical measurements recorded. This concludes the work that was published in the proceedings of the Twenty-Second International Conference on Cement Microscopy.

Introduction

The methodology for the testing is described in Part I of this paper and will not be revisited in this document. The 10-in. bars have been cured for 1 year in the 5% sulfate bath, and after the final measurements were recorded, the bars were cut and sectioned for compressive-strength measurements and ESEM examination.

While the cements tested were not totally sulfate-resistant, every construction cement treated with UCA universal cement additive showed marked improvement in sulfate resistance over nontreated construction cements; thus UCA additive *can* make local cements more sulfate-resistant.

Experimentation

The techniques and equipment used in the tests were described in Part I, and were used throughout the last 6 months of evaluation.

Microscopy was not used on the sulfate-test cement bars until the 1-year curing test was completed. The ESEM photos were all taken of fresh, damp, uncoated samples. The compressive-strength data was collected on a Tinius Olsen compressive-strength instrument with automated stress loading.