Ordinary Portland Cement as a Barrier for Carbon Capture, Utilization, and Storage (CCUS) Applications

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Introduction

When considering the use of ordinary Portland cement (OPC) as a long-term barrier for both construction and abandonment in wells, it is essential to validate its suitability and durability regarding the environment of use. This is especially relevant in environments where it may encounter corrosive substances. The recent industry increase in CCUS activities warrants investigation into OPC's viability in applications where direct contact with CO_2 is expected. The works cited in this bulletin are listed as items [1] through [17] in the Bibliography, followed by additional references that were reviewed.

Ordinary Portland Cement as a Barrier for Carbon Capture, Utilization, and Storage (CCUS) Applications

1 Scope

This bulletin provides technical information that may be utilized when planning and selecting the type and design of wells associated with carbon capture, utilization, and storage (CCUS). The intent of this document is to provide the user with comprehensive information on the suitability of ordinary Portland cement (OPC) as a barrier in CCUS applications. This document is not intended to be an exhaustive or prescriptive tool; rather, it contains information to increase knowledge and assist industry in the safe and long-term reliability of OPC in CCUS applications The studies cited in this bulletin were performed with OPC that met the requirements of API 10A [1].

2 Normative References

There are no normative references for this document.

3 Terms, Definitions, Acronyms, and Abbreviations

3.1 Terms and Definitions

For the purposes of this document, the following terms and definitions apply.

3.1.1
alteration
A chemical reaction where the composition of a substance changes, creating new substances with different characteristics.

3.1.2
carbonation
The chemical reaction of carbon dioxide to produce carbonates, bicarbonates, and carbonic acid.

3.1.3
ordinary Portland cement
OPC
Ground clinker that generally contains hydraulic calcium silicates and aluminates and usually contains one or more of the forms of calcium sulfates as an interground additive.

3.2 Acronyms and Abbreviations

C2S	dicalcium silicate (cement chemistry notation)
C3A	tricalcium aluminate (cement chemistry notation)
C3S	tricalcium silicate (cement chemistry notation)
C4AF	tetracalcium aluminoferrite (cement chemistry notation)