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COMPUTATIONAL FLUID DYNAMICS MODELING OF A LEAKING EUROPEAN WELL COMPLETION

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Abstract

This paper presents the results of a computational fluid dynamics (CFD) study to evaluate the thermodynamic behavior of natural gas leaking from the production tubing of a European well completion. A CFD model of a generic European well completion was developed in an effort to reproduce the measured leak rate and temperature change reported by Grosswig et al. [2009] using continuous fiber-optic temperature logging. This effort finds that while a CFD model can be developed to match the cooling effect caused by gas leaking from the production tubing into the lower pressure annulus of a tubing-packer well completion (in a typical European well completion configuration), substantial additional work is required to develop a generalized model that could be applied as a monitoring tool to infer that downhole temperature anomalies in typical cavern wells are actually potential breaches in the well's casing.

Key words: gas storage caverns, computational fluid dynamics (CFD), casing leaks, temperature logging, leak detection