

Assessment of the relevance of Coffinite formation within the near-field environment of spent nuclear fuel geological disposals

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Abstract

Experiments were performed in anoxic gloves box in an attempt to synthesise Coffinite both in representative near-field conditions, and in conditions which were expected to favour its precipitation according to thermodynamic calculations. The experimental results did not confirm the predictions. However, a new mineral was observed instead of Coffinite. In addition, accurate characterization of various natural samples demonstrate the permanent presence of U(VI) within Coffinite contradictory to its theoretical composition. Our observations raise the question on the validity and applicability of available -actually estimated- thermodynamic data of Coffinite. Based on kinetic hindrance of Coffinite formation, coffinitization of spent nuclear fuel in geological disposal is not anticipated to be a dominant short term process.