

Iron-bentonite interactions found in bentonite deposits

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It is proposed that high-level nuclear wastes (HLW) will be disposed in underground repositories, where steel overpack containing HLW is surrounded by the bentonite-sand buffer. Steel components are unstable under the disposal environment. They will corrode and react with the adjacent clay materials. The interaction may affect the properties of the clay. The effects of interaction on the stability of clay materials have received much attention. Some laboratory experiments and geochemical modeling in regard to the iron-clay interaction have been performed (Lantenois et al. 2005, Wilson et al. 2006ab, Perronnet et al. 2008). In order to support the plausible prediction of long-term iron-bentonite interaction, the natural analogue studies for iron-bentonite interaction have been desired.

The ideal situations for the natural analogue of the iron-bentonite interaction are the occurrences for the long-term interaction of bentonite with native iron under reducing environments. However it is quite rare in nature. On the other hand, it is not improbable to find the iron accumulations in bentonite deposits. These occurrences may indicate the interaction of bentonite with iron-rich fluid if the accumulations occurred by the reaction after bentonite formation. If the accumulations were occurred by other processes like a simultaneous formation with bentonite, the surrounding part of bentonite must be suffered by long-term interaction with iron accumulations. The occurrences of the iron accumulations in bentonite were found in Kawasaki bentonite deposit at Miyagi Prefecture, Japan and Kuroishi bentonite deposit in Aomori Prefecture, Japan. The purpose of the present study is to reveal the mineralogical changes of bentonite interacted with iron and to estimate the physical and chemical conditions of the bentonite alterations.

References: Lantenois, S. et al. 2005. *Clays and Clay Minerals* 53, 597-612; Perronnet et al. 2008. *Applied Clay Science*, 38, 187-202; Wilson, J. et al. 2006a. *Geochimica et Cosmochimica Acta* 70, 306-322; Wilson, J. et al. 2006b. *Geochimica et Cosmochimica Acta* 70, 323-336