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## Alteration of Bentonite induced by iron-containing solution

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### Abstract

Bentonite is a candidate buffer material for geological disposal of high-level radioactive waste as a part of engineered barrier system (JNC, 1999). The artificial barrier is composed of the cover of the vitrified waste with a carbon steel container, and filling of the bentonite as a buffer material to surrounding. Bentonite consists primarily of smectite that is expected to perform hydraulic conductivities, self-healing behaviors, shock-absorbing properties and adsorption properties. These are based on its swelling properties holding water within interlayer and cation exchange abilities. However, in long term disposal period (~1Ma), carbon steel container will alter to iron-corrosion product and leach the dissolved iron to the surroundings. Therefore, it is concerned that the properties of bentonite change due to the alternation induced by iron released from carbon steel container. A lot of laboratory investigations of iron-bentonite interaction are performed energetically in the nations trying to establish geological disposal of high-level radioactive waste (Wilson et al., 2006; Perrnnet et al., 2007; Marty et al. 2009). However, it is difficult to evaluate long term alternation phenomenon such as iron-bentonite interaction in the geological disposal because laboratory experiments are limited time scale phenomenon. The natural analog study is suggested as an adapted approach for long term evaluation for the stability of engineered barrier system. Through this approach, it could be possible to gain new knowledge about future alteration of bentonite induced by iron. We already found the occurrences indicating the reaction of bentonite with iron-containing solution in Kawasaki deposit, Kuroishi deposit and Mikawa deposit.in Japan. The purpose of this study is to reveal the alteration processes of bentonite induced by iron-containing solution in Kuroish deposit.

Keywords: Bentonite, Iron, Natural Analog