

Investigation of redox environment around an oxidation front

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The environment of the deep underground rocks holds anaerobic reduced condition which delay migration of radionuclides and prevent metallic corrosion. The chemistry of the rocks, groundwater and activity of microorganisms are important to determine the redox environment. However, synthetically studies were limited. In this study, the rocks and groundwater distributed around oxidation front were analyzed, and the mechanism of the redox zoning was examined.

Field investigation was done around cavern for the storage of low level radioactive west in the Rokkasho. For the investigation of the original environment of underground, rock samples which not affected excavating perturbations were obtained from the tunnel face during excavation and dry drilling. The rock samples consisted of the pumice tuff and the pumiceous sandstone of the Tertiary. Groundwater samples were taken from the drill holes installed in the tunnel wall.

The mineralogical, chemical analyses of the rocks showed decrease of pyrite at the Oxidation front which the color was change from gray to brown. Redox potential of the groundwater changed from negative to positive, and the value of the dissolved oxygen was increased at the front.

This was explained the chemical reaction of the oxidation of pyrite by the dissolved oxygen which infiltrated from the ground surface. The oxidation front of the rock was well corresponding to the redox of the groundwater.