

Weathering of siliceous mudstone of Koetoi Formation in Horonobe area, Japan

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When the rock under reduction environment exposed to the atmosphere by tunnel digging, it may oxidize rapidly. Since oxidation of rock has a possibility of degrading cavity wall quickly, it is necessary to understand the weathering of rock before digging, such as geological disposal of radioactive wastes. This report shows the result of investigation about the oxidization front in siliceous mudstone of the Neogene Koetoi Formation in the Horonobe area, Hokkaido, Japan. This is a part of result of the joint research of JAEA (Japanese Atomic Energy Agency) and CRIEPI (Central Research Institute of Electric Power Industry).

Investigated outcrop is located in Toikanbetsu, Horonobe. Siliceous mudstone is gray in fresh part, and light brown or seal brown in weathered part. Three types of weathering were observed in the outcrop: (1) weathering from the land surface, (2) weathering from the road cut, and (3) weathering from the crack. About these weathered parts, rocks in the fresh part and weathered part were sampled continuously, and chemical analysis, mineral analysis, and dissolution test, etc. were carried out.

From the results of analysis, each weathering part was classified into the oxidized zone and the dissolution zone. In the oxidized zone, the increase in iron (amorphous iron ore) was remarkable. In the weathering from crack, it was also rich in Mn and P. Clay mineral was increasing in the oxidized zone of seal brown in color. On the other hand, pyrite has disappeared mostly, and sulfur is also poor in the oxidized zone. Pyrite and sulfur increased in the dissolution belt, and the transition from the oxidized zone was rapid. These results suggest the following weathering models: (1) infiltration of the groundwater and the atmosphere containing oxygen from the land surface, (2) generation of the acid water by oxidization of pyrite in siliceous mudstone, (3) dissolution of minerals and progress of the weathering inside a base rock.