Geophysical Research Abstracts, Vol. 8, 03861, 2006
SRef-ID: 1607-7962/gra/EGU06-A-03861

Radioactive intensity and geochemistry of uranium –bearing black shale from the Ogcheon Fold Belt, South Korea

S. J. Chi(1), U. Yun (1)

(1) Institute of Geoscience and Mineral Resources, Daejeon, South Korea(csjung@kigam.re.kr / Fax: +82 42 861-9714 / Phone: +82 42 868-3168)

At an exposure of black shale in Cambro-Ordovician Ogcheon Fold Belt, several low-grade uranium deposits with maximum content of 300$\sim$400ppm (U_3O_8) were discovered by drilling exploration. U-bearing black shale consists of quartz, micas, graphite, calcite, dolomite, muscovite, V-beraing mica, chlorite, barite, barium-rich feldspars, apatite, Iron-oxides, sulfides, and uranium minerals. Uranium occurs as dominantly secondary minerals (autunite, meta-autunite, torbernite, francevillite) that are in the forms of scattered fine grains and thin films along fractures of thin coaly beds. Primary uraninite is rarely fine-graind disseminats and associated with organic materials in blcak shale. In-situ gamma ray spectrometry (GRS) measurements and uranium analyses were regionally conducted at 834 sites from approximately 5,100km^2 of the Ogcheon Fold Belt. GRS measurements conducted using a calibrated Exploranium GR320 gamma ray-spectrometer have yielded values less than 287ppm eU in outcrops. The contour map of GRS measurements produces small and somewhat discontinuous eU anomalies above 100ppm in Geosan, Boeun and Geumsan areas. Uranium contents of bed-rocks from the Ogcheon Fold Belt are less than 308ppm. Uranium content of bed-rocks in the Geosan area ranges from 0.6 to 202ppm. At Boeun and Geumsan areas, uranium contents of bed-rocks are 0.1 to 233ppm and 0.6 to 308ppm, respectively. Depending on bed-rock types, uranium average contents are as following: coaly beds (40.5ppm), black slate (6.2ppm), phyllite (3.1ppm), limestone (2.1ppm), meta-sandstone (2.5ppm), granitic rocks (3.7ppm), Uranium concentrations of 270 stream water samples in the uranium anomalous areas range from 0.003 to 371ppb, dominantly less than 10ppb. Groundwater samples contain below 98.0ppb with average of 4.0ppb. Coal mine waters show the highest uranium concentration of 3,334ppb

in the uranium anomalous area. Eh-pH diagram of water samples of uranium concentration over 5ppb in uranium anomalous areas indicates that uranyl carbonates are most common oxidation states in stream water and groundwater. As the ionic strength of an oxidized solution increases, other ions, notably Ca^{2+}, Mg^{2+}, and K^{+}will displace the uranyl ion from soil exchange sites, forcing it into solution. Statistic factor analysis of uranium and major composition of water samples reveals that uranium is very similar geochemical behavior with Ca^{2+}, $Mg^{2+}$and SO_4^2. It indicates that dissolved uranyl concentrations of water that pass coal seams will likely be controlled by cation exchange processes.