Suitable hydrogeochemical conditions for *in situ* uranium leaching in the Shihongtan deposit

J. LIU[1,2], Y. ZHOU[1], Z. SUN[1,2] AND B. HU[1,2]

[1]Key Laboratory of Nuclear Resources and Environment (East China Institute of Technology), Ministry of Education, Nanchang, Jiangxi 330013, China (*correspondence: zhxsun@ecit.edu.cn)

[2]Laboratory of National Defence Key Discipline of Radioactive Geology and Exploration Techniques (East China Institute of Technology), Fuzhou, Jiangxi 344000, China

The Shihongtan uranium deposit is one of the largest sandstone-type uranium deposits in China. Because the total dissolved solids of groundwater is high up to 8-12g/L in this deposit, it is difficult to extract uranium by alkaline *in situ* leaching which can produce calcite precipitation and result in chemical plugging.

Based on investigation of hydrogeological conditions of *in situ* leaching, geochemical modeling and laboratory experiments, the suitable hydrogeochemical conditions for alkaline *in situ* leaching were obtained as follows: The activity product of $[Ca^{2+}]*[CO_3^{2-}]$ should be less than 3.39×10^{-9} when the pH value of ground water is less than 6.9 in natural conditions. During the *in situ* leaching process, the dissolution-precipitation of calcium carbonate is influenced by the concentration of HCO_3^-, Ca^{2+} and pH value of ground water. Higher concentration of HCO_3^- is favorable for uranium leaching. To keep the saturated index of calcium carbonate be less than 0, the concentration of Ca^{2+} or pH value must be reduced if the concentration of HCO_3^- is increased. It is necessary to control suitable pH and the lowest Ca^{2+} concentration in order to keep high concentration of HCO_3^-. The alkaline *in situ* leaching is suitable for uranium extraction from this deposit if the conditions of Ca^{2+}, pH and HCO_3^- are under well control.

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Inter-comparison of methods to detect Methylmercury in porewater of rice paddy

JINLING LIU[1,2], XINBIN FENG[1]*, LIHAI SHANG[1], GUANLE QIU[1], HAIYUYAN[1] AND HENGYAO[1,2]

[1]State Key Laboratory of Environmental Geochemistry, Institute of Geochemistry, Chinese Academy of Sciences, Guiyang, 550002, China (*correspondence: fengxinbin@vip.skleg.cn)

[2]Graduate University of Chinese Academy of Sciences, Beijing, 100049, China (kingxmu05@yahoo.com.cn)

Understanding the mechanisms of the transport of dissolved Methylmercury (MeHg) from rice paddy soil into the water column is very important to better reveal the processes of bio-accumulation of MeHg by rice plants. The detailed information on MeHg distribution in porewater of rice paddy soil is also important to understand the processes of MeHg bioaccumulation in rice. Three methods are currently used for porewater sampling: the dialysis device (peeper), sediment core sectioning (core) and the diffusive gradient in thin films (DGT). However, none of these methods are considered as a standard method. Field inter-comparison were performed at rice paddy near Wanshan mercury mined area in Guizhou, China to test if these methods could give comparable results. Even the discrepancies of MeHg concentrations obtained from different methods were significant; all three methods reported a similar trend of MeHg distribution in soil profile. Based on different principles, these methods reflect different states of MeHg in porewater. Flux, equilibrium concentration and instantaneous concentration of MeHg in porewater are detected by DGT, peeper and core sectioning methods, respectively. Considering the repeatability and accuracy of MeHg concentrations in soil porewater, the DGT technique was considered as the best method.