

10. Basic Research on Arsenic Leaching from Naturally Contaminated Rocks Attributable to Environmental Change

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Arsenic-bearing rocks excavated during tunnel construction and related work are deposited at landfill disposal sites, where arsenic leaching countermeasures are implemented. Arsenic elution characteristics identified immediately after excavation are used to design these countermeasures. However, no consideration is given to environmental changes, such as exposure to reducing environments, to which excavated rocks may be exposed after placement at the landfill. Our study sought to grasp the arsenic elution characteristics for excavated rocks attributable to environmental changes after landfill. As part of this study, we performed environmental monitoring at the disposal site, including monitoring of oxygen concentrations, temperatures, and the oxidation reduction potential of the leachate. We performed various tests with the following three factors in mind: changes in the oxidizing environment attributable to the atmospheric exposure of excavated rocks and the effects of the shift to a reducing environment; the effects of differences in ambient oxygen concentrations; and the effects of temperature changes. Our results showed that reducing environments accelerate arsenic elution. This suggests that the design of corresponding countermeasures must account for the arsenic elution characteristics attributable to such environmental changes.

Keywords: excavated rock, arsenic elution, redox potential, ambient oxygen concentration, temperature change