

Case Studies of Monitored Natural Attenuation of Contaminated Groundwater by VOCs

Takeshi Komai[1]

[1] Green, AIST

Monitored natural attenuation (MNA) is a methodology within the process of risk assessment. The background of the technical approach is based on scientific understanding of the decrease or decay of hazardous chemicals due to physical, chemical and biological processes, especially for biodegradation process in groundwater. Even if the concentration of chemical exceeds to the environmental criteria and the monitoring of the situation keeps maintaining, we can select the corrective action of measures by the method of MNA. One of the actions is the completion of clean-up activity for affected groundwater. In the first step of MNA we should conduct a lot of studies on biodegradation mechanism, processes, and properties in-situ conditions. If we can obtain the concrete evidence of high rate degradation in the specified domain, the groundwater simulation will be conducted to estimate the promising decrease of the concentration in the second step. It is also necessary to confirm that the risk level is relatively small in the case of the completion of clean-up activity. The final decision will be made by the information disclosure and acceptable criteria from the data of MNA procedure.

We have been carrying out some case studies of MNA for VOCs in groundwater. Practical sites contaminated by TCE, PCE, gasoline with BTEX, and heavy oils were used for the assessment. To make clear the mechanism of natural attenuation, we have monitored and obtained the data from the sites, and we also analyzed a lot of parameters, Temperature, pH, DO, Redox potential, and chemical components are important to estimate the existence of biodegradation in the site. More promising evidences are made by the observation of microorganism and gene analysis. As a result of the evaluation, we could find the natural attenuation of TCE by a kind of biodegradation and the production of cis-DCE that gradually decreased with time in the process of the degradation.