Approaches for Low-Impact Groundwater Remediation

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Large-scale groundwater remediation systems can have unintended, negative impacts on the local ecosystem and broader environment. Those impacts could result from greenhouse gas emissions, ecosystem disturbance, and groundwater depletion during remediation system implementation and operation, among others. Low-impact groundwater remediation approaches may provide equivalent or superior environmental outcomes when constituent concentrations associated with coal combustion products (CCP) management units require corrective action but do not pose unacceptable risk to human health or the environment, large-scale groundwater remediation systems would be difficult or especially disruptive to implement, or other site characteristics (remote location, limiting geology, etc.) inhibit the feasibility of large-scale groundwater remediation.

Some remedial technologies are inherently less impactful than others, and impacts associated with conventional remediation approaches can be reduced through careful selection, design, and implementation. To justify selection of low-impact groundwater remediation approaches, site geology and hydrogeology, nature and extent of constituent migration, risk to receptors, current and future land use, and CCP unit status are characterized and evaluated. Case studies are presented demonstrating the selection and implementation of several low-impact groundwater remediation approaches, including focused (hot spot) treatment, operating remediation systems using solar power, pulse pumping, phytomanagement, passive hydraulic control, and in situ treatment.

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