# Formation of Secondary Containment Systems Using Permeation of Colloidal Silica

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**Abstract:** U.S. Environmental Protection Agency (USEPA) regulations require the capture of spills from liquid tanks containing hazardous chemicals by using a secondary containment system. Compacted clay or geomembrane liners are commonly used in secondary containment systems, but they are cumbersome when used in conjunction with existing liquid tanks because of pipeline networks surrounding the tanks. This study evaluates the formation of hydraulic barriers for secondary containment through the permeation of colloidal silica grout. A simplified infiltration model is presented to predict the downward movement of the colloidal silica grout into a soil layer, considering the timedependent increase in dynamic viscosity of the colloidal silica for different concentrations of an electrolyte accelerator. Because the simplified infiltration model cannot predict the soil-grout interaction or the permeation of the colloidal silica by fingering, its results were calibrated by using the observations from a large-scale column test involving the permeation of colloidal silica into sand. The predicted position of the wetting front was found to match that of the experiment when the parameter governing the change in viscosity of the colloidal silica was increased by a factor of 30. The infiltration model calibrated with observations from column infiltration experiments provides a simple approach to the design of the secondary containment systems using permeation of colloidal silica.

Full reference:

Link to file*:

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