

ISS Treatability Study on MGP Pond Sludge

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Background/Objectives. KEMRON Environmental Services, Inc. performed an in situ solidification/stabilization treatability study on “Pond Sludge” sampled from a former MGP site on the Susquehanna River Site (the site) located in Nanticoke, Pennsylvania. The site materials presented a particularly difficult matrix of peat, organic silts, and backwater sediments. The primary objective of the bench-scale study was to evaluate the ability of commonly used and readily available reagents and addition rates to achieve the performance criteria of a strength greater than 50 pounds per square inch (psi) but less than 250 psi after 28 days and a hydraulic conductivity value of 5.0×10^{-7} .

Approach/Activities. In order to assist in the development of appropriate reagent(s) and addition rates, KEMRON evaluated selected physical properties of the homogenized “Pond Sludge” material, readily available re-use fill material from the site and nearby areas (impacted fill), and manufactured sand. Based on the physical characteristics of the site material, re-use of fill material outside the required clean-up zone on the site, and manufactured sand, KEMRON developed experimental mixture formulations. Based on the results of the experimental mixtures, KEMRON developed 12 mixtures in a stabilization/solidification evaluation phase. KEMRON prepared various mixtures as a one-step process and as a two-step process to determine if the method of additive application would affect the overall performance of the mixture designs. Additives used during the study included Type I Portland Cement, fill materials, and Chemical Pebble Lime (Quicklime). Following a 28-day curing period, the solidified samples were tested for compressive strength and hydraulic conductivity and compared to the performance criteria.

Results/Lessons Learned. A total of eight experimental mixtures followed by 12 ISS mixtures were developed using homogenized Pond Sludge from the site. One of the 12 formulations successfully met the site criteria of 50 psi and hydraulic conductivity of 5.0×10^{-7} cm/sec after 28 days of curing. The study revealed that a two-stage mixing process was more effective in improving strength and hydraulic conductivity. The study showed that the re-use of impacted fill would successfully meet the performance criteria and realize a significant cost savings to the client.