

In-Situ Persulfate Oxidation of Soil Contaminated with Hydraulic Oil at a New Jersey Site

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Non-aqueous phase liquids (NAPLs) such as hydraulic oils are frequent sources of contamination in the soil subsurface. The immiscibility of these organic contaminants with water results in pore space entrapment within the soil matrix and persistence of the pollution over long periods of time. This study investigates whether alkaline-activated persulfate oxidation treatment sufficiently lowers the contamination levels below the New Jersey Extractable Petroleum Hydrocarbons (EPH) regulatory criteria for a site contaminated with hydraulic oil. As per the New Jersey Department of Environmental Protection (NJDEP) EPH document entitled "Evaluation of Extractable Petroleum Hydrocarbons in Soil Technical Guidance," an EPH product limit of 17,000 mg/kg has been established for all Category 2 EPH petroleum products such as hydraulic oil.

The effectiveness of this technology was evaluated quantitatively via batch reactor tests. Two sets of treatments were carried out with varied persulfate treatment dosages: one with a surfactant pre-flush and one without. The pre-flush did not show an improvement over the persulfate treatment. With a 40 g/kg persulfate dosage, a 66% reduction in EPH was achieved. Higher dosages were less effective due to auto-decomposition of the persulfate.

For the field application, one pore volume of the persulfate-sodium hydroxide solution will be infiltrated into the 50 ft by 60 ft treatment area via three injection galleries in trenches, targeting a 3-6 ft below ground surface soil (BGS) depth. Five injection events will be spaced every three weeks. The field application will begin in May and results of the treatment will be presented.

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