

Abstract Submitted
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Remediation of Petroleum Impacted Soils with Electron Beam Irradiation¹ JOHN LASSALLE, CHRIS CAMPBELL, ABISMAEL DIAZ, DAVID STAACK², Texas AM University Department of Mechanical Engineering, THOMAS HOELEN, PAUL BIRETA, DEYUAN KONG, GABRIEL SABADELL, Chevron Energy Technology Company, USA — Soil contamination by crude oil presents a global environmental threat. Existing remediation techniques such as incineration and bioremediation are not always practical. Hydrocarbons from approximately C16-C40 are relatively recalcitrant in soil but still mobile enough for exposure to organisms through direct contact or groundwater. Hydrocarbons lighter than C40 constitute Total Petroleum Hydrocarbons, an index of contamination levels. The high-power-density heating and radicals generated by electron beam irradiation show potential for remediation of petroleum impacted soils. Experiments were conducted using a 10 MeV, 15 kW electron beam to investigate the remediation process. These experiments demonstrated radiation chemistry effects unique to the irradiation process, as well as other attributes of the treatment. Treatment of soil samples with a 3 MeV electron beam at currents from 14.4-28.5 mA has shown reductions to below 1% TPH at the high power densities required for the technology to be practical at site scales. Dose rates for these experiments varied from 10-80 kW/kg, with penetration depths of approximately 2.5 cm for the 10 MeV beam and 0.9 cm for the 3 MeV beam. Experiments have also been conducted to demonstrate TPH reductions in heavily impacted sludge (TPH >10%).

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