Evaluating Routine Groundwater Parameters to Determine Site Specific Biostimulatory Formulations for Hydrocarbon Remediation.

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Many former retail fuel facilities in Canada have been subject to the release of gasoline and diesel resulting from faulty or leaking underground storage tanks (UST). Historically, contaminated soil at these locations would be excavated and disposed of at an off-site treatment facility. With the rising costs associated with equipment operation and offsite disposal, environmental managers are turning to in situ remediation technologies. A particularly effective in situ remediation technique for petroleum hydrocarbons is bioremediation, specifically biostimulation which involves the delivery of nutrients and electron acceptors to the impacted area below surface. Standardized biostimulatory recipes have been used across North America for many years with varying levels of success. This variability can be attributed to the heterogenous nature of soils and site-specific geochemistry. Soils in the Canadian prairies typically have high clay and carbonate content resulting in high sorption of the nutrients delivered in the amendment solution, specifically phosphate. A key to unlocking the increased effectiveness of biostimulation in Canada's calcareous soils is understanding soil buffering capacity and how it contributes to the weathering of the amendment solution. A bench-scale microcosm test was conducted to determine the influence of the calcareous soils from 6 sites across Saskatchewan on a standard or base biostimulatory solution. Calcium dissolution generally followed first-order kinetics with the results highlighting site-specific differences in dissolution rates. Statistical analyses are currently underway to determine which soil properties and groundwater parameters are driving these differences in dissolution rates. Once the drivers are identified they can be used to adjust biostimulatory amendment solutions to increased hydrocarbon degradation rates.

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Amy Jimmo is an environmental scientist with over 12 years experience in site characterization and remediation. She is a capable field and technical resource with experience in all aspects of multifaceted projects including Phase II environmental site assessments, laser-induced fluorescence surveys, soil vapour extraction, multiphase extraction, and in-situ chemical oxidation studies. Over the past few years, Amy has specialized in the design and implementation of bioremediation and natural source zone depletion studies.