Calcium Acetate: an alternative for gypsum in improving water flow in oilfield, brine impacted soils[1]

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Abstract: High concentrations of sodium chloride dominate oilfield produced waters (brine) of the Williston Basin (USA). When accidental spills of produced waters occur, there's an immediate need to reduce concentrations of chloride to protect surface and groundwater systems and to reduce concentrations of sodium in soil to prevent any unwanted swelling and dispersion in soil. Swelling and dispersion of soils will likely occur if sodium adsorption ratio (SAR) values are too high, and the electrical conductivity (EC) drops below a certain threshold that is required to maintain flocculation. To prevent this, a calcium amendment can be applied to replace sodium with calcium on soil exchange sites. Historically, gypsum has been the most common calcium amendment used for improving brine impacted soils. Flue gas desulfurization gypsum is available in North Dakota but is still a sparingly soluble amendment. The time required for in-situ remediation is thus controlled by the volume of water needed to exceed gypsums solubility and to flush chloride from soil. The purpose of this research is to investigate the use of calcium acetate as an amendment for brine impacted soils as compared to gypsum. Calcium acetate has a similar concentration of calcium compared to gypsum and is also over 100 times more soluble that gypsum. Additionally, we hypothesize that the acetate could serve as an available carbon source for soil microbes. This laboratory experiment will compare how varying levels of gypsum and calcium acetate can influence soil hydraulic conductivity, chemical and physical properties when mixed with oilfield brine impacted soils.

Additional Key Words: Hydraulic Conductivity, Produced Water, Sodium Adsorption Ratio, Electrical Conductivity

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