Remediation and Re-Vegetation of Brine Impacted Soil: A Case Study

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Abstract

Produced water contaminated soils are present at a former oil production site in northwest Louisiana. A common past practice was to store saline produced water in an open pit adjacent to the central tank battery. The open pit often flooded with rainfall, resulting in over-berm discharges impacting approximately six acres of pine forest down slope. A growing awareness of the environmental impact of past oil field practices motivated the initiation of the remediation and re-vegetation effort at the site. Soil samples were taken in the early 1990's to quantify the levels of impact. A leachate collection system was installed at the site in 1994 to aid in the removal of brine contamination. The high clay content of the soil and the loss of soil structure impeded removal of brine from the soil. Several applications of chemical additives and attempts to re-vegetate the site were unsuccessful in improving soil structure and controlling erosion. In January 1998, a full scale planting of pine seedlings was attempted without success.

During the fall of 1998, soil amendment applications were made using woody organic material, fertilizer, gypsum and seeding with rye grass. The woody organic material (primarily pine bark) was incorporated into the top 20 cm of soil. An irrigation system was also installed to provide supplemental water to four acres of the site during dry periods. Controlled water application to the site ensures a constant flushing of soluble cations and anions from the soil. Selected soil chemical parameters monitored include electrical conductivity (EC), sodium adsorption ratio (SAR), pH, total organic carbon (TOC), available nitrogen, and total nitrogen. Physical properties being monitored include water infiltration rates and bulk density. The parameters are monitored to document changes in the physico-chemical properties at the site. A full scale planting of pine seedlings and a trial planting of green ash seedlings were completed in January 2001. The pine and green ash seedlings indicate signs of new growth and normal survival rates.