Fiber Rolls as a Tool for Re-Vegetation of Oil-Brine Contaminated Watersheds

Period Covered by Report: 10-14-06 to 01-14-07
Date of Report: 02-01-07
EPA Grant Number: X83-2428-01
Title: Fiber Rolls as a Tool for Re-Vegetation of Oil-Brine Contaminated Watersheds
Investigators: Drs. Greg Thoma, Milan Vavrek, Howard Hunt, Kerry Sublette
EPA Project Officer: Bala Krishnan
Project Period: 10-12-2006 - 10/11-2006, extension granted to 06-30-07
Project Amount: $70,740
Research Category: Brine Scar Remediation

Description:

Historic oil brine scars (sites that repeatedly received produced water) are extremely difficult to remediate because these sites possess degraded, highly saline soils, erosion damage, little or no plant cover and an altered microbial community. Ecosystem function is diminished as a result of these impacts.

We are evaluating the contribution of fiber rolls to restoration of a historic oil brine scar in south Arkansas. Four treatments (natural attenuation, standard soil reclamation techniques, fiber rolls, and soil reclamation with fiber rolls) have been applied to plots within the site. Fiber rolls are tubes formed with a geotextile material and filled with organic fiber, mycorrhizal fungal inoculum, bacterial inoculum (soil) and salt-tolerant plants. Consequently, fiber rolls may serve a variety of ecological functions including primary productivity, filtering of sediments and moisture and nutrient retention. Rolls also serve as a source vegetative growth, seeds, microbial spores, organic matter and nutrients.

Objective(s) of the Research Project:

Our primary objective is to examine the utility of fiber rolls as an effective, inexpensive, and easy-to-use remediation tool at oil brine spill sites. Established fiber rolls and adjacent brine affected plots will be examined to determine the:

1) Structural integrity and ability of fiber rolls to withstand periodic flooding/water flow,
2) Amount of sediment accretion behind fiber rolls,
3) Survival, extent and type of vegetative growth in fiber rolls, and
4) Type and extent of vegetation expansion from fiber rolls onto adjacent soils.

Soil reclamation as a result of treatments will also be assessed through measurements of electrical conductivity, sodium adsorption ratio, and cation exchange capacity.

Progress Summary/Accomplishments:

We asked for and received a grant extension to 6/30/07. The extension allowed additional time for surface treatments to affect soil characteristics. Delays in receipt of initial funding for this project forced a substantial delay in the establishment of fiber rolls and soil surface treatments at the Schuler site in South Arkansas. Seeding mixtures had to be adjusted from warm season grasses to cool season grasses. This delay shortened the time period over which soil treatments could affect soil properties. So, the grant extension will allow an additional 6-month period of time for soil characteristics to respond to surface treatments.

Results from post-treatment soil samples were received from the Agricultural Diagnostic Laboratory, University of Arkansas n January 28, 2007. We are currently in the process of analyzing the results.

Preliminary assessment suggests that fiber rolls combined with soil treatments appear to be an effective remediation technique on historic brine scars by providing a functioning plant community from which re-vegetation across the site can be initiated.

Publications/Presentations

Future Activities:

Completion of the final report is anticipated for June, 2007.