

Demonstration Wetland System Installed for Produced Water Treatment

During June 2012, Dr. James Castle and researchers at Clemson University constructed a demonstration wetland treatment system at a coal bed methane field in northern Alabama with project partner Chevron. The field system was designed based on data collected from pilot scale wetlands operated at Clemson under NETL project DE-FC26-08NT0005682 “Innovative Water Management Technology to Reduce Environmental Impacts of Produced Water.”

Efficiencies for pilot-scale treatment were calculated and performance parameters were compared with treatment goals. Ammonia was removed from produced water in the pilot-scale wetland to levels low enough to meet irrigation and livestock watering criteria. Zinc concentrations met the livestock watering criteria, and irrigation guidelines and surface discharge criteria were met for all sampling periods except one. Concentrations of low molecular weight organics were below all of the beneficial use guidelines and criteria for every sampling period. Adequate selenium removal was achieved only with the addition of an amendment. The concentrations of iron, manganese, nickel, and zinc decreased to below irrigation and livestock guidelines in the wetlands with larger removal rates in the subsurface flow series than in the free-water surface series. Oxidizing wetland cells lowered oil concentrations while reducing wetland cells lowered concentrations of cadmium, copper, nickel and zinc. Water depth in the wetland cells can affect the sediment redox conditions which affects the removal pathways for contaminants.

Plants will acclimate for several weeks in the demonstration wetland before the collected site water is passed through the system. Target contaminants include metals, metalloids, oil and grease. Onsite water treatment has been designed for surface discharge so water hauling practices can be reduced. (S. McSurdy, 412-386-4533, Natural Gas and Oil Project Management)

