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BENEFICIAL USE OF DRILLING WASTE - A WETLAND RESTORATION TECHNOLOGY

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Pioneer Natural Resources
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National Petroleum Technology Office
U.S. DEPARTMENT OF ENERGY
Tulsa, Oklahoma

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Yearly Technical Progress Report
Reporting Period January 27, 1998 through January 27, 1999

Specific accomplishments will be detailed in our final report prior to January 22, 1999 (contract termination date). The results obtained thus far are promising with regard to the low toxicity of restored drill cuttings (particularly the Cameron substrate) with increasing levels of salinity. Water extraction, acid digestion, and interstitial water samples from the restored drill cuttings, as well as redox potential, soil pH and interstitial nitrate/ammonium concentrations, and the photosynthetic response, have been determined for the baseline fresh water condition (June-August 1998), at 9ppt (September-November 1998), at 18ppt (December-February 1998,1999), and at 27ppt (currently underway). Salinities will be brought to full-strength seawater (36ppt) on May 24, 1999. The Cameron drill cuttings are remarkably similar to dredge spoil, which is currently being used as a wetland creation substrate. The few elements that were extracted into the interstitial water were primarily cations (Ca, K, Mg) and were not elevated to a level that would pose a threat to wetlands productivity. Swaco drill cuttings remained high in aluminum with concomitant high pH, which likely resulted in limited plant productivity through hindered nutrient uptake. It is important that the permanently flooded hydrologic regime supported healthy growth in most of the species tested because the pending field demonstration project will be impounded to restrict hydrologic exchange with the surrounding wetlands for at least one year. Cameron drill cuttings supported higher rates of photosynthesis, across species, than Swaco drill cuttings. Wiregrass and cordgrass had the highest overall photosynthetic rates across substrates and exceeded other species on both drill cuttings substrates. It is important to note that the mesocosm facility has enabled emulation of the worst-case scenario (that is the scenario most likely to transfer elements from the substrate to the water column), namely a closed tidal system with subsurface extraction of recycled interstitial water. Even under these extreme conditions the restored drill cuttings appeared to be non-toxic and supported vigorous vegetative biomass production. In short, results from the current differential-salinity mesocosm project indicate that a field demonstration project utilizing restored drill cuttings is safe and will likely result in the creation of healthy and stable wetlands.