PROJECT FACT SHEET

CONTRACT TITLE: Conduct Elemental Analysis or Restored Drill Site Cuttings Used in Hydrologic Regimes

ID NUMBER: DE-AF22-96BC14995

B & R CODE: AB0555000

DOE PROGRAM MANAGER:
NAME: William H. Hochheiser
PHONE: (202) 586-5614

DOE PROJECT MANAGER:
NAME: Rhonda P. Lindsey
LOCATION: BPO
PHONE: (918) 337-4407

PROJECT SITE
CITY: Hammond **STATE:** LA
CITY: **STATE:**
CITY: **STATE:**

CONTRACTOR: Wetlands Restoration Lab
Southeastern Louisiana Univ
ADDR: SLU-814

Hammond, LA 70402

CONTRACT PROJECT MANAGER:
NAME: Gary Shaffer
PHONE: (504) 549-2865
FAX: (504) 549-3851
INTERNET ADDRESS:

CONTRACT PERFORMANCE PERIOD:
01/26/1996 to 09/30/1996

PROGRAM: Environmental-Gas
RESEARCH AREA: Environmental

FUNDING (1000'S)	DOE	CONTRACTOR	TOTAL
PRIOR FISCAL YRS	0	0	0
FISCAL YR 1996	50	0	50
FUTURE FUNDS	0	0	0
TOTAL EST'D FUNDS	50	0	50

OBJECTIVE: Analyze and synthesize data on marsh creation, using restored drill cuttings, from an intensive mesocosm project that will emulate field conditions.

METRICS/PERFORMANCE:

Products developed: The first metric/performance criterion is to determine if a fully functional wetlands mesocosm facility (i.e., a controlled system scaled between lab and field) was constructed. All aspects of the proposed design are now fully functional. The second metric/performance criterion is to determine if wetland vegetation can be established on the restored cuttings; five species (including six different genotypes of wiregrass (Spartina patens) have been established. The third metric/performance criterion involves elemental analysis of (a) the cuttings material, (b) interstitial water, and (c) aboveground water. We have conducted elemental analysis on the cuttings materials and their leachates. We will conduct elemental analysis on interstitial water, aboveground water, and further analyses of the substrates. The fourth metric/performance criterion involves toxicity testing and this is complete. The fifth metric/performance criterion involves comparison of instantaneous rates of photosynthesis of vegetation growing in cuttings with control vegetation, under three hydrologic regimes, with and without nutrient augmentation. A final metric/performance criterion involves analysis of above- and belowground biomass partitioning. We were going to complete this task during late October 1996, but we are now considering exposing the vegetation to a winter and following an additional growing season to assess long-term production capacities.

We are isolating the conditions necessary to create wetlands using restored drill cuttings. If successful, rather than adding the innocuous material to hazardous waste sites, it will be used to enhance establishment of wetland vegetation in otherwise open-water systems.

PROJECT DESCRIPTION:

Background: Southeastern Louisiana University is unique in the United States in that it houses two mesocosm facilities designed for projects involving wetlands. These mesocosm facilities each contain one hundred forty four 200-liter vessels, fully networked to four 4000-liter supply vessels. The temperature-controlled facilities are capable of manipulating hydrologic conditions from stagnant, to tidal, to continuous flow (riverine). The individual mesocosms are large enough to enable natural root and shoot development of herbaceous vegetation and, therefore, provide results that should extrapolate to field conditions with far greater accuracy than traditional small-pot greenhouse experiments. Furthermore, the insulated mesocosms provide natural soil-temperature profiles enabling soil metabolism also to emulate field conditions.

Work to be performed: One hundred forty four 200-liter vessels, fully networked to four 4000-liter supply vessels, have been constructed and are being subjected to a 2x3x4x6 factorial treatment arrangement. Specifically, two nutrient conditions (fertilized, not fertilized), three hydrologic regimes (moist-but-not flooded, permanently flooded, and daily tidal cycle), four substrates (100% restored drilled cuttings from SWACO process, 100% restored cuttings from Cameron process, restored cuttings (Cameron) capped with dredge spoil, and 100% wetland soil (control)), and six vegetative conditions (five species of wetland vegetation and the non-vegetated control) are completely cross classified in the experiment. For all treatment combinations, soil, surface water, interstitial water, and plant tissue will be subjected to elemental analysis (Al,Ca, Cd, Cr, Cu, Fe, K, Mg, Mn, Na, Ni, P, Pb, and Zn), and No3/No2 and NH4 nitrogen at days 0 and 28, and quarterly thereafter. Instantaneous measurements of photosynthesis will be conducted at least as frequently as the elemental analyses. Faunal (lubber grasshopper) numbers also will be monitored and faunal biomass will be subjected to toxicity trials, or traditional mysid toxicity tests will be performed. In addition, we will monitor vertical profiles of pH and Eh (redox potential) in the sediments/soil substrates as well as bulk density and percent organic content. At the end of the growing season (late October, 1996 or 1997), above- and below ground vegetation will be harvested and dried for resource partitioning analysis.

PROJECT STATUS:

Current Work: The mesocosm facility constructed for this project is complete and functions flawlessly. Vegetation has been acclimated for one month. Elemental analysis will continue and instantaneous rates of photosynthesis will be monitored beginning in August, 1996.

Scheduled Milestones:

Construct mesocosm facility, apply substrates, fine-tune hydrologic regimes, and acclimate vegetation	06/96
Conduct elemental analyses	
Conduct photosynthetic measurements	
Harvest above- and below ground biomass for final assessment	10/97
Analyze and synthesize information gleaned, prepare final report	04/97
Convene meeting of interested parties	04/97
Publish results in referred journal and present findings at appropriate conferences	06/97

Accomplishments: If successful, this project will lead to a three-year field study and future use of restored drill cuttings to create wetlands and reduce the load on hazardous waste facilities. We will convene a forum involving government agencies, private industry, and academicians near the end of the proposed project to enhance dissemination of our findings. The purpose of this meeting is to communicate our findings and to generate dialogue concerning the use of restored drill cuttings for wetlands creation. SWACO and Cameron will present their methodologies and Greenhill Petroleum will present their estimates of the cost effectiveness of this approach. We will, of course, also document our analyses and syntheses in the form of a Final Report and publish the findings in a refereed journal.