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MCRD PARRIS ISLAND
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SALT MARCH VEGETATION EVALUATION LETTER REPORT FOR SITE 1 INCINERATOR LANDFILL AND SITE 41 FORMER INCINERATOR MCRD PARRIS ISLAND SC

10/28/2004

MACTEC ENGINEERING AND CONSULTING INC

MACTEC

October 28, 2004

Christian Canon, RRPT, CHMM
Project Manager
Environmental Chemical Corporation
625 McGruder St, NE
Atlanta, GA 30312

Subject: **Report of Salt Marsh Vegetation Evaluation**
SWMU 1 and 41
Marine Corps Recruit Depot
Parris Island, South Carolina

Dear Mr. Canon:

At the request of Mr. Christian Canon with ECC and as authorized by ECC's subcontract to MACTEC dated September 9, 2002, MACTEC Engineering and Consulting Inc. (MACTEC) has conducted a limited visual reconnaissance of the restored marsh at SWMU1/4. The purpose of the work was to confirm the reported low density of smooth cordgrass (*Spartina alterniflora*) and to offer options for the management of this potentially non-conforming situation. The field work was conducted by Allen W. Conger of MACTEC, a principal scientist familiar with wetland restoration and management. This brief report is not meant to replace or substitute for the required annual monitoring as provided for in the original restoration plan, as approved by the client.

Background

MCRD Parris Island, South Carolina is the Marine Corps' reception and recruit training facility for enlisted men from states east of the Mississippi River and for enlisted women nationwide. MCRD Parris Island is located along the southern coast of South Carolina, within Beaufort County, approximately one mile south of Port Royal and three miles south of Beaufort, South Carolina. MCRD Parris Island occupies an area of approximately 8,047 acres. As a part of base operations, an incinerator was operated from 1921 to 1965 on Horse Island and the resulting ash was disposed of by depositing the ash on the ground surface and in trenches on the island. Surrounding sediments were contaminated by runoff from the landfill. As a part of the remediation of the site, contaminated sediments were excavated and consolidated on the landfill prior to closure. The excavated areas were then backfilled with clean soils to approximate original grades.

The Remedial Design Report specified that the surface of these backfill would be revegetated with smooth cordgrass (*Spartina alterniflora*). This species was planted at the recommended densities in the restoration area from propagated cuttings supplied by a local company.

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Methodology

Mr. Allen Conger performed the field work for this study on October 6, 2004 in the morning at a period of low tide to allow reasonable field access. Field notes and sketches were recorded and photographs were taken to document the current status of the site. Copies of photos are included with this report. The surficial soils were hand excavated using a dutch soil auger for field examination to evaluate the backfill soil characteristics. The excavated soils were replaced in the same hole following examination. Six soil samples were collected for standard agricultural pH testing using the recommended procedures provided by Clemson Extension Service. Soil sample sites were selected at multiple selected locations by Mr. Conger. Sampling was limited by difficult access in saturated soils at some locations. In each sample location, four to six soil cores extending to six inches deep were collected, mixed, and then a representative portion was placed in the sample bag. The results of testing on these samples are presented on the attached table.

The locations of the samples were recorded in a field notebook. Qualitative observations of vegetation density, wildlife, vegetation, and hydrology were also noted periodically.

Current Status

The restoration area is readily observable from the adjacent park and from the landfill cover (Photos 1 and 2). The areas of interest are demarcated by the outside edge of the riprap revetment extending out to the existing undisturbed vegetated marsh and existing mud flats. The soils in the restoration area are slightly lighter colored than the adjacent marsh soils.

All of the designated restoration area appeared to be graded to well within the upper inter tidal zone (up to 3.1 feet above mean sea areas). The ordinary high water mark and flood tide marks were distinct along the riprap revetment, adjacent shore and existing marsh (Photograph 3). The flood tide was observed to cover the restoration area at the end of the field work.

Numerous small pools (less than 40 square feet) and a limited number of narrow tidal channels (less than 1 foot wide) with slowly flowing water were observed throughout the restoration area (Photograph 4). These channels were shallow and stable and serve as a direct connection between the restoration area and the adjacent wetlands. Hydrology indicators observed within the mitigation area included saturated soils, inundation in areas, oxidized rhizospheres, rack lines, water-stained vegetation, drainage patterns, and high water marks. No significant area of dense rack (mats of dead smooth cordgrass or other herbaceous and woody vegetation) was observed with the exception of a small mat at the southeast corner of the restoration area.

The soils in the restoration area appeared to be very stable. No field evidence of significant sedimentation or erosion was observed beyond that of normal marsh and tidal processes. Most of the restoration area had a relatively uniform slope from the lower-lying adjacent marsh up to the riprap revetment. A few small irregularities (slight mounds and shallow depressions), well within the normal intertidal zone, were observed.

The majority of the restoration area has experienced deposition of a thin (less than 1/2 inch) veneer of black organic silt apparently deposited by the tide and bio-perturbation of the placed soils. This deposited soil is similar to the soil surface of the adjacent undisturbed marsh. The surficial soils in the restoration area were observed to harbor numerous invertebrates as evidenced by small holes/burrows at densities estimated at 60-100 per square foot (Photograph 5). Hermit

crabs were observed occasionally throughout the restoration area while snails and fish were observed in most of the small, shallow pools remaining at low tide. The dense invertebrate burrowing appears to be mixing the organic material and the placed sandy material within the entire restoration area.

Wildlife observed within the restoration area consisted of various shorebirds, while tracks of white-tailed deer (*Odocoileus virginicus*) and raccoon (*Procyon lotor*) were observed.

Smooth cordgrass was the only vegetation observed to be growing in the restoration area. This plant was the only species planted and the only species likely to tolerate the environmental conditions of the area. Smooth cordgrass was observed throughout the migration area. However, the observed percent areal cover for this species is very low (estimated less than 10 percent). There were significant areas with no vegetation observed throughout the restoration area. The west side and the north side had slightly greater survival of smooth cordgrass than the eastern portion of the restoration area.

Two areas with some regeneration of smooth cordgrass were hand excavated around the living plant stems to document subsurface growth. Both areas have a significant number of connected rhizomes that were vigorous and often connected to above ground stems in the vicinity (Photograph 6). Most of the observed living stems had limited height above ground level (average 6 inches), which allowed them to be completely covered by tides other than low tide.

The soil sampling results indicate that the majority of the restoration has suitable pH to support smooth cordgrass regeneration. However, two samples in the northern portions of the restoration area, one located in an area of good cordgrass regeneration and another in an area of poor cordgrass regeneration, resulted in soil ph values of 5.2 and 4.8. This is significantly below the soil pH value average of the two other existing marsh samples (7.2) and the one other restoration area samples (7.6). Due to the significant variances in the results, additionalsoil sampling would be advised during the annual monitoring.

Recommendations

The original plan documented the standard chain of events that accompany a potential variance from desired conditions. The plan calls for "post-construction" monitoring and annual monitoring to gauge the extant conditions of the marsh restoration area. The survival of the planted smooth cordgrass is an important part of the success criteria. There are specific contingency plans to address conditions as encountered during this brief site visit.

MACTEC recommends that no action be taken at this time. It is apparent that the restoration marsh has been installed correctly and is stable. There is no indication that any drastic changes would occur this fall and winter. It is especially encouraging that the natural salt marsh fauna has colonized the site extensively. MACTEC recommends that a comprehensive monitoring event be scheduled for April of the 2005 growing season. The spring monitoring event will allow for the sprouting and observation of new growth from underground rhizomes not visible, from seeds from the fall crop of smooth cordgrass, and from coppice regeneration from adjacent marsh. The timing of this monitoring event will allow a review of new growing season conditions and the time to allow for implementation of contingency plan activities. Recommendations for additional planting or application of fertilizer or pH adjustment materials can be prepared based on the results of the sampling and conditions observed in the field at that time.

MACTEC appreciates the opportunity to provide ECC with these recommendations. If you have any questions, please contact us.

Sincerely,

MACTEC Engineering and Consulting, Inc.

Allen W. Conger
Principal Scientist

James L. Studer, P.E.
Principal Engineer

ANALYSIS RESULTS

Name Lab # Sample # Date	Soil PH	Buffer PH
Conger, Al 4109007 1 10/18/04	7.6	7.95
Conger, Al 4109008 2 10/18/04	4.8	7.70
Conger, Al 4109009 3 10/18/04	5.2	7.80
Conger, Al 4109010 4 10/18/04	6.4	7.85
Conger, Al 4109011 5 10/18/04	7.0	7.85
Conger, Al 4109012 6 10/18/04	7.3	7.85

Photo 1. October 2004 view from picnic area above western portion of restoration area looking north.

Photo 2. October 2004 view form edge of landfill above eastern portion of restoration area looking north.

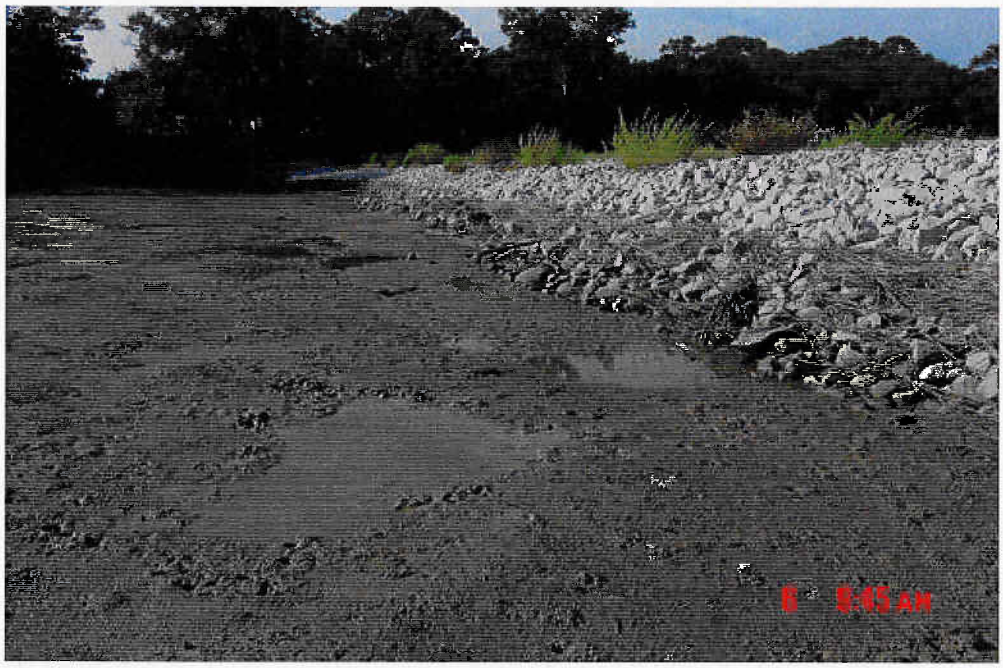

Photo 3. October 2004 view from restoration area looking south along east side of landfill.

Photo 4. October 2004 view from top of landfill looking north over north end of the restoration area.

Photo 5. October 2004 view of example area of restoration area showing apparent invertebrate burrows.

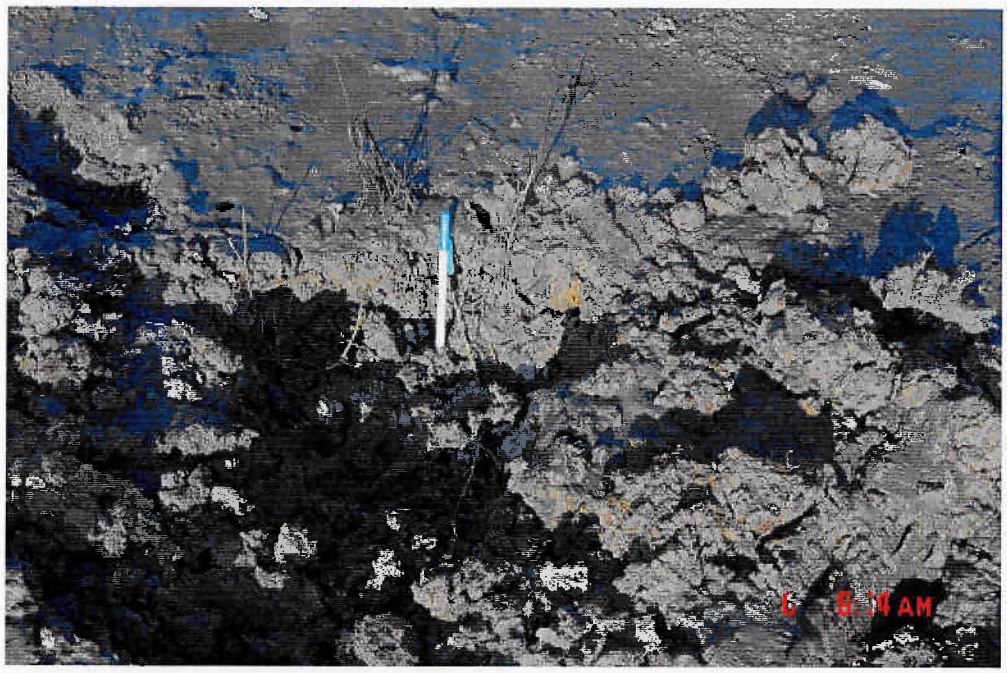

Photo 6. October 2004 view of underground root structure of typical smooth cordgrass plant in western restoration area.