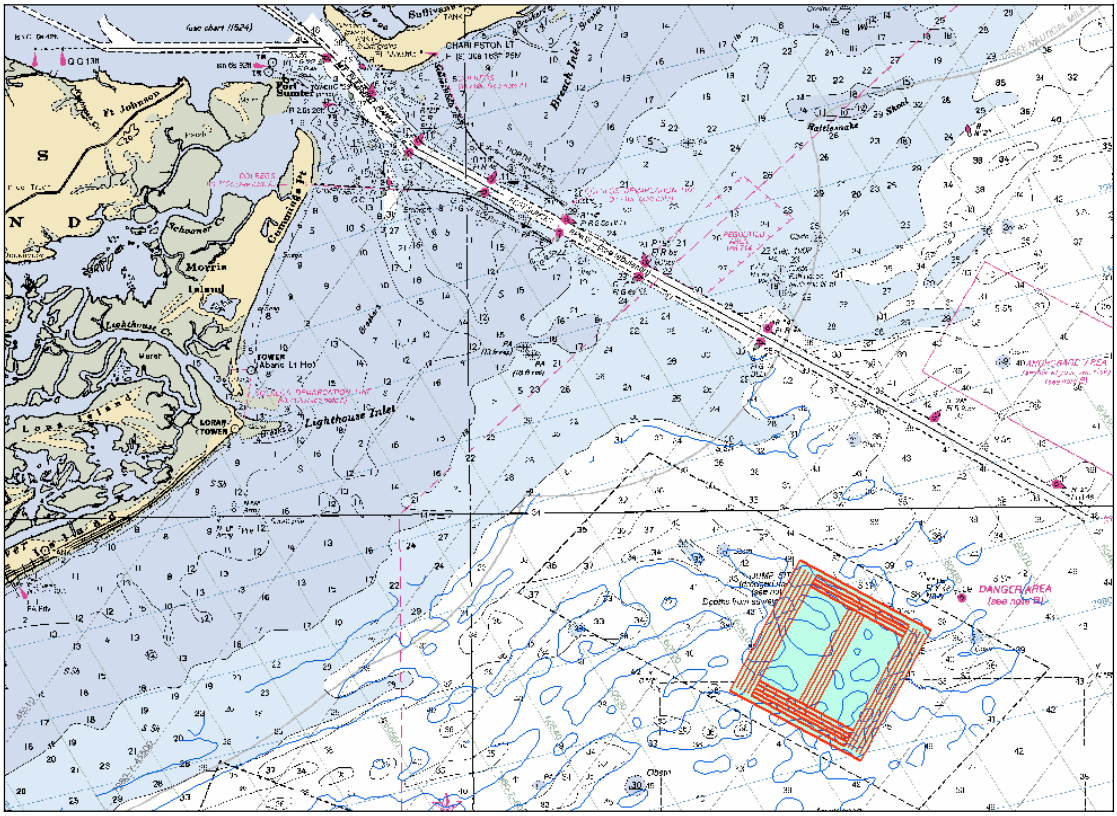
CHARLESTON
OCEAN DREDGED MATERIAL DISPOSAL SITE

SITE MANAGEMENT AND MONITORING PLAN



NOVEMBER 2005

The following Site Management and Monitoring Plan for the Charleston ODMDS has been developed and agreed to pursuant to the Water Resources and Development Act Amendments of 1992 (WRDA 92) to the Marine Protection, Research, and Sanctuaries Act of 1972 for the management and monitoring of ocean disposal activities, as resources allow. by the U.S Environmental Protection Agency and the U.S. Army Corps of Engineers

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This plan was jointly prepared and reviewed by the U.S. Environmental Protection Agency/Region 4, the U.S. Army Corps of Engineers/Charleston District, the U.S. Fish and Wildlife Service, the South Carolina Department of Natural Resources and the South Carolina State Ports Authority.

This plan is effective from the date of signature for a period not to exceed 10 years. The plan shall be reviewed and revised more frequently if site use and conditions at the site indicate a need for revision.

CHARLESTON OCEAN DREDGED MATERIAL DISPOSAL SITE (ODMDS)
SITE MANAGEMENT AND MONITORING PLAN

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Charleston ODMDS
Site Management and Monitoring Plan

INTRODUCTION. It is the responsibility of the U.S. Environmental Protection Agency (EPA) and the U.S. Army Corps of Engineers (COE) under the Marine Protection, Research, and Sanctuaries Act (MPRSA) of 1972 to manage and monitor Ocean Dredged Material Disposal Sites (ODMDSs) designated by the EPA pursuant to Section 102 of MPRSA. As part of this responsibility, a Site Management and Monitoring Plan (SMMP) for the Charleston ODMDS was originally developed as a result of issues related to resource protection in March 1993. This modified SMMP replaces the original and incorporates subsequent monitoring results and provisions of WRDA 92. Upon finalization of this revised SMMP, these SMMP provisions shall be requirements for all dredged material disposal activities at the site. All Section 103 (MPRSA) ocean disposal permits or evaluations shall be conditioned as necessary to assure consistency with the SMMP.

Site Management and Monitoring Plan Team. An interagency SMMP team has existed since the development of the original plan and is responsible for this revised SMMP. The team consists of the following agencies and their respective representatives:

Charleston District Corps of Engineers	EPA Region 4
SC Dept. of Natural Resources	U.S. Fish & Wildlife Service
SC State Ports Authority	

Other agencies such as the National Marine Fisheries Service, South Atlantic Fisheries Management Council and the South Carolina Department of Health and Environmental Control will be asked to participate as appropriate. The SMMP team will assist EPA and the COE in evaluating existing monitoring data, including the type of disposal, the type of material, location of placement within the ODMDS and quantity of material. The team will recommend appropriate monitoring techniques, determine the level of monitoring, and assist in evaluating the significance of results and potential management options.

SITE MANAGEMENT

Section 228.3 of the Ocean Dumping Regulations (40 CFR 220-229) states: "Management of a site consists of regulating times, rates, and methods of disposal and quantities and types of materials disposed of; developing and maintaining effective ambient monitoring programs for the site; conducting disposal site evaluation studies; and recommending modifications in site use and/or designation." The plan may be modified if it is determined that such changes are warranted as a result of information obtained during the monitoring process.

Disposal History and Site Characteristics. The Charleston, South Carolina, Ocean Dredged Material Disposal Site is one of the most active, frequently used sites in the South Atlantic Bight (part of EPA's Region 4 area of responsibility). The general site has been in use since 1896 for disposal activities. The original management plan for ocean dredged materials disposal associated with the Charleston Harbor complex (1987) called for two sites. The permanently designated ODMDS was approximately 2.8 x 1.1 nautical miles in size (Figure 1, labeled "smaller ODMDS"). This site was designated to receive all dredged material emanating from maintenance dredging activities in the harbor and entrance channels. Surrounding the permanent ODMDS was a larger ODMDS. This site encompassed an area of approximately 5.3 x 2.3 nautical miles (Figure 1, labeled "larger ODMDS"), and was designated for one time use, only, for placement of material obtained during the Charleston Harbor Deepening Project. This larger ODMDS was designated for a seven year period of use (1987-1994) for placement of material obtained during the Charleston Harbor Deepening Project.

In the fall/winter of 1989-1990, local fishermen reported that disposal operations occurring in the permanently designated, smaller ODMDS were impacting a live bottom area within the western quarter of that area. Until that time, no significant live bottom areas were known to exist within or near either the larger or small disposal area. Due to the discovery of live bottom habitat, a line was immediately put in place by the EPA that was located on the eastern edge of the smaller ODMDS, in an effort to protect these valuable resources (Figure 1, labeled "EPA line"). The final rule regarding this line was published in the Federal Register in 1991, and stated that "All dredged material, except entrance channel material, shall be limited to that part of the site east of the line between coordinates 32º39'04"N, 79º44'25"W and 32º37'24"N, 79º45'30"W unless the materials can be shown by sufficient testing to contain 10% or less of fine material (grain size of less than 0.074 mm) by weight and shown to be suitable for ocean disposal."

Video mapping of the seafloor was conducted during this same time period (1990) by the EPA in the vicinity of the ODMDSs in an effort to precisely map the location and extent of live bottom within and beyond the boundaries of both the smaller and larger ODMDSs. Based on the results of the video survey, the interagency SMMP Team (EPA, SCDNR, COE, and SCSPA) jointly decided in 1993 that the area actively used for disposal should be moved to a new location within the larger ODMDS to avoid future disposal of materials on sensitive live bottom habitat. This location was four square miles in size, and agreed upon by all agencies (Figure 1, four square mile Disposal Zone). The creation of this four square mile

Disposal Zone within the larger ODMDS required the development of a Management Plan which included a comprehensive Monitoring Plan for the site. The monitoring plan was regarded as a flexible strategy with the various task and techniques applied as appropriate and as dictated by disposal activities. (Charleston ODMDS Site Management Plan, 1993). The four square mile Disposal Zone and surrounding areas were divided into three zones (Figure 2, disposal zone, inner boundary, and outer boundary), which formed 20 discrete areas (or strata) of comparable size (one square mile). Based on the Site Management Plan, the COE began building an L-shaped berm on the western side of the four square mile Disposal Zone using material from the 42-ft deepening project. The berm was to be constructed of harder materials and was designed to serve as a barrier, with finer materials to be placed to the east of the barrier.

In 1995, the smaller ODMDS was officially de-designated in the Federal Register due to the presence of live bottom habitat in the area. The language describing the larger ODMDS was modified such that the site could be used for all disposal materials permitted for offshore disposal, which meant that the site was no longer limited for the disposal of deepening materials. In addition, the time limit restricting the use of the larger disposal area to a seven year period was removed, and the site was permitted for "continued use."

The U.S. Congress authorized the most recent Charleston Harbor Deepening Project in 1996. The project was planned to deepen the entrance channel from 42 ft to 47 ft, and the inner harbor channel from 40 ft to 45 ft. Approximately 20-25 million cubic yards of sediments were planned for disposal in the four square mile Disposal Zone selected by the Task Force in 1993.

On October 10, 2001, a proposed rule was published in the Federal Register [66 FR 51628] to modify the site name and restriction of use. The proposed action was (1) to define the four square mile Disposal Zone as the only area in which disposal can continue, (2) to shorten the official name of the site from the Charleston Harbor Deepening Project ODMDS to the Charleston ODMDS and (3) to remove the line that restricts the disposal of fine-grained material. The only letter received during the 45 day comment period came from the Office of Ocean and Coastal Resource Management, South Carolina Department of Health and Environmental Control. Upon receipt of the consistency determination for the Coastal Zone Management Act, EPA proceeded with the final rule which became effective on June 6, 2002.

<u>Management Objectives</u>. There are three primary objectives in the management of each ODMDS. These are:

- Protection of the marine environment;
- Beneficial use of dredged material whenever practical; and
- Documentation of disposal activities at the ODMDS.

The following sections provide the framework for meeting these objectives to the extent possible.

Dredged Material Volumes. It is intended that the Charleston ODMDS will be used for dredged material from the greater Charleston, South Carolina vicinity. The two primary users of the Charleston ODMDS have been and are expected to be:

U.S. Army Corps of Engineers for Civil Works

South Carolina State Ports Authority

Since 1987, approximately 40,407,780 million cubic yards of dredged material have been disposed of at the Charleston ODMDS. In addition, the estimated projected use of the ODMDS over the next five years is approximately 750,000 cubic yards.

Historical Use of the Charleston ODMDS by a Non-Federal User

DATE	PROJECT (SPA Terminal)	SPONSOR	CUBIC YARDS	NEW WORK OR MAINTENANCE
Mar-91	Union Pier	State Ports Authority	43,195	Maintenance
Mar-91	Columbus Street	State Ports Authority	24,898	Maintenance
Jan-92	Union Pier	State Ports Authority	117,266	Maintenance
Feb-92	Columbus Street	State Ports Authority	141,400	New Work
Aug-92	Wando Welch	State Ports Authority	1,056,425	New Work
Jun-00	Wando Welch	State Ports Authority	55,430	Maintenance
Aug-00	Wando Welch	State Ports Authority	106,235	New Work
Oct-00	Union Pier	State Ports Authority	119,809	Maintenance
Jun-01	Wando Welch	State Ports Authority	37,363	Maintenance
Mar-02	Wando Welch	State Ports Authority	54,273	Maintenance
June-03	Union Pier	State Ports Authority	69,889	Maintenance

No restrictions are presently placed on disposal volumes. Disposal of unrestricted volumes is dependent upon results from future monitoring surveys and studies of site capacity, as well as concerns for navigational safety.

Material suitability. Two basic sources of material are expected to be placed at the site, new work dredged material and maintenance material. These materials will consist of mixtures of silt, clay and sand in varying percentages.

Historical Use of the Charleston ODMDS by the US Army Corps of Engineers, Charleston, (thousand CY per fiscal year)

Date	Entrance Channel	Lower Harbor	Daniel Island Widening	Contract Type*
	Hopper Dredging	Clamshell Dredging	Clamshell Dredging	
1988	369.7			2
1990		865.2		3
1991		493.4		2
1993	6621.7			3
1994		880.5		1
1995	1583.7			2
1997	683.1			2
2000			2239.0	1
2002	9738.8	10645.2		3
2003	708.4	1284.6		2
2004	1575.4			2
2005		892.9		2
Projected 5-yr. use	750.0	750.0		

*Contract Type: 1-New Work, 2-Maintenance or O&M, 3- Combination of New Work and O&M

The suitability of dredged material for ocean disposal must be verified by the COE and agreed to by EPA prior to disposal. Verification will be valid for three years from the time last verified. Verification will involve: 1) a case-specific evaluation against the exclusion criteria (40 CFR 227.13(b)), 2) a determination of the necessity for testing including bioassay (toxicity and bioaccumulation) testing for non-excluded material based on the potential for contamination of the sediment since last tested, and 3) carrying out the testing (where needed) and determining that the non-excluded, tested material is suitable for ocean disposal.

Documentation of verification will be completed prior to use of the site. Documentation will be in the form of a MPRSA Section 103 Evaluation. The Evaluation and any testing will follow the procedures outlined in the 1991 EPA/COE Dredged Material Testing Manual and the Regional Implementation Manual (RIM). The MPRSA Section 103 Evaluation will be in the form outlined in Appendix B of the RIM. Water Quality Compliance determinations will be made using the STFATE (ADDAMS) model and the input parameters provided in Appendix A. Only material determined to be suitable through the verification process by the COE and EPA will be placed at the Charleston ODMDS.

Time of disposal. At present no restrictions have been determined to be necessary for disposal related to seasonal variations in ocean current or biotic activity. As monitoring

results are compiled, should any such restrictions appear necessary, disposal activities will be scheduled so as to avoid adverse impacts. Additionally, if new information indicates that endangered or threatened species are being adversely impacted, restrictions may be incurred.

Disposal Technique. No specific disposal technique is required for this site. However, it is the intent of this plan to maximize any advantages of strategic placement of materials.

Disposal Location. Disposal of all dredged material at the Charleston ODMDS must occur within the 4-square mile Disposal Zone defined by the following corner coordinates (using the NAD 83 datum):

32.65663 ^{o} N, 79.75716 ^{o} W
32.64257 ^{o} N, 79.72733 ^{o} W
32.61733 ^{o} N, 79.74381 ^{o} W
32.63142 ^{o} N, 79.77367 ^{o} W

Prior to any disposal of dredged materials, an agreement between EPA and COE will be reached concerning the exact placement of these materials. Permits/contracts will specify exact locations for the disposal of any material from the project. Fine-grained materials will be placed within the area surrounded by berms constructed of more consolidated material. Any coarse-grained material, or suitable consolidated material which is not used for another beneficial purpose (i.e., beach nourishment), will be used as needed to expand the boundary berms.

Permit and Contract Conditions. The disposal monitoring and post-disposal monitoring requirements described under Site Monitoring will be included as permit conditions on all MPRSA Section 103 permits and will be incorporated in the contract language for all federal projects. Appendix B contains a template for standard permit conditions for MPRSA 103 permits for the Charleston ODMDS and Appendix C contains a template for standard contract conditions for civil works projects that intend to use the ODMDS.

Permit Process. The permit process is outlined in Figure 2 and consists of 10 main steps:

- **Preapplication Consultation**: Includes discussion of alternatives and the qualitative and quantitative information required by the District Engineer for use in evaluating the proposed dredged material.
- **Evaluation of Dredged Material Proposed for Ocean Disposal**: Includes development, approval and implementation of sampling and analysis plan (see section on Material Suitability). This step should include close coordination between EPA Region 4, the Charleston District COE and the applicant.
- **Permit Application**: According to 33 CRF 325.1, a permit application must include the following:
  1. A complete description of the proposed activity, including necessary drawings, sketches, or plans.
  2. The location, purpose, and need for the proposed activity; scheduling of the

activity; names and addresses of adjoining property owners; location and dimension of adjacent structures.

3. A list of authorizations required by other Federal, interstate, State, or local agencies for the work, including all approvals received or denials already made.
4. The source of the material; the purpose of the disposal and a description of the type, composition, and quantity of the material (this includes information necessary to determine if the material is in compliance with the criteria); the method of transportation and disposal of the material; and the location of the disposal site.

- **Review of Application for Completeness**: Additional information is requested if the application is incomplete.
- **Public Notice**: Per 33 CFR 325.3, Public Notices issued by the COE for dredged material disposal must include all of the information in 40 CFR 225.2(a) (see RIM). A supplemental, revised or corrected Public Notice will be issued if the District Engineer believes that the new information affects the review of the proposal.
- **EPA MPRSA Review**: Independent review of the information to determine whether the disposal activity complies with the criteria found in 40 CFR 227 and 228.
- **District Engineer Completes Evaluation**: The District Engineer addresses comments and holds public meeting if needed.
- **COE Public Interest Review**: The COE must consider all comments, suggestions, and concerns provided by all commenters and incorporate their comments into the administrative record of the application.
- **Permit Issued**: A decision to issue or deny a permit is discussed in either a Statement of Findings or Record of Decision.
- **Permit Public Notice**: A list of permit decisions is published and distributed to all interested parties each month.

<u>Information Management of Dredged Material Placement Activities.</u> As discussed in the following sections, a substantial amount of diverse data regarding use of the Charleston ODMDS and effects of disposal is required from many sources (EPA, COE, SCDNR, SCSPA). If this information is readily available and in a useable format it can be used to answer many questions typically asked about a disposal site:

- What is being dredged?
- How much is being dredged?
- Where did the dredged material come from?
- Where was the dredged material placed?
- Was dredged material dredged correctly? Placed correctly?
- What will happen to the environment at the disposal site?

As part of site management, EPA and the COE will investigate alternatives for appropriate data management. The Dredged Material Spatial Management Analysis and Record Tool (DMSMART) is currently in development by the COE DOER program at the Waterways Experiment Station. This tool will include guidance to Districts for development of a database of dredging project history and a database of the dredging and disposal site monitoring data. Once available, the District, with assistance from EPA Region 4, will evaluate the best approach to implementing a data management system, which may or may not include DMSMART. This will enable the COE and EPA to better manage the Charleston ODMDS.

SITE MONITORING

The MPRSA establishes the need for including monitoring program as part of the Site Management Plan. Site monitoring is conducted (1) to ensure the environmental integrity of a disposal site and the areas surrounding the site, and (2) to verify compliance with the site designation criteria, any special management conditions, and with permit requirements. Monitoring programs should be flexible, cost effective, and based on scientifically sound procedures and methods to meet site-specific monitoring needs. A monitoring program should have the ability to detect environmental change as a result of disposal activities and assist in determining regulatory and permit compliance. The intent of the program is to provide the following:

1) Information indicating whether the disposal activities are occurring in compliance with the permit and site restrictions; and/or
2) Information concerning the short-term and long-term environmental impacts of the disposal; and/or
3) Information indicating the short-term and long-term fate of materials disposed of in the marine environment.

The main purpose of a disposal site monitoring program is to determine whether dredged material site management practices, including disposal operations, at the site need to be changed to avoid significant adverse impacts.

Disposal Monitoring. For all disposal activities, the dredging contractor will be required to prepare and operate under an approved electronic verification plan for all disposal operations. As part of this plan, the contractor will provide an automated system that will continuously track the horizontal location and draft condition (vertical) of the disposal vessel from the point of dredging to the disposal area, and return to the point of dredging. Plotted coordinates will be collected using DGPS in latitude/longitude in decimal degrees (NAD 83 datum) and provided in a digital format on request to all SMMP team agencies. Required digital data are as follows:

(a) the dump number;

(b) the location from which the dredged material came;

(c) brief description of the material in each dump (e.g., clean, coarse sand; sand and shell sand mixed with clay and shell; dark organic silt sand; or other);

(d) the number of cubic yards on each dump;

(e) the beginning and ending coordinates for each dump and the compass heading at the beginning of the dump;

(f) the date and time of each dump; and

(g) the map number on which the dump is plotted.

Within sixty (60) days prior to the commencement of some disposal operations, a baseline bathymetric survey by the COE or other site user will be conducted of the disposal area and adjacent areas. The survey will be taken along lines spaced on 400-foot intervals and be of sufficient length to adequately cover the area. Accuracy will be $\pm$ 0.5 feet. The survey will be referenced to MLLW and corrected for tide conditions at the time of the survey. The Charleston District ARTIS tide gauge will be utilized for tidal corrections, until replaced by DGPS-RTK.

As a follow-up to the baseline bathymetric survey, the COE or other site user will conduct a survey after disposal. The number of transects and accuracy required will be the same as in the baseline survey.

The user will be required to prepare and submit to the COE daily reports of operations and a monthly report of operations for each month or partial month's work.

Historical Monitoring Activities: Extensive monitoring of the Charleston ODMDSs has occurred throughout the years. The following sections describe these efforts by type.

Bathymetry: Detailed bathymetric monitoring of the smaller ODMDS and surrounding area have generally been conducted every 12-18 months by the U.S. Army Corps of Engineers (COE) since 1972 (Winn *et al.* 1989). The primary objectives of these bathymetric surveys were to: (1) document the location and configuration of mounds created with dredged material, which was placed along narrow corridors within the smaller ODMDS, and (2) determine whether these mounds were remaining stable.

Sediment Characteristics and Sediment Contaminants: Monitoring of bottom sediment characteristics and sediment contaminant levels in the area was first completed in 1978 (Winn *et al.* 1989) by the South Carolina Department of Wildlife and Marine Fisheries (SCWMRD, now the South Carolina Department of Natural Resources). The SCWMRD study provided sediment data at 40 sites, and contaminant levels at 24 sites in and around the larger ODMDS (SCWMRD 1979, Van Dolah *et al.* 1983). Interstate Electronic Corporation (IEC) sampled sediments at 10 sites and contaminant levels at 10 sites in the area of the larger ODMDS during 1979 (EPA 1983). These studies did not find elevated levels of contaminants. The SCWMRD study found higher levels of mercury and cadmium than the IEC study, which may have been due to analytical methodology (EPA 1983).

Winn *et al*. (1989) collected sediment and sediment contaminant samples at 28 sites in the larger ODMDS and surrounding areas. None of the stations displayed contaminant levels above the range observed in the 1978 SCWMRD study. Minor changes in sediment characteristics were detected, with some movement of material away from the disposal site. Surficial sediment composition outside the disposal site did not appear to be altered.

As part of the baseline assessment of the current four square mile Disposal Zone, 200 sediment samples were collected in both 1993 and 1994 in and around the Disposal Zone (Van Dolah *et al*. 1996, 1997). Bottom sediments in the area were comprised primarily of medium to fine-grained sands, with variable concentrations of silt/clay and shell hash. Relatively high concentrations of mud (>10%) were found within the disposal area in 1993. By 1994, most of the muddy sediments had dispersed. Forty composite sediment contaminant samples were also collected during the 1993-1994 assessment. Metal contaminants were detected in several strata, but concentrations were generally below known bio-effects levels.

Biological Communities: Benthic assemblages in the vicinity of the larger ODMDS have been monitored since 1978. SCWMRD (1979) completed an assessment in 1978. No major differences were found in the benthic communities collected within the ODMDS compared to adjacent areas (Van Dolah *et al.* 1983). The IEC sampled the benthos at 10 sites during March and December in the vicinity of the larger ODMDS (EPA 1983). Their findings also did not indicate any differences in the benthic communities present which could be attributed to previous disposal operations.

An updated assessment was completed in 1987 by the SCWMRD due to the changes in the site designation that occurred at that time. The benthic sampling program was designed around the corridor disposal concept with a network of stations positioned to intercept the migration of material over the bottom, if it occurred, and to assess changes in the benthic communities resulting from the movement of dredged material. The 1987 baseline survey detected minor changes in benthic community structure related to a disposal operation completed in 1986, and some movement of the material was detected away from the disposal site (Winn *et. al*., 1989). However, this movement did not appear to significantly alter benthic communities outside the smaller ODMDS.

SCDNR completed intensive benthic infaunal sampling in the four square mile Disposal Zone and surrounding boundary areas in 1993-94 as part of a baseline assessment of the area (Van Dolah *et al*. 1996, 1997). During this period, they collected benthic samples at 200 stations each year in 20 zones located within and around the current disposal site. Faunal composition, faunal abundance, and number of species varied among zones and strata. The abundance of some general taxonomic groups were found to be related to sediment type, a finding which suggests that future large scale disposal operations could lead to disposal-related impacts.

In addition, several studies of demersal fishes and decapods have been conducted in the South Atlantic Bight since the early 1970's. Some of these studies have included one or more sites in the vicinity of the ODMDSs (Wenner *et al.* 1979a, 1979b, 1980; Wenner and Read 1981).

In July 1992, EPA, in conjunction with the University of Georgia's Department of Ecology, undertook a study on the physiological effects of dredged material on the oxygen metabolism of *Oculina arbuscula* (scleractinian) and *Lophogorgia hebes* (gorgonian). The results of the study suggest that while coral recovery from single episodes of low-level sediment exposure is likely, recovery from repeated low level exposures or single episodes of high-level exposure becomes more difficult (Porter, 1993). Both long-term responsiveness and immediate short-term productivity rates were inhibited by exposure to sediment concentrations above 100 mg/l (15 NTU) (Porter, 1993).

Hydrographic Data: Hydrographic data has been collected as part of most assessments of the Charleston ODMDSs. In 1978, SCWMRD collected hydrographic data at 40 sites during their August sampling effort (SCWMRD 1979). The IEC assessment in 1979 provided additional hydrographic data for the larger ODMDS in the March and December sampling seasons (EPA 1983). Water quality data were collected by SCWMRD in 1987 during the summer and winter (Winn *et al.* 1989). Hydrographic data were also collected by SCDNR during summer sampling periods in 1993 and 1994 (Van Dolah *et al*. 1996, 1997).

Data on ocean currents at the Charleston ODMDSs were collected by EPA in summer and winter 1991, and NOAA also collected a limited number of observations in the seaward reaches of the Charleston Harbor Entrance Channel. The ocean current data were used by the Corps of Engineers, Waterways Experiment Station (WES), for input into a model simulating sediment plume dispersion for a dumping episode at the site. Ocean current data revealed a predominant NNE component during the summer. While the strong NNE component was also present during the winter, a westerly component was evident during that season as well. Currents toward the southern, and neighboring sectors, were minimal during these sampling periods.

The National Ocean Service (NOS), Coastal Estuarine and Oceanography Branch (CEOB) deployed a 1200 kHz acoustic Doppler current profiler (ADCP) in the larger ODMDS from January 1994 through September 1995 in an effort to measure ocean currents in the vicinity of the site. The results of this study found that the currents in the vicinity of the Charleston

ODMDS consist of tidal, wind-driven, and density-driven currents. The currents flowing toward the southwest or west could potentially transport dredged material to the benthic communities in the southwest corner of the larger ODMDS (Williams *et al.* 1997).

Sediment Mapping Surveys: To assist in defining dredged material placement and migration within the Charleston Harbor ODMDSs, real time mapping of the seafloor sediments in the Charleston ODMDS and surrounding areas has been conducted. Two sampling techniques were used in these surveys, one sled equipped to detect selective stable gamma isotopes in the surficial sediments (gamma sled), and another sled selective to fine surficial seafloor sediments (CS_3 sled). Sites were mapped along transects spaced approximately 1000 feet apart.

The EPA, in conjunction with the University of Georgia's Center for Applied Isotope Studies (CAIS), completed a survey within the smaller ODMDS site in July 1988, and within the larger ODMDS site in March 1990. Survey results indicated the seafloor within the smaller site was relatively homogeneous, from a selected gamma isotope perspective, and relatively void of fine sediments since the CS_3 sled, which is selective to sediments generally smaller than 400 microns, did not retrieve any material. The larger site was mapped again on the following dates: August 1991, May 1993, and June 1994. Each of these surveys was successful in tracking and documenting the dispersion of the dredged material deposited at the disposal site. The construction of the L-shaped berm was clearly indicated, as well as other areas of elevated silt/clay concentrations due to historical disposal operations or unidentified origins (Noakes 1995).

<u>Recent Monitoring Events</u>: Based on reports from commercial shrimpers (January 2000), SCDNR staff investigated muddy areas found outside the four square mile Disposal Zone. SCDNR sampled in February-March 2000, and confirmed that sediments high in silt/clay content were found in areas surrounding the ODMDS. SCDNR identified these concerns to the COE, who reviewed logs and found unauthorized dumps made outside the four square mile Disposal Zone. Reconnaissance of about 50 unauthorized dump sites was completed by a subcontractor to the dredging company and reviewed by SCDNR staff. At least one of the unauthorized dump sites appeared to have occurred over live bottom, and other dumps may also have occurred over other live bottom areas, but if so, the bottom and evidence of reef growth were completely buried by the unauthorized dumps. A report summarizing these findings (Jutte *et al.* 2000) was sent to USACOE, the contractor (Norfolk Dredging Company), and USEPA. SCDNR made several recommendations to the COE regarding future disposal operations:

> 1. For the remainder of this disposal operation, and for all subsequent offshore dredge material disposal projects off South Carolina, electronically unalterable cruise tracks and dump locations should be examined on a weekly basis by the COE and made available upon request to state and federal resource agencies. The coordinates of any unauthorized dumps should be reported immediately after discovery by the COE to those concerned agencies so that immediate actions can be taken to investigate the problem.

2. The dredge material scows or hopper dredges (loaded or unloaded) should never use routes that cross known live bottom areas. Currently this includes any area outside of the ODMDS and south of a line from the center of the ODMDS to the seaward tip of the south jetty. This would avoid any inadvertent dump of material over sensitive bottom areas due to equipment failure.
3. The dredge material scows or hopper dredges should close their doors before leaving the ODMDS. This will ensure that all disposal materials are released within the authorized area, and that no trails of sediment are left outside the ODMDS from barges that have not completely released their material.
4. In the event of additional "misdumps" similar investigations should be conducted to determine what measures would be necessary to restore or to mitigate the impacted bottoms as appropriate.

During the March 2000 SMMP meeting, the COE noted that the berms under construction at the ODMDS were being built with a mixture of materials, rather than the more consolidated materials as originally planned. It was agreed that future barge loads of material would be assessed by the subcontractor, with more consolidated materials (e.g. cooper marl, rocky material) being placed on the berm, and finer, unconsolidated, materials placed to the SE of the berm. The SMMP Team also discussed the path of barge traffic over live bottom reef habitat en route to the ODMDS. Team members agreed that by traveling a northerly track to the shipping channel, the potential for accidental dumps over live bottom reefs could be eliminated.

An interim assessment of the biological, sediment, contaminant, and bathymetric conditions was planned to occur approximately halfway through the current Charleston Harbor Deepening Project. This effort was initiated in 2000, with some portions of the study expedited to further investigate unauthorized dumping activities. In March 2000, Coastal Carolina University's Center for Marine and Wetland Studies, in cooperation with the US-Geological Survey, completed a side scan sonar survey, swath bathymetry survey, and CHIRP sub-bottom profiling of the ODMDS and surrounding areas. During the same year (September), SCDNR staff also collected biological and sediment samples at 200 sites in and around the ODMDS, and composite sediment contaminant samples in each strata. A sediment mapping survey by the University of Georgia's Center for Applied Isotope Studies was conducted in October 2000.

In July and August 2001, exploratory dives were completed in areas surrounding the four square mile Disposal Zone likely to have hard bottom with epifaunal sponge and coral growth based on available data. Several general areas with possible hard bottom reef habitat were selected for exploratory dives. These general areas were chosen based on (1) side scan sonar and CHIRP sub-bottom profiling surveys collected in March 2000 by Coastal Carolina University's Center for Marine and Wetland Studies (CMWS) and US-Geological Survey (USGS), (2) reports of hard bottom locations from the SEAMAP Bottom Mapping Project,

(3) communication with knowledgeable SCDNR staff, (4) 1990 EPA video survey data, and (5) additional side scan sonar and video camera tows in August 2000. Four suitable study sites were located outside the boundary areas to the west, east, and southwest, and within the boundary area in the southwest corner. Two reference study sites were also identified.

Each of the six sites has been surveyed numerous times to date. During each sampling period, video surveys of sponge/coral communities, video surveys of fish communities, surficial sediment depths, surficial sediment characteristics, and sedimentation rates are collected. In addition, a detailed side scan sonar survey with simultaneous underwater video has been completed annually to determine any changes in the areal extent of each reef site. Biannual assessments of these index hard bottom reef sites continued through spring 2005 although reporting of the results are not anticipated prior to spring 2006.

Two cruises completed in 2001 collected additional data in the vicinity of the Charleston ODMDS. The EPA's OSV Anderson July 2001 cruise, in cooperation with CMWS, collected detailed side scan and bottom video in the areas surrounding the six index reef sites also being studied by SCDNR. In addition, approximately 25% of the four square mile Disposal Zone, inner boundary zone, and outer boundary zone was resurveyed. During this same cruise, University of South Carolina (USC) staff, in cooperation with the EPA and SCDNR, deployed a sedimentation sensor (optical backscatter sensor) and current profiler (acoustic Doppler velocimeter) near the ODMDS to measure the combined actions of waves and currents in the ODMDS, measure the local suspended sediment concentration, and calculate threshold conditions for re-suspension. The reporting of these efforts failed to produce the anticipated threshold conditions due to the limited nature of field measurements actually obtained.

The CMWS conducted a second geophysical cruise, using the NOAA Ship Ferrel, in August 2001. The remaining area of the disposal site and the boundary areas surrounding the disposal site were imaged. In addition, side scan coverage was extended offshore 1.5 kilometers as a preliminary assessment of the area seaward of the existing disposal site. Also in support of the ODMDS study, CMWS and SCDNR, using the Ferrel, recovered the USC equipment deployed on the July EPA cruise.

A post-assessment was conducted upon completion of the current harbor deepening project. The goal of this study was to establish biological, sediment, sediment contaminant, and bathymetric conditions following large-scale disposal activity, and compare these findings with baseline and interim assessments. In addition, this study will document to what extent the deepening project filled available space within the four square mile Disposal Zone.

The post-assessment incorporated the same sampling strategies and previous assessments (see below). Biannual assessments of index hard bottom reef sites has continued through at least spring 2005 (see details below). Based on the data collected during these studies,

specific recommendations for monitoring in subsequent years of the program may change, and findings may warrant an extension in the length of the monitoring program. Results from these studies are anticipated in spring 2006.

Monitoring Objectives**:** Monitoring objectives of the Charleston ODMDS SMMP are to:

1. Determine the fate of dredged material placed at the site,

2. Assess the impact of dredged material movement outside the four square mile Disposal Zone through the early detection of changes in sediment characteristics (physical and chemical), and biological communities which may be deemed as adverse and chronic, and

3. Assess the extent and impact of unauthorized disposal activities outside the four square mile Disposal Zone.

Since several different ecological components are susceptible to perturbation by dredged material disposal, and an alteration to one component may result in impacts on another, a comprehensive monitoring approach is proposed with several specific objectives. These objectives are to:

1. Continue bathymetric, side scan sonar, gamma isotope, and sediment chemistry mapping of the four square mile Disposal Zone and surrounding areas, relate these findings to plotted coordinates of disposal events and previously collected data. If deemed necessary, expand these surveys beyond the historical monitored boundary areas.
2. Use data collected to determine, to the extent possible, the direction, distance, and volume of dredged sediment migration.
3. Evaluate the success of submerged berm construction on (1) retarding the over-bottom movement of dredged material, and (2) the development of habitat and attraction of recreationally important fish species to demonstrate beneficial uses of ODMDS berm design.
4. Evaluate the effects of disposal and subsequent movement of dredged material on the physical and chemical characteristics of the sediments and benthic infaunal communities in and adjacent to the ODMDS.
5. Periodically map the distribution of live bottom in and around the ODMDS to monitor for changes in the size of these critical resource areas. At specific index reef sites, document any changes in sponge and coral density and/or condition, areal extent, and surficial sediment characteristics
6. Collect seasonal, long term, ocean current data to enhance dump model predictive capability at the Charleston sites.

Monitoring Approach and Rationale:

Tracking Disposal Activity:

An essential requirement for effective site monitoring activities at the Charleston ODMDS is accurate placement, recording, and plotting of all disposal events. The Charleston District, USACOE, requires such information from all dredging contractors and will continue to compile and continuously update computer plots depicting placement of all maintenance and new work dredged material. Plotted coordinates will be collected using GPS in latitude/longitude in decimal degrees (NAD83 datum) and provided in a digital format on request to all agencies on the SMMP Team. Unauthorized dumps made outside the Disposal Zone could be investigated to determine what measures would be necessary to restore or mitigate the impacted bottoms, as appropriate. The scope, level of complexity and primary responsibility for conducting such investigations can only be determined on a case-by-case basis.

Sediment Mapping and Bathymetry:

Close grid bathymetry and sediment mapping using gamma and CS3 sled techniques may be conducted as part of the post-assessment and three-year post-assessment. The mapping effort should encompass the entire area of the four square mile Disposal Zone and the surrounding 16 monitoring zones (Figure 2). Expanded mapping efforts of critical hard bottom reef habitats to the west of the existing monitoring zones may also be warranted. Due to the apparent highly dynamic nature of sediment transport at the site, detection of more discrete migration patterns may require mapping at a greater frequency, and targeting a specific disposal pile.

Side Scan Sonar Surveys:

Side scan sonar surveys of the four square mile Disposal Zone and surrounding monitoring areas will be conducted as part of each assessment. Due to the possibility of unauthorized dumps and future requests for site expansion, side scan sonar surveys should be collected beyond the existing monitoring zones to the west and east whenever possible to expand the existing mosaic and our knowledge of the seafloor in this region. When deemed necessary by SMMP Team, simultaneous side scan sonar and underwater video camera tows will be conducted.

Benthic Infaunal and Sediment Sampling:

These monitoring activities will involve collecting samples in and around the ODMDS using a stratified random sampling design. All twenty zones will be sampled within the four square mile Disposal Zone, the inner boundary, and the outer boundary, with a minimum of ten grab samples collected within each zone. Each grab sample obtained for faunal assessment will be sub-sampled to determine sediment characteristics of the sample (e.g.,

grain size, percent silt, clay, sand, $CaCO_3$). A composite sample within each zone will be collected to measure sediment contaminant levels. The sediment characteristics and contaminant levels found in the zones within the Disposal Zone will be compared with zones outside the Disposal Zone to document any changes that occurred following disposal operations. Biological communities (e.g., faunal densities, biomass, species numbers, community structure, and feeding guilds) will be assessed by comparing samples collected in areas with high silt/clay content or high sediment contaminant concentrations with samples collected from a boundary zone where there is no evidence of change in sediment condition**.** As a cost-saving measure, benthic sampling could be conducted using a tiered approach. After collecting samples in all twenty zones (see above), sample processing would be limited to a subset of samples collected in areas with high silt/clay content or high sediment contaminant concentrations to be compared with another subset of samples collected from boundary zones where there was no evidence of change in sediment condition. The sediment samples will be used to further characterize the composition of surficial sediments in and around the ODMDS, and aid in interpreting changes in benthic infaunal composition.

The results of the post-assessment and three-year post-assessment will be statistically compared to results from the baseline and interim assessments. These surveys will determine whether benthic resources outside the Disposal Zone were affected by disposal of fine-grained materials, whether these changes were detrimental, and the duration of these effects. Impacts to benthic infaunal communities, such as changes in faunal composition, or significant alterations in species number or biomass, can affect trophic functions of predator species such as shrimp, fish, and crabs.

Live/Hard Bottom Mapping:

Biannual assessments of index hard bottom reef sites will continue through at least spring 2005. During each sampling period, video surveys of sponge/coral communities, video surveys of fish communities, surficial sediment depths, surficial sediment characteristics, and sedimentation rates will be collected. Side scan sonar surveys will be conducted annually to determine any changes in the areal extent of each reef site, and simultaneous underwater video surveys will be recorded when necessary. Based on data collected during the study, specific recommendations for monitoring in subsequent years of the program may change, and findings may warrant an extension in the length of the monitoring program.

Sediment Transport/Current Studies:

Longer term current data over an annual cycle would (1) elucidate the effectiveness of the berm constructed at the ODMDS, (2) enhance calibration of the WES dump model, (3) assist in development of a transport model by WES and (4) help clarify sediment redistribution patterns revealed by sediment mapping surveys.

Continuously recording equipment (such as acoustic Doppler current profilers, optical backscatter sensors, and sediment size transmissometers could be deployed to provide a long-term data base obtained over a year period to evaluate patterns and natural variability. Similar efforts have been utilized at the Wilmington ODMDS to determine mound movement and sediment mobility (Davis and Miller 2001). Deployment of an Acoustic Doppler Current Profiler (ACDP) placed within or adjacent to the four square mile Disposal Zone would provide the best data base for this effort. Quarterly or semiannual retrieval of the data record would provide timely information on prevailing current patterns. Collection of such data should be coincident with the post-disposal assessment during which sediment mapping and sediment sampling occurs, allowing integration of current data into these programs.

Sediment Contaminant Monitoring:

A critical component of the proposed monitoring plan will be to periodically sample sediments in and adjacent to the ODMDS to monitor for changes in sediment contaminant levels. Sampling for sediment contaminants should be conducted in conjunction with the benthic monitoring effort, using a composite sample from each zone (N = 20) to reduce analytical costs. Samples should be collected as part of each assessment completed at the site. More frequent sampling of the sediments may be warranted if elevated levels of certain contaminants are found, but the analysis could be restricted to only those constituents which are above acceptable bioeffects levels.

Modification of ODMDS SMMP

Once the results have been reported for all outstanding monitoring studies in the spring of 2006, the SMMP Team will convene to make recommendations to the EPA and COE on future monitoring studies needed in light of projected site use. At that time, this document will be updated/modified to incorporate those recommendations.

Should the results of the monitoring surveys indicate that continuing use of the ODMDS would lead to unacceptable impacts, then either the ODMDS Management Plan will be modified to alleviate the impacts, or the location of the ODMDS will be modified.

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Winn, R.N., R.F. Van Dolah, A. Frankenburg, T.W. Kana. 1989. Benthic and sedimentological studies of the ocean dredged material disposal site (ODMDS) for Charleston, South Carolina. Volume I: Text. Final Report submitted to the U.S. Army Corps of Engineers, Charleston District. Prepared by the South Carolina Wildlife and Marine Resources Department. 166 pp.

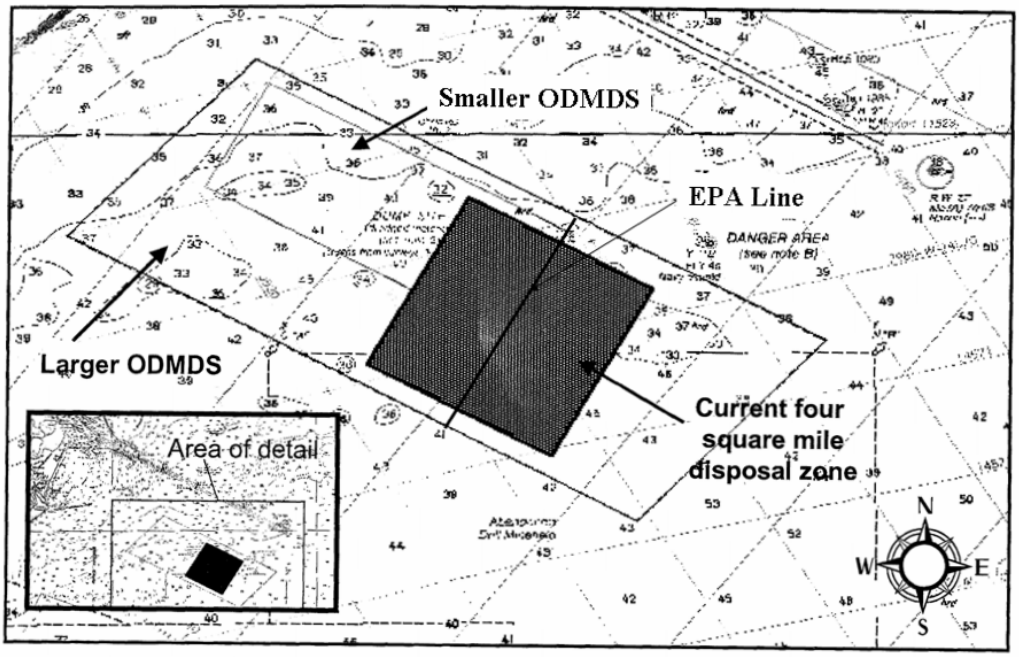

Figure 1. Location of the larger ODMDS, smaller ODMDS, and the currently designated four square mile disposal zone.

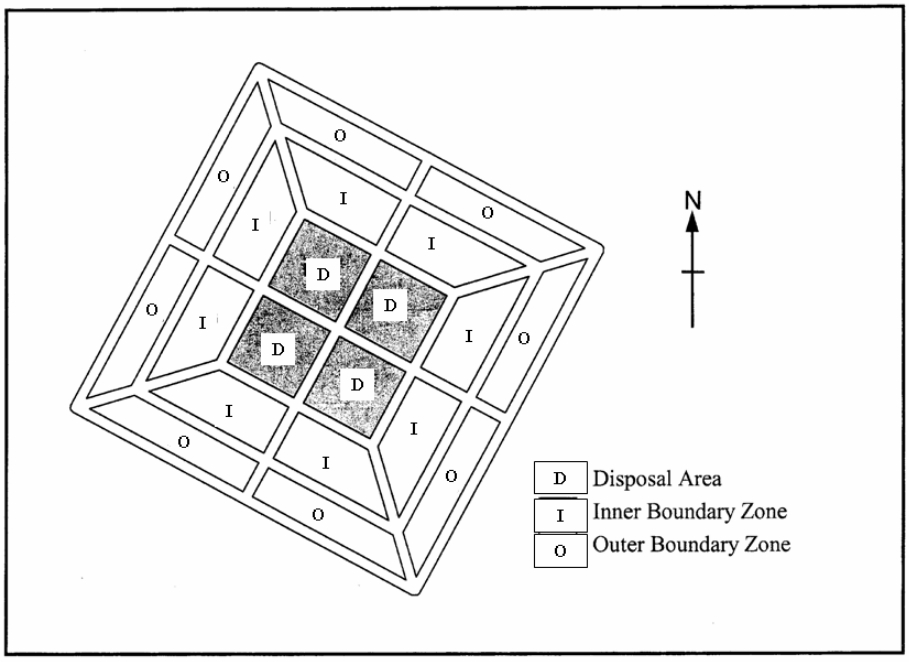

Figure 2. Designated disposal zone within the Charleston ODMDS and the surrounding boundary zones.

APPENDIX A

WATER COLUMN EVALUATIONS
NUMERICAL MODEL (STFATE) INPUT PARAMETERS

Water Column Evaluations
Numerical Model (STFATE) Input Parameters
Charleston ODMDS

SITE DESCRIPTION

Parameter	Value	Units
Number of Grid Points (left to right)	45	
Number of Grid Points (top to bottom)	45	
Spacing Between Grid Points (left to right)	350	ft
Spacing Between Grid Points (top to bottom)	350	ft
Constant Water Depth	**36**	ft
Roughness Height at Bottom of Disposal Site	.005[1]	ft
Slope of Bottom in X-Direction	0	Deg.
Slope of Bottom in Z-Direction	0	Deg.
Number of Points in Ambient Density Profile Point	2	
Ambient Density at Depth = 0 ft	**1.0215**	g/cc
Ambient Density at Depth = **36** ft	**1.0220**	g/cc

AMBIENT VELOCITY DATA

Parameter	Value	Units
Water Depth	**36**	ft
Profile	Logarithmic	
Vertically Averaged X-Direction Velocity	0.0	ft/sec
Vertically Averaged Z-Direction Velocity	0.33	ft/sec

DISPOSAL OPERATION DATA

Parameter	Value	Units
Location of Disposal Point from Top of Grid	7,875	ft
Location of Disposal Point from Left Edge of Grid	7,875	ft
Dumping Over Depression	0	

INPUT, EXCECUTION AND OUTPUT

Parameter	Value	Units
Location of the Upper Left Corner of the Disposal Site - Distance from Top Edge	1,800	ft

Location of the Upper Left Corner of the Disposal Site - Distance from Left Edge	1,800	ft
Location of the Lower Right Corner of the Disposal Site - Distance from Top Edge	13,950	ft
Location of the Lower Right Corner of the Disposal Site - Distance from Left Edge	13,950	ft
Duration of Simulation	14,400	sec
Long Term Time Step	600	sec

COEFFICIENTS

Parameter	**Keyword**	**Value**
Settling Coefficient	BETA	0.000[1]
Apparant Mass Coefficient	CM	1.000[1]
Drag Coefficient	CD	0.500[1]
Form Drag for Collapsing Cloud	CDRAG	1.000[1]
Skin Friction for Collapsing Cloud	CFRIC	0.010[1]
Drag for an Ellipsoidal Wedge	CD3	0.100[1]
Drag for a Plate	CD4	1.000[1]
Friction Between Cloud and Bottom	FRICTN	0.010[1]
4/3 Law Horizontal Diffusion Dissipation Factor	ALAMDA	0.0225[2]
Unstratified Water Vertical Diffusion Coefficient	AKYO	Pritchard Expression
Cloud/Ambient Density Gradient Ratio	GAMA	0.250[1]
Turbulent Thermal Entrainment	ALPHAO	0.235[1]
Entrainment in Collapse	ALPHAC	0.100[1]
Stripping Factor	CSTRIP	0.003[1]

[1]Model Default Value
[2]Calculated from NOAA Field Work at Fort Pierce (1994)

APPENDIX B

TEMPLATE FOR MPRSA 103 STANDARD PERMIT CONDITIONS

GENERIC SPECIAL CONDITIONS
FOR MPRSA SECTION 103 PERMITS
CHARLESTON, SC ODMDS

I. DISPOSAL OPERATIONS

A. For this permit, the term disposal operations shall mean: navigation of any vessel used in disposal of operations, transportation of dredged material from the dredging site to the Charleston, SC ODMDS, proper disposal of dredged material at the disposal area within the Charleston, SC ODMDS, and transportation of the hopper dredge or disposal barge or scow back to the dredging site.

B. The Charleston, SC ODMDS is defined by the following corner coordinates (NAD 27 Datum):

32°38’06” North by 79°41’57” West
32°40’42” North by 79°47’30” West
32°39’04” North by 79°49’21” West
32°36’28” North by 79°43’48” West

The Disposal Zone for which all dumping at the Charleston ODMDS is currently restricted is defined by the following corner coordinates (NAD 83 Datum):

32.65663 ° N, 79.75716 ° W
32.64257 ° N, 79.72733 ° W
32.61733 ° N, 79.74381 ° W
32.63142 ° N, 79.77367 ° W

C. No more than [NUMBER] cubic yards of dredged material excavated at the location defined in [REFERENCE LOCATION IN PERMIT] are authorized for disposal at the Charleston, SC ODMDS. The permittee agrees and understands that all dredged material will be placed in such a manner that its highest point will not exceed –25 feet MLW.

D. The permittee shall use an electronic positioning system to navigate to and from the Charleston, SC ODMDS. For this section of the permit, the electronic positioning system shall be recorded in Eastings and Northings and Latitude and Longitude using a differential global positioning system equipment operating with a minimum accuracy level of 10 feet or better horizontal. If the electronic positioning system fails or navigation problems are detected, all disposal operations shall cease until the failure or navigation problems are corrected.

E. The permittee shall certify the accuracy of the electronic positioning system proposed for use during disposal operations at the Charleston, SC ODMDS. The certification shall be accomplished by direct comparison of the electronic positioning system’s accuracy with a known fixed point.

F. The permittee shall not allow any water or dredged material placed in a hopper dredge or disposal barge or scow to flow over the sides or leak from such vessels during transportation to

the Charleston, SC ODMDS, to the extent practicable. In addition, the permittee understands that no debris is to be placed in the ODMDS.

G. A disposal operations inspector and/or captain of any tug boat, hopper dredge or other vessel used to transport dredged material to the Charleston, SC ODMDS shall insure compliance with disposal operation conditions defined in this permit.

1. If the disposal operations inspector or the captain detects a violation, he shall report the violation to the permittee immediately.
2. The permittee shall contact the U.S. Army Corps of Engineers, Charleston District's Regulatory Division (843) 329-8044 and EPA Region 4 at (404) 562-9395 to report the violation within twenty-four (24) hours after the violation occurs. A complete written explanation of any permit violation shall be included in the post-dredging report.

H. When dredged material is disposed, no portion of the hopper dredge or disposal barge or scow shall be farther than 100 feet from the center of the disposal lanes as assigned for that project.

I. The permittee shall use an automated disposal verification system that will continuously track (1 to 5 minute intervals) the horizontal location and draft condition of the disposal vessel (hopper dredge or disposal barge or scow) to and from the Charleston ODMDS. This information shall be available in electronic format to the Charleston District Corps of Engineers and EPA Region 4 upon request.

Required digitally recorded data are: vessel name, dump number, location from which the dredged material came, brief description of material in each dump (e.g., clean coarse sand; sand and shell sand mixed with clay and shell; dark organic silt); number of cubic yards on each dump; the beginning and ending coordinates for each dump and the compass heading at the beginning of each dump; date and time of each dump; and the map number on which the dump is plotted. This information will be available to the Charleston District Corps of Engineers on a daily basis in a digital format (e-mail or CD daily and CD of the entire project at the end of the construction). Upon completion of each dredging operation, the permittee agrees to prepare a computer-generated report which encompasses the required information. The data shall be capable of being read and manipulated with software running on an operating system of MS-DOS 3.3 or newer version. The files shall include all applicable sensor values in the units described in this section in ASCII, comma delimited, floating point data. Signs and decimal points are indicated as stated for specific parameters measured. The required record fields shall be separated with a comma (ASCII 32, 20 Hex) and terminated with a carriage return, line feed (CR/LF) sequence (OD/OA Hex). These fields shall contain only those characters described. No additional characters or data shall be included.

Header File Field Labels At the beginning of each day's data recording the following data shall be listed one time: If not applicable state NA.

Current Date: Month-Day-Year
Vessel Name: Name Of Vessel

Captain: Captain's Full Name
Volume of Hopper Dredge or Scow Barge : Rating Volume Cubic Yards
Distance of Scow From Tow Vessel: Stern of Tow Vessel to Bow of Barge
Disposal Technique: Bottom Dump, Pumpout, etc.
Draft Empty: Feet rounded up at .5 Ft Datum:
SC State Plane NAD83, Etc.
Phase 1: Save Data Every 60 Seconds
Phase II: Save Every Data Every 06 Seconds
A field ID heading is required beginning in the first column and progressing across to include all required columns for each type of vessel recorded. A sample of column labels for a hopper dredge would be as follows:

Date,Time,x83,y83,Lat83,Lon83,Foredr,Aftdr,Heading,Speed
If this work is being conducted using a scow, add **Dump ID** to the string.

DATE: Date in local time, formatted ddmmyy
TIME: Local time formatted hhmmss
X LOCATION: X (easting) position of the dredge, 0 decimal places
Y LOCATION: Y (northing) position of the dredge, 0 decimal places
LATITUDE: degrees, 6 decimal places
LONGITUDE: degrees, 6 decimal places
FORWARD AND AFT DRAFT: Draft of vessel below the waterline at the forward and aft sensor locations, in feet.
HEADING: Heading in degrees of the vessel. Values are from 000 to 359.
SPEED: Vessel speed, in knots, over the ground averaged over the reporting interval.
DUMP ID: Individual dumps should be numbered consecutively starting with number 1 for the first dump.

Example string:
10/13/2005,09 50 42,2389000,312220,32.362878, 79.364565,15,14,160,05.7

The permittee agrees to prepare a series of maps at an appropriate scale that will clearly show the individual dumps. Each dump will be labeled using the same number that is used to record the dump in the daily log and the database. A cumulative summary map(s) of all dumps will be submitted to the District Engineer within 30 days at the end of the dredging operation. The cumulative summary map(s) is required in addition to the submittal of daily logs. The permittee may continue to use the same map until the density of dumps makes it difficult to identify the individual dumps by number. Maps will be labeled as map numbers in a series, and the lowest and highest dump numbers that appear on each map will be shown as part of the map title. At the end of the work, the permittee will compile the maps, as necessary, into a series and reduce the maps to eleven inches on the small side and folded into a bound (8 ½" X 11") report, with the daily dump logs.

The permittee shall use South Carolina State Plane or latitude and longitude coordinates (North American Datum 1983). State Plane coordinates shall be reported to the nearest 0.10 foot and latitude and longitude coordinates shall be reported as decimal degrees to the fifth place.

J. The permittee shall conduct a bathymetric survey of the Charleston ODMDS within two months prior to project disposal and within 30 days following project completion.

1. The number and length of the survey transects shall be sufficient to encompass the Charleston ODMDS and a 0.25 nautical mile wide area around the site. The transects shall be spaced at 400-foot intervals or less.

2. Vertical accuracy of the survey shall be ±0.5 feet. Horizontal location of the survey lines and depth sounding points will be determined by an automated positioning system utilizing either microwave line of site system or differential global positioning system. The vertical datum shall be mean lower low water (m.l.l.w) and the horizontal datum shall use South Carolina State Plane or latitude and longitude coordinates (North American Datum 1983). State Plane coordinates shall be reported to the nearest 0.10 foot and latitude and longitude coordinates shall be reported as decimal degrees to the fifth place.

K. Between December 1 and March 31, NMFS requires monitoring by endangered species observers with at-sea large whale identification experience to conduct daytime observations for whales. During daylight hours, the vessel must take precautions to avoid whales. During evening hours or when there is limited visibility due to fog or sea states of greater than Beaufort, 3, the vessel must slow down to 5 knots or less when traversing between areas if whales have been spotted within 15nm of the vessel's path within the previous 24 hours. In addition, vessel shall maintain a 500 yard buffer zone between the vessel and any sighted whale.

L. Essential Fish Habitat (EFH). The Magnuson-Stevens Fishery Conservation and Management Act (MSFCMA), 16 USC 1801 et seq. Public Law 104-208 reflects the Secretary of Commerce and Fishery Management Council authority and responsibilities for the protection of essential fish habitat. The Act specifies that each Federal agency shall consult with the Secretary with respect to any action authorized, funded, or undertaken, or proposed to be authorized, funded, or undertaken by such agency that may adversely affect any EFH identified under this act. EFH is defined in the Act as "those waters and substrate necessary to fish for spawning, breeding, feeding, or growth to maturity." Detailed information on federally managed fisheries and their EFH is provided in the 1998 amendment of the Fishery Management Plans for the South Atlantic Region prepared by the South Atlantic Fishery Management Council (SAFMC). The 1998 generic amendment was prepared as required by the MSFCMA.

II. REPORTING REQUIREMENTS

A. The permittee shall send the U.S. Army Corps of Engineers, Charleston District's Regulatory Division and EPA Region 4's Wetlands, Coastal and Water Quality Branch (61 Forsyth Street,

Atlanta, GA 30303) a notification of commencement of work at least thirty (30) days before initiation of any dredging operations authorized by this permit and referenced by the permit number. In addition, the permittee agrees to contact the U.S. Coast Guard at (843) 727-7683 prior to disposing of any material in the ocean disposal site.

B. The permittee shall submit to the U.S. Army Corps of Engineers weekly disposal monitoring reports. These reports shall contain the information described in Special Condition I.I.

C. The permittee shall send one (1) copy of the disposal summary report to the Charleston District's Regulatory Branch and one (1) copy of the disposal summary report to EPA Region 4 documenting compliance with all general and special conditions defined in this permit. The disposal summary report shall be sent within 30 days after completion of the disposal operations authorized by this permit. The disposal summary report shall include the following information:

1. The report shall indicate whether all general and special permit conditions were met. Any violations of the permit shall be explained in detail.

2. The disposal summary report shall include the following information: Corps permit number, actual start date and completion date of dredging and disposal operations, total cubic yards disposed at the Charleston, SC ODMDS, locations of disposal events, and pre and post disposal bathymetric survey results (in hard and electronic formats).

III. PERMIT LIABILITY

A. The permittee shall be responsible for ensuring compliance with all conditions of this permit.

B. The permittee and all contractors or other third parties who perform an activity authorized by this permit on behalf of the permittee shall be separately liable for a civil penalty of up to $50,000 for each violation of any term of this permit thy commit alone or in concert with the permittee or other parties. This liability shall be individual, rather than joint and several, and shall not be reduced in any fashion to reflect the liability assigned to and civil penalty assessed against the permittee or any other third party as defined in 33 U.S.C. Section 1415(a).

C. If the permittee or any contractor or other third party knowingly violates any term of this permit (either alone or in concert), the permittee, contractor or other party shall be individually liable for the criminal penalties set forth in 33 U.S.C. Section 1415(b).

APPENDIX C

Charleston District Corps of Engineers
Contract Specification Language

General. The Charleston ODMDS is located offshore Charleston, South Carolina. The Charleston, SC ODMDS is defined by the following corner coordinates (NAD 27 Datum):

32°38'06" North by 79°41'57" West
32°40'42" North by 79°47'30" West
32°39'04" North by 79°49'21" West
32°36'28" North by 79°43'48" West

The Disposal Zone for which all dumping at the Charleston ODMDS is currently restricted is defined by the following corner coordinates (NAD 83 Datum):

32.65663 ° N, 79.75716 ° W
32.64257 ° N, 79.72733 ° W
32.61733 ° N, 79.74381 ° W
32.63142 ° N, 79.77367 ° W

No more than [NUMBER] cubic yards of dredged material excavated at the location defined in [REFERENCE LOCATION IN PERMIT] are authorized for disposal at the ODMDS. The Contractor agrees and understands that all dredged material will be placed in such a manner that its highest point will not exceed –25 feet MLLW.

2. Disposal of Excavated Material. The Contractor will be required to furnish an electronics surveillance feature of the movement of and deposition of the excavated material. This surveillance feature shall monitor horizontal location by means of an automated (computer) system that will continuously track the horizontal location and draft condition (vertical) of the dredged material transport vessel from the dredge area to the disposal site and return.
If a hopper dredge is used, the Hopper Dredge Silent Inspector will be used to obtain the required data. If dredging is conducted by other means (Mechanical/Bucket, Clamshell, Scow, Cutterhead) the digital data required is as follows:

Current Date: Julian Date
Vessel Name: Name Of Vessel
Captain: Captain's Full Name
Volume of Hopper Dredge or Scow Barge : Rating Volume Cubic Yards
Distance of Scow From Tow Vessel: Stern of Tow Vessel to Bow of Barge
Disposal Technique: Bottom Dump, Pumpout, etc.
Draft Empty: Feet rounded up at .5 Ft Datum:
SC State Plane NAD83, Etc.
Phase 1: Save Data Every 60 Seconds

Phase II: Save Every Data Every 06 Seconds

A field ID heading is required beginning in the first column and progressing across to include all required columns for each type of vessel recorded. A sample of column labels for a hopper dredge would be as follows:

Date,Time,x83,y83,Lat83,Lon83,Foredr,Aftdr,Heading,Speed

If this work is being conducted using a scow, add **Dump ID** to the string.

DATE: Date in Julian Date, calendar day of the year from 1 to 365/366.
TIME: Local time formatted hhmmss
X LOCATION: X (easting) position of the dredge, 0 decimal places
Y LOCATION: Y (northing) position of the dredge, 0 decimal places
LATITUDE: degrees, 6 decimal places
LONGITUDE: degrees, 6 decimal places
FORWARD AND AFT DRAFT: Draft of vessel below the waterline at the forward and aft sensor locations, in feet.
HEADING: Heading in degrees of the vessel. Values are from 000 to 359.
SPEED: Vessel speed, in knots, over the ground averaged over the reporting interval.
DUMP ID: Individual dumps should be numbered consecutively starting with number 1 for the first dump.

Example string:
031,09 50 42,2389000,312220,32.362878, 79.364565,15,14,160,05.7

Horizontal positioning for all instrumented vessels shall be recorded in Eastings and Northings and Latitude and Longitude using differential global positioning system equipment operating with a minimum accuracy level of 10 feet or better horizontal. The coordinates shall be corrected to display and record the physical centerline location of each vessel measured at the intersection point longitudinally and transversely projected along the vessel unless otherwise specified. Easting and Northing Positioning ,1983 NAD Geographic Coordinates, shall be recorded with a typical positioning value output string that would occupy a seven and six character field with zero decimal places and Latitude and Longitude Positioning, NAD 83 shall be recorded with a typical positioning value output string that would occupy two nine character fields carried to six decimal places. Vertical drafts shall have an accuracy of ± one-half foot and must be continuously updated as required. Horizontal (X and Y) and vertical (Z) data must be collected in sets tied to the real time-of-day and date. All digital data shall be collected and stored on removable storage media. The data will be supplied to the Corps on 3-1/2” (1.44 Mbyte) diskettes or other removable storage format no later than 24 hours after the data has been recorded. The data collected while the transport vessel is in the D/A vicinity will also be plotted in chart form to show the track of the vessel approaching, through and leaving the D/A. The chart will indicate the path of the vessel draft at 200-foot intervals while within this plotted chart zone. More than one disposal area trip may be stored onto a single floppy disk as long as each trip data is indexed to and clearly identifiable. The original floppy disks, when full or complete, will be furnished to the Government within 24 hours. The hard copy plotted chart shall be orderly organized and maintained at some central location on essentially a daily basis for evaluation by the Contracting Officer or his Authorized representative at all times. At the end of each week of operations the Contractor shall orderly bind-up the collected hard copy data and submit same to the Contracting Officer for permanent file record.

3. Reporting Requirement. The Contractor will be required to prepare and submit a Daily Report of Operations, ENG Form 4267, for all dredging work activities (as appropriate). All reports must be submitted to the Government's representative on a daily basis and not in groups. The Contractor shall also prepare a Monthly Report of Operations for each month or partial month's dredging work on ENG Form 4267. The monthly report is to be submitted to the Contracting Officer's Authorized Representative, consolidating the previous month's work. Further instructions on the preparation of the reports will be furnished at a Preconstruction Conference. Upon completion of the job, the Contractor shall submit a consolidated job report, combining the monthly reports.

4. Quality Control.

a. Electronic positioning. While performing all excavation (dredging) work under this contract the contractor shall control the horizontal positioning of the dredge and make all required surveys with electronic positioning equipment. The dredges electronic positioning equipment shall be installed and operated at all times.

b. The contractor shall establish and maintain quality control for operations under this section to assure compliance with contractual requirements and maintain records of his quality control for qualification of survey personnel, and accuracy and completeness of required survey work, including but not limited to the following:

c. Survey work shall be performed by survey personnel in accordance with "Manual of Survey Instructions", copies of which are available for review at the Charleston District Office. All responsibilities for accuracy, completeness and verification of survey work so performed shall remain with the Contractor.

d. Daily reports shall be made by the Contractor for those days requiring surveying activity. Such reports shall be prepared using Form 4267. All reports shall be prepared daily and signed by the Contractor's authorized representative and submitted to the Government's representative on the next duty day following the surveying activity. Said reports shall include, but not be limited to: equipment used; location, description, and type work performed; inspections of said work; verbal instructions received and actions taken; safety; and causes for delays.

e. All survey work is subject to periodic inspection and/or verification by the Government during or after such work. Should any portion of the surveys be found to be in error it shall be the responsibility of the Contractor, at no cost to the Government, to correct such errors. Presence of the Government representative on the work site does not release the Contractor of his responsibility for providing quality control of the required survey work and does not release the Contractor from the responsibility of taking necessary corrective action should errors be found. The determination of acceptable and unacceptable dredged channel remains the responsibility of the Authorized Representative of the Contracting Officer.

f. All surveys for open water disposal areas, baselines, hydro-ranges, cutting ranges and all other necessary survey work are to be performed by standard survey methods. Soundings shall be made at such intervals specified by the Government and to an accuracy of 0.5 foot. Tide will be observed and recorded every half hour, in addition to the beginning and ending of the survey. Tide heights will be read and recorded to the nearest 0.1 foot. All baselines and all markers, whether land or water based, shall be tied to existing land based survey markers using

channel centerline coordinates furnished by the Government. Then such survey work shall be clearly and completely recorded in standard field books, and shall be made available for inspection and/or verification by representatives of the Government. Said books shall, upon or before completion of the requirements of this contract, become the property of the Government. All poles, stakes, flagging, books, and/or other survey materials shall be furnished by the Contractor.