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Water Management Division
Wetlands, Coastal & Nonpoint Source Section
Atlanta, GA

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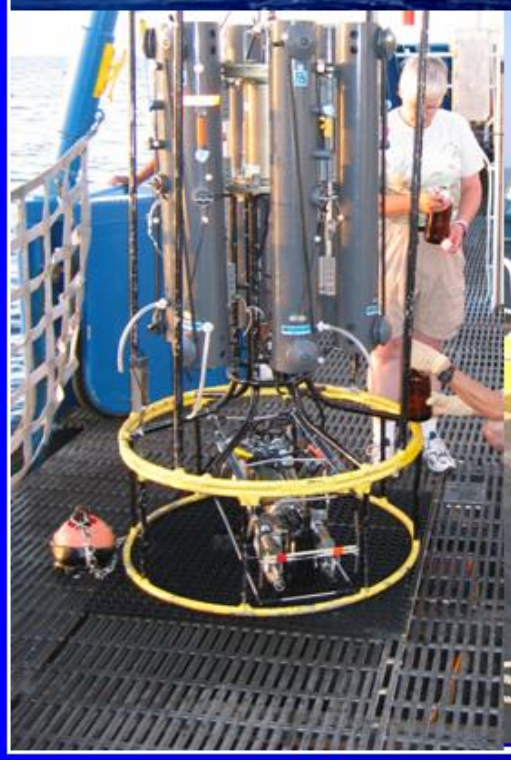
Pascagoula ODMDS Status and Trends
April 2006



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ACKNOWLEDGEMENTS

Samples were collected April -, 2006 from the Pascagoula Ocean Dredged Material Disposal Site (Doug Johnson, Site Manager; Gary W. Collins, Chief Scientist). Sample tracking and custody were performed by Phyllis Meyer. Navigation was handled by Chris McArthur, while Drew Kendall led deck operations. On-board sample processing on the invertebrate samples was led by Steve Blackburn. Processing of the chemical samples and the sediment particle size samples was performed by Morris Flexner and Barbara Keeler, respectively. Water quality profiling and sampling were led by Mel Parsons. Invaluable assistance was provided by Katie Burge, Velma Diaz, Van Kozak, Matt Lang, and Neil Warren.

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INTRODUCTION

Ocean disposal of dredged materials can affect the environment of a disposal site by disturbing the benthic community and potentially causing long-term reduction of oxygen in the pore waters of the sediments and the overlying waters. Natural oceanographic processes can also be responsible for transporting disposed materials offsite into nearby habitats.

As part of Region 4's strategy to monitor the effects of dredged material disposal within the marine environment, routine surveys of the benthos and water column within and adjacent to our sites are conducted so that their status may be assessed. In addition, the data is archived so that over time, trends which may occur can be observed. These status and trends surveys are consistent with the requirements of 40 C.F.R. 228.9. The present study being discussed was conducted aboard the Ocean Survey Vessel (OSV) Bold on April 22-23, 2006.

BACKGROUND

The Pascagoula ODMDS was designated by EPA in 1991. The ODMDS has received both new work and maintenance material from the Federally-authorized navigation channels from the Pascagoula Harbor area. In addition, construction of Naval Station Pascagoula on land previously used for dredged material disposal has resulted in an increase in the annual average cubic yards needing ocean disposal.

A Site Management and Monitoring Plan was developed for the Pascagoula ODMDS in 1991 and revised in 2006. Annual bathymetry surveys have been conducted at the site by the Corps of Engineers. The last status and trends survey conducted at this ODMDS was in July, 1999.

Survey Area and Location

The study area is within and surrounding the Pascagoula, MS ODMDS located offshore Horn Island. The ODMDS is approximately 18.5 square nautical miles (nmi) in area. Twenty-one stations were selected in order to analyze the sediment grain size, chemical, and biological characteristics of three areas: 1) inside the ODMDS where disposal has occurred; 2) inside the ODMDS where no disposal has occurred; and 3) outside the ODMDS. Of these 21, two (2) received water quality sampling. Depths in this area range from 38 to 52 feet. The ODMDS boundary corner coordinates (NAD 27) are:

30°12'06"N 88°44'30"W
30°11'42"N 88°33'24"W
30°08'30"N 88°37'00"W
30°08'18"N 88°41'54"W

Center coordinates: 30°10'09"N 88°39'12"W

The ODMDS, survey area and station locations are shown in Figure 1.

METHODS AND MATERIALS

Method Rationale: Characterization of the benthic community and sediment size/chemistry at selected stations, followed by analysis of community parameters via statistical treatment, allows for identification and interpretation of changes in the community structure. Such community statistics can be used to draw inferences regarding perturbations to the benthic macroinvertebrate community and subsequently allow for judgments regarding the likelihood of impact from dredged material disposal.

Sampling Stations

The boundaries of the Pascagoula ODMDS measure approximately 3 x 6 nmi. Twenty-one stations (see Table 1 and Figure 1) were established in an attempt to adequately sample three separate treatment areas. The area within the ODMDS used for disposal of dredged material was sampled with six stations. The western half of the ODMDS, where no disposal has occurred, was sampled with nine stations, while the outer environs were sampled with six stations (three positioned around the western end and three around the eastern end). Two stations were selected for water quality sampling (see Figure 1).

Water Quality

To characterize the general water quality associated with the dump site, the following water column parameters were measured: conductivity, dissolved oxygen (DO), salinity, temperature, density, turbidity, % light transmission and Chlorophyll a.

All measurements were collected utilizing the ship's CTD. Go Flow® bottles attached to the CTD/rosette frame were tripped at the bottom and just above the pycnocline to obtain water samples for the laboratory analysis. Once the rosette was back aboard the ship, the bottles were emptied directly into the appropriate sample containers, labeled, and refrigerated until demobilization. Laboratory analysis of the water includes nutrients, metals, PAHs, PCBs and pesticides. In addition, one sample container was filled with bottom water and analyzed for dioxins.

Seafloor Sampling

Bottom sampling at all twenty-one stations was accomplished by a minimum of two deployments of a Young grab (surface area = 0.04 m^2; depth of 10 cm) from the stern of the ship. After retrieval of the grab and confirmation of an adequate sample, the device was either sub-sampled in order to obtain discrete samples for sediment particle size

analyses, sediment chemical analyses, or used for benthic macroinvertebrate identification. The sampling device and handling/preservative protocol for each type of sample follows below:

Sediment Particle Size

Two separate samples for particle size were collected from the Young grab by acrylic 5 cm diameter coring tubes. The subsamples were placed into whirl packs, labeled, and frozen for return to the lab. The samples were analyzed by subcontractor utilizing the wet sieve method (ASTM D-422).

Sediment Chemistry

Analyses for the following parameters were conducted at the SESD lab in Athens, Georgia: heavy metals scan, nutrients which includes total phosphorous (TP), NO2+NO3, NH3, and TKN, extractable organic compounds (PAH's, pesticides, and PCBs). The sample was transferred to a glass pan and thoroughly mixed. The sample was alloquated into two 236.6 ml. glass containers and preserved by storing at 4 C until analyzed. One container was analyzed for extractable organic compounds and the other was analyzed for metals and nutrients. One composite sample from each of the four zones was also collected for dioxin analysis.

Benthic Macroinvertebrate Infauna

Sediment from a separate deployment of the grab were collected to obtain benthic macroinvertebrate organisms. On-board processing involved washing the sample through a #35 screen (0.5mm). The sample retained on the screen after washing was preserved in 10% seawater formalin with staining solution. Benthic containers were labeled both internally and externally and stored for transfer to contract lab facilities. The details of sorting and identification of infaunal taxa are described in Vittor, 2007.

All sampling procedures and sample preservation for analyses were according to the SESD Standard Operating Procedures (SOP), (US EPA 1996, 2002).

RESULTS AND DISCUSSION

Water Quality

The results of the water quality profiles are summarized in Table 2, and visually demonstrated by Figures 2 and 3. Both stations sampled showed the presence of a distinct pycnocline, revealing that the ODMDS water column is poorly mixed.

Temperatures recorded ranged from 20.32 to 25.89 ^{o}C, while salinity ranged from 27.00 to 35.45 ppt (see Table 2, Figure 2).

Dissolved oxygen (DO) and turbidity readings also showed the presence of poorly mixed waters. DO ranged from 4.65 to 7.14 mg/L and turbidity ranged from 0.18 to 2.85 ntu's (see Table 2, Figure 3).

When viewed on a Gulf-wide perspective, it is understandable that an area such as the Pascagoula ODMDS might have poorly mixed overlying waters. The potential volume of freshwater flowing offshore into an area secluded from influence by the Loop currents would take considerable time to mix with typical ocean waters. Only a major storm system driving into the area from the southeast or spin-off eddies from the Loop current would speed up the normal mixing cycle.

Chemical analyses of the water samples collected as part of this study showed all analytes to be at or below the detection limit (see Appendix D).

Seafloor Sampling

Sediment Particle Size.

The results of the sediment particle size analyses are given in Table 3. The eastern part of the ODMDS showed silt/clay fractions ranging from < 1.0 % to over 96 % while the western stations showed silt/clay fractions to be more consistently greater than 95 % (with only two exceptions – W07 and W09). Silt/clay fractions from stations outside the site were also heterogeneous, ranging from 0.60 % to 98.83 %. Based on the high standard deviations seen when calculating means for each zone, no statistically significant difference would be expected.

Sediment Chemistry.

The sediment chemistry showed most contaminants to be at or below detection limits. Ten metals (see Table 4) and a few dioxin congeners were the only exceptions. A scrutiny of the dioxin data (Appendix C) fails to show any consistency or a pattern to either the specific congener detected or the area from which a detection occurred.

The results of metals analyses reveal some interesting and consistent patterns within the data set. For each of the ten metals detected, the western part of the ODMDS not only had the highest concentrations, but was also consistently about twice the levels of the eastern ODMDS and the western outside zones. The eastern area outside the ODMDS consistently showed the lowest levels seen during this survey.

Benthic Macroinvertebrate Infauna.

The benthic infauna data is detailed and summarized in "Pascagoula, Mississippi ODMDS 2006 Benthic Community Assessment "(Vittor, 2007). Bivalves dominated the total assemblage (45.6%), while polychaetes ranked first (45.0%) in number of taxa represented. In terms of abundance, the bivalves were followed by polychaetes (33.2%) and malacostracans (6.8%): by taxa, the polychaetes were followed by malacostracans (19.8%), gastropods (13.7%) and bivalves (10.7%). In general, the stations representing inside the ODMDS were dominated by polychaetes, while stations outside the ODMDS were dominated by mollusks.

The dominant taxa were the bivalve, *Tellina* [LPIL] (21.9%), the bivalve family, Semelidae [LPIL] (11.1%), the polychaete, *Mediomastus ambiseta* (7.5%), and the bivalve, *Abra aequalis* (5.7%).

Density data averaged 1383.3 organisms/m^2 inside the eastern portion of the ODMDS, 563.9 organisms/m^2 within the western portion of the ODMDS, and 7391.7 3 organisms/m^2 outside the site. If comparing density between stations inside the site versus outside the site, a significant difference can be found. A significant difference can also be seen if comparing density of the western part of the ODMDS with density seen outside the site. However, no significant difference exist between the eastern portion of the site when compared to either the western site or the stations outside the site (Vittor, 2007).

The mean number of taxa was 18.7 taxa/station for the eastern part of the ODMDS, 11.3 taxa/station for the western part of the ODMDS, and 33.2 taxa/station outside the site. Statistical comparisons of the taxa richness data mirrors results of the density data (Vittor, 2007).

The results of cluster, ANOSIM and SIMPLER analyses are discussed in detail within Vittor, 2007. In summary, these results indicate that assemblages from the eastern part of the ODMDS more closely resemble those found outside the site than they do with those within the western part of the site. Table 5 lists the infaunal community parameters by station.

CONCLUSIONS

The benthic environment of the Pascagoula ODMDS, as well as that found just outside the site, was sampled in order to determine its status and hopefully identify possible trends. While the present study design will not allow for any type of rigorous impact assessment, it will hopefully highlight trends which would indicate that a more detailed, concentrated effort is needed.

The various parameters analyzed through this effort all indicate that, while some significant differences were found when comparing the actively-used part of the site to that which has never been used, there were no discernable differences if the area dumped on was compared to areas outside the ODMDS. Even a cursory review of the data indicates that differences seen between the various zones, particularly the patterns that emerge in the sediment metals data, are a result of the wide disparity between these zones in the percentage of the silt/clay fraction making up the sediments found in each location.

In conclusion, the data collected in April 2006 shows that the benthic community of the Pascagoula ODMDS is viable, healthy and showing no indication that any type of adverse impact has occurred due to the dumping of dredged material.

REFERENCES

ASTM D-422. Standard Test Method for Particle Size Analysis of Soils. American Society for Testing and Materials. Pennsylvania. 1994.

USEPA. 1996. Environmental Investigations Standard Operating Procedures and Quality Assurance Manual. US Environmental Protection Agency, Region 4. Athens, GA.

USEPA. 2002. Standard Operation Procedures Ecological Assessment Branch. US Environmental Protection Agency, Region 4. Athens, GA.

Vittor. 2007 **-** Pascagoula, Mississippi ODMDS 2006 Benthic Community Assessment. Barry A. Vittor & Associates, Inc., Mobile, Alabama.

Table 1. Pascagoula ODMDS Status and Trends Stations – April 2006.

Station ID	(Degrees, minutes) Latitude(N)	Longitude(W)	Young Grabs(y/n)	CTD Casts(y/n)
PASE01	30° 11.400'	88° 33.900'	y	n
PASE02	30° 11.500'	88° 34.500'	y	n
PASE03	30° 10.700'	88° 35.300'	y	n
PASE04	30° 10.000'	88° 37.000'	y	n
PASE05	30° 11.024'	88° 36.023'	y	y
PASE06	30° 11.700'	88° 37.000'	y	n
PASW01	30° 09.144'	88° 41.178'	y	n
PASW02	30° 09.144'	88° 38.496'	y	n
PASW03	30° 10.302'	88° 43.194'	y	n
PASW04	30° 10.302'	88° 41.850'	y	y
PASW05	30° 10.302'	88° 39.162'	y	n
PASW06	30° 11.466'	88° 43.860'	y	n
PASW07	30° 11.466'	88° 41.178'	y	n
PASW08	30° 11.466'	88° 39.834'	y	n
PASW09	30° 11.466'	88° 38.496'	y	n
PASO01	30° 10.872’	88° 33.332'	y	n
PASO02	30° 11.908'	88° 33.180'	y	n
PASO03	30° 12.500'	88° 35.200'	y	n
PASO04	30° 09.000'	88° 45.000'	y	n
PASO05	30° 12.500'	88° 45.300'	y	n
PASO06	30° 13.000'	88° 40.600’	y	n

Table 2. Pascagoula ODMDS Water Quality Data – April 2006

	Temperature ©	Salinity (ppt)	DO (mg/L)	Turbidity (ntu's)
Eastern station				
minimum	20.47	27.53	4.65	0.18
maximum	25.89	35.39	7.14	2.85
Western station				
minimum	20.32	27.00	4.89	0.20
maximum	25.83	35.45	7.05	1.81

Table 3. Pascagoula ODMDS Sediment particle size – April 2006.

	Inside				Outside	
	East		West			
	%sand	%silt/clay	%sand	%silt/clay	%sand	%silt/clay
	99.65	0.35	1.44	98.56	99.40	0.60
	48.19	51.81	3.28	96.72	71.79	28.20
	58.09	41.92	3.41	96.59	65.22	34.78
	3.61	96.38	4.72	95.28	1.17	98.83
	71.06	28.94	1.44	98.55	76.69	23.31
	2.09	97.91	4.05	96.18	58.50	41.50
			55.59	44.41		
			3.22	96.78		
			25.23	74.77		
mean	47.12	52.89	11.38	88.65	62.13	37.87
std. dev	38.405	38.402	18.158	18.169	32.964	32.965
variance	1474.966	1474.748	329.719	330.122	1086.642	1086.680

Table 4. Sediment Metals Analyses – Pascagoula ODMDS, April 2006.

	(concentrations are expressed as mg/kg)				
Aluminum	INSIDE - east	4400	Arsenic	INSIDE - east	4.8
	INSIDE - west	10000		INSIDE - west	8.3
	OUTSIDE - east	1600		OUTSIDE - east	2.9
	OUTSIDE - west	4700		OUTSIDE - west	5.8
Beryllium	INSIDE - east	0.45	Chromium	INSIDE - east	9
	INSIDE - west	1		INSIDE - west	18
	OUTSIDE - east	0.3U		OUTSIDE - east	3.8
	OUTSIDE - west	0.46		OUTSIDE - west	9.3
Copper	INSIDE - east	4.2	Iron	INSIDE - east	9500
	INSIDE - west	9.9		INSIDE - west	21000
	OUTSIDE - east	1.5		OUTSIDE - east	4500
	OUTSIDE - west	5.1		OUTSIDE - west	11000
Lead	INSIDE - east	7.9	Manganese	INSIDE - east	270
	INSIDE - west	18		INSIDE - west	570
	OUTSIDE - east	3		OUTSIDE - east	120
	OUTSIDE - west	8.1		OUTSIDE - west	290
Nickel	INSIDE - east	4.8	Zinc	INSIDE - east	26
	INSIDE - west	12		INSIDE - west	58
	OUTSIDE - east	1.4		OUTSIDE - east	11
	OUTSIDE - west	5.7		OUTSIDE - west	30

Table 5. Infaunal Community Parameters – Pascagoula ODMDS, April 2006.

Station	Taxa Richness	Density	Diversity	Evenness
Outside the ODMDS				
PASO01	42	7950		
PASO02	38	9300		
PASO03	26	2700		
PASO04	4	125		
PASO05	48	20100		
PASO06	41	4175		
Mean	33.2	7391.7	3.02	0.67
Std. Dev.	16.0	7079.8		
Inside the ODMDS, outside disposal influence				
PASW01	24	2425		
PASW02	10	325		
PASW03	7	225		
PASW04	9	400		
PASW05	4	125		
PASW06	9	250		
PASW07	18	575		
PASW08	14	525		
PASW09	7	225		
Mean	11.3	563.9	3.48	0.89
Std. Dev.	6.3	713.3		
Inside the ODMDS, within disposal influences				
PASE01	17	650		
PASE02	29	2100		
PASE03	20	1600		
PASE04	9	375		
PASE05	32	2900		
PASE06	5	675		
Mean	18.7	1383.3	3.56	0.83
Std. Dev.	10.7	991.7		

Table 6. Comparative Summary – Pascagoula ODMDS, April 2006.

	Inside, east	Inside, west	Outside
Grain Size Analyses			
	2006	**2006**	**2006**
% sand	47.12	11.38	62.13
% silt/clay	52.89	88.65	37.87
Sediment chemistry			
Aluminum	4400	10000	1600 - 4700
Arsenic	4.8	8.3	2.9 - 5.8
Beryllium	0.45	1.0	0.3 - 0.46
Chromium	9	18	3.8 - 9.3
Copper	4.2	9.9	1.5 - 5.1
Iron	9500	21000	4500-11000
Lead	7.9	18	3 – 8.1
Manganese	270	570	120 - 290
Nickel	4.8	12	1.4 – 5.7
Zinc	26	58	11 - 30
Infauna analyses			
Taxa richness (#spp./station)			
Minimum	5	4	4
Maximum	32	24	48
Mean	18.7	11.3	33.2
Density (#organisms/m2)			
Minimum	375	125	125
Maximum	2900	2425	20100
Mean	1383.3	563.9	7391.7
Taxa diversity (H')			
Mean	3.56	3.48	3.02
Taxa evenness (J')			
Mean	0.83	0.89	0.67

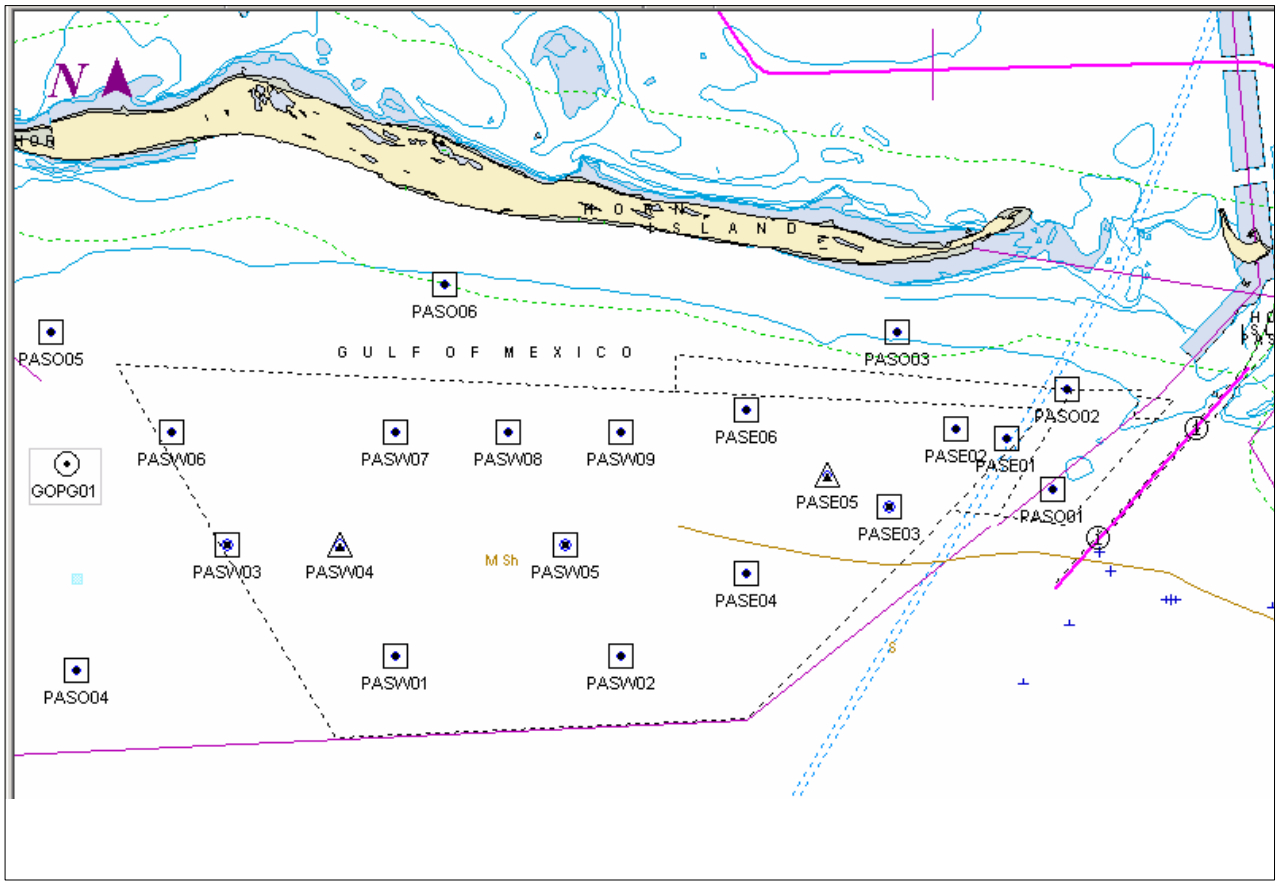

Figure 1. Pascagoula sample stations, April, 2006.
(triangles indicate which stations were also sampled for water)

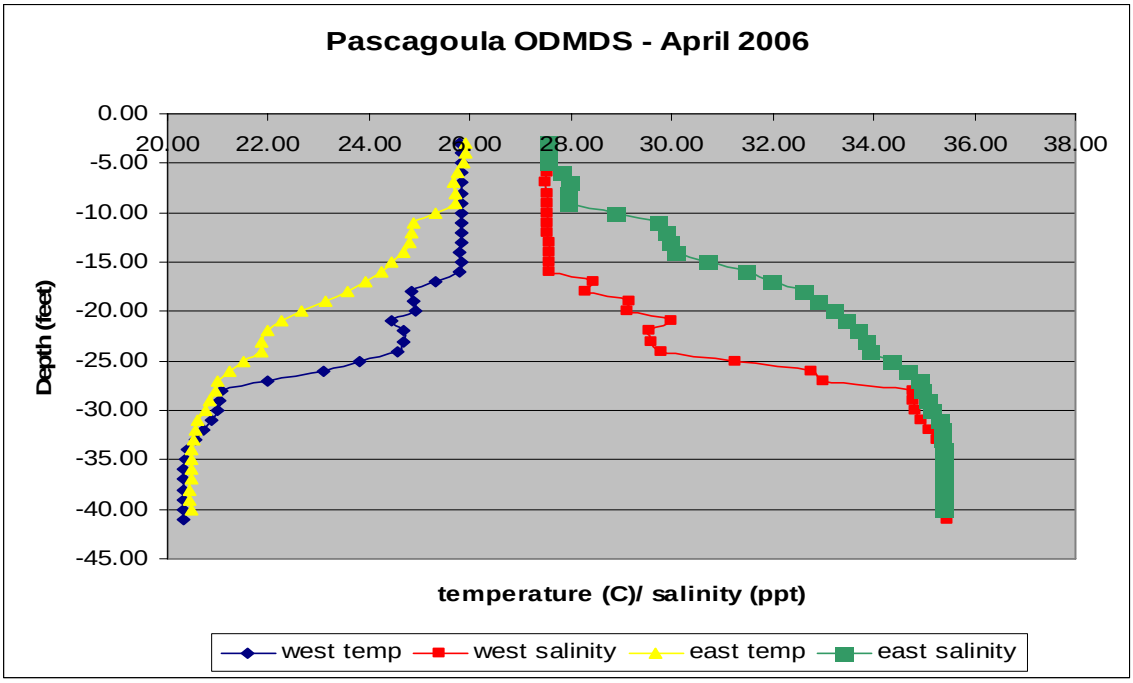

Figure 2. Temperature and Salinity Profiles – Pascagoula ODMDS, April 2006.

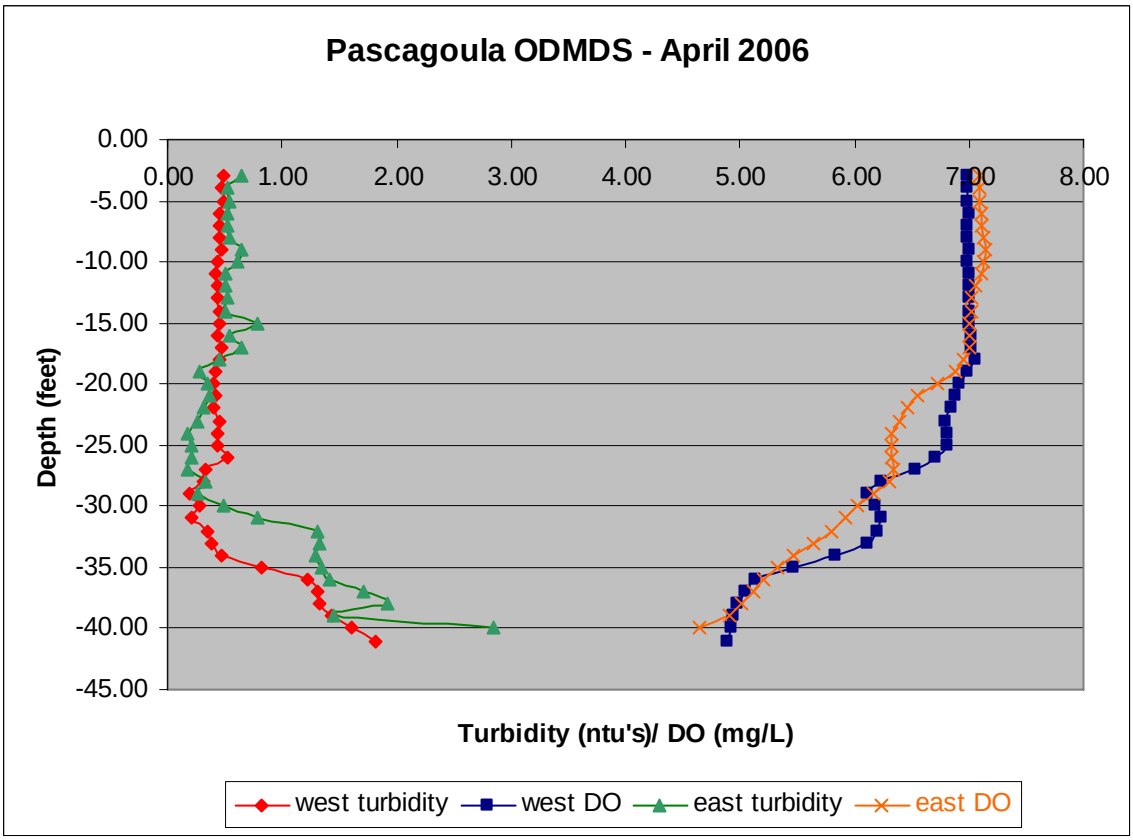

Figure 3. Dissolved Oxygen and Turbidity Profiles – Pascagoula ODMDS, April 2006

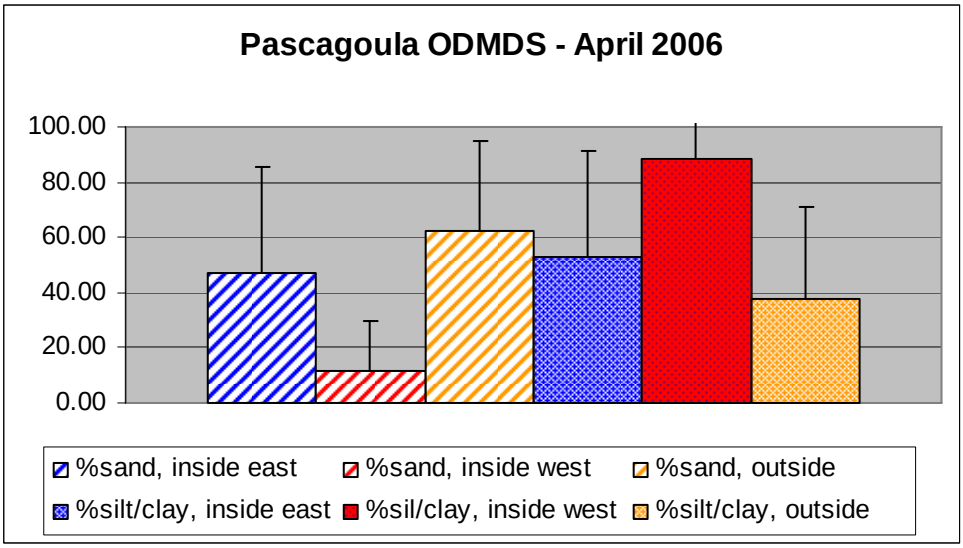

Figure 4. Grain Size Distribution, Pascagoula ODMDS – April 2006

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APPENDIX A

SCIENTIFIC PARTY

Name	Survey Responsibility	Organization
Gary W Collins	Chief Scientist	EPA/R4/Atlanta
Christopher McArthur	Project Manager/Team Leader	EPA/R4/Atlanta
Mel Parsons	Water Quality	EPA/R4/Athens
Morris Flexner	Chemical samples	EPA/R4/Athens
Drew Kendall	Deck ops	EPA/R4/Atlanta
Phyllis Myers	Chain-of-custody	EPA/R4/Athens
Steve Blackburn	Infaunal samples	EPA/R4/Atlanta
Barbara Keeler	PSD samples	EPA/R6/Dallas
Van Kozak	Technician	EPA/R6/Dallas
Matt Lang	Technician	COE/Mobile
Katie Burge	Technician	COE/Mobile
Neil Warren	Technician	COE/Mobile
Velma Diaz	Technician	COE/Mobile

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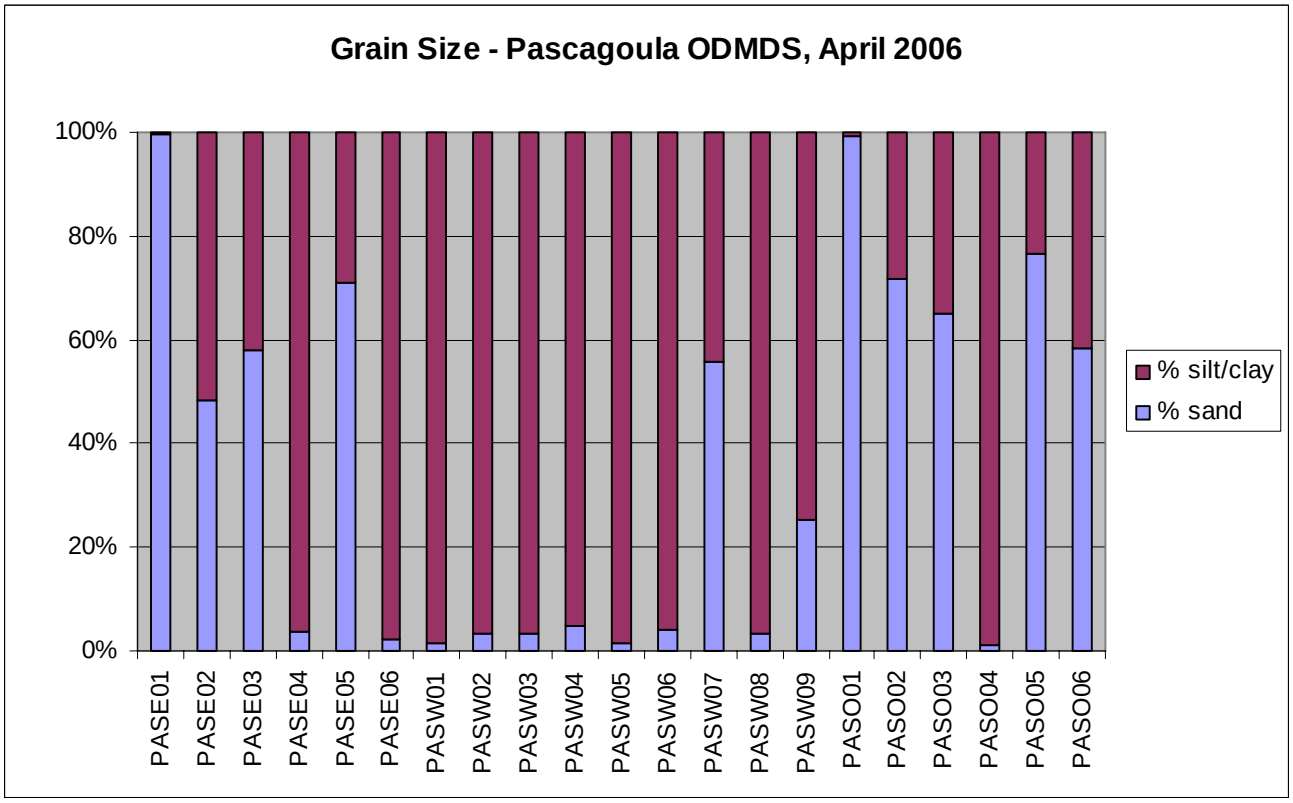
Appendix B

Sediment Particle Size Distribution

Table B1. Grain Size Distribution – Pascagoula ODMDS, April 2006.

Station	% sand	%silt/clay
PASE01	99.65	0.35
PASE02	48.19	51.81
PASE03	58.09	41.92
PASE04	3.61	96.38
PASE05	71.06	28.94
PASE06	2.09	97.91
PASW01	1.44	98.56
PASW02	3.28	96.72
PASW03	3.41	96.59
PASW04	4.72	95.28
PASW05	1.44	98.55
PASW06	4.05	96.18
PASW07	55.59	44.41
PASW08	3.22	96.78
PASW09	25.23	74.77
PASO01	99.40	0.60
PASO02	71.79	28.20
PASO03	65.22	34.78
PASO04	1.17	98.83
PASO05	76.69	23.31
PASO06	58.50	41.50

Figure B1.


Grain Size - Pascagoula ODMDS, April 2006
100%
80%
60%
40%
20%
0%
PASE01
PASE02
PASE03
PASE04
PASE05
PASE06
PASW01
PASW02
PASW03
PASW04
PASW05
PASW06
PASW07
PASW08
PASW09
PASO01
PASO02
PASO03
PASO04
PASO05
PASO06
% silt/clay
% sand

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APPENDIX C

Sediment Chemistry – Metals, Extractables, Pesticides, PCBs and Dioxins

Table C1. Sediment Metals Analyses - Pascagoula ODMDS, April 2006.
(concentrations reported as mg/kg, dry weight)

	INSIDE - east	INSIDE - west	INSIDE - westD		OUTSIDE - east	OUTSIDE – west
Aluminum	4400	10000	9800		1600	4700
Antimony	0.5U	0.5U	0.5U		0.5U	0.5U
Arsenic	4.8	8.3	8.6		2.9	5.8
Beryllium	0.45	1	0.96		0.3U	0.46
Cadmium	0.25U	0.25U	0.25U		0.25U	0.25U
Chromium	9	18	17		3.8	9.3
Copper	4.2	9.9	9.6		1.5	5.1
Iron	9500	21000	20000		4500	11000
Lead	7.9	18	17		3	8.1
Manganese	270	570	550		120	290
Nickel	4.8	12	12		1.4	5.7
Selenium	1U	1U	0.99U		1U	1U
Silver	0.25U	0.25U	0.25U		0.25U	0.25U
Thallium	0.5U	0.5U	0.5U		0.5U	0.5U
Total Mercury	0.049U	0.054	0.048		0.047U	0.047U
Zinc	26	58	56		11	30

u - Analyte not detected at or above reporting limit. The number is the minimum quantitation limit.

Table C2. Sediment Extractables Analyses -Pascagoula ODMDS, April 2006.

(concentrations reported as ug/kg, dry weight)

	INSIDE - east	INSIDE – west	OUTSIDE - east	OUTSIDE- west	Dupe/split
2-Methylnaphthalene	***25***	***36***	***37***	19	***24***
Acenaphthene	***13***	***19***	***20***	10	***13***
Acenaphthylene	13	19	19	10	13
Anthracene	12	17	17	9	11
Benzo(a)anthracene	12	17	17	9	11
Benzo(b)Fluoranthene	13	19	19	9.8	12
Benzo(ghi)Perylene	12	17	17	9	11
Benzo(k)Fluoranthene	12	17	17	9	11
Benzo-a-Pyrene	12	17	17	9	11
Chrysene	12	17	17	9	11
Dibenzo(a,h)Anthracene	12	18	18	9.6	12
Fluoranthene	12	17	17	9	11
Fluorene	***12***	***17***	***17***	9	***11***
Indeno(1,2,3-cd)Pyrene	12	17	17	9	11
Naphthalene	***31***	***45***	***46***	***24***	***30***
Phenanthrene	12	17	17	9	11
Pyrene	19	***28***	***28***	14	18

NOTE: all values were "U" flagged (analyte not detected at or above reporting limit…the number is the minimum quantitation limit.)

* Numbers in bold and italic type exceeded the target detection limit.

Table C3. Sediment Pesticides Analyses – Pascagoula ODMDS, April 2006.

(concentrations reported as ug/kg, dry weight)

	Inside- East	Inside- West	Dupe/split	Outside- East	Outside- West
4,4'-DDD (p,p'-DDD)	1.4	***2.1***	***2.1***	1.1	1.3
4,4'-DDE (p,p'-DDE)	0.76	0.82	0.97	0.43	0.65
4,4'-DDT (p,p'-DDT)	***2.1***	***2.9***	***3***	1.5	2
Aldrin	5.6	8.2	8.3	4.3	5.4
alpha-BHC	5.6	8.2	8.3	4.3	5.4
alpha-Chlordane /2	0.77	0.88	0.91	1.1	0.66
beta-BHC	5.6	8.2	8.3	4.3	5.4
Cis-Nonachlor /2	5.6	8.2	8.3	4.3	13
delta-BHC	5.6	8.2	8.3	4.3	5.4
Dieldrin	0.56	0.82	***2.1***	0.43	0.54
Endosulfan I (alpha)	5.6	8.2	8.3	4.3	5.4
Endosulfan II (beta)	14	2.2	2.1	11	13
Endosulfan Sulfate	14	4.1	5.5	11	13
Endrin	14	2.5	2.6	11	13
Endrin Ketone	14	2.1	2.1	11	13
gamma-BHC (Lindane)	5.6	8.2	8.3	4.3	5.4
gamma-Chlordane /2	0.59	0.86	0.85	1.1	0.55
Heptachlor	5.6	8.2	8.3	4.3	5.4
Heptachlor Epoxide	5.6	8.2	8.3	4.3	5.4
Methoxychlor	28	41	42	21	27
Toxaphene	***56***	***82***	***83***	43	***54***
trans-Nonachlor /2	5.6	8.2	8.3	4.3	13

NOTE: all values were "U" flagged (analyte not detected at or above reporting limit…the number is the minimum quantitation limit.)

* Numbers in bold and italic type exceeded the target detection limit.

Table C4. Sediment PCBs Analyses - Pascagoula ODMDS, April 2006.
(concentrations reported as ug/kg, dry weight)

	Inside- East	Inside- West	Dupe/split	Outside- East	Outside- West
PCB Congener #8	0.72	***1.6***	0.83	0.43	0.54
PCB Congener #18	***1.3***	***1.2***	0.83	0.59	***1.3***
PCB Congener #28	0.56	0.82	0.83	0.43	0.54
PCB Congener #44	0.56	0.82	0.83	0.43	0.54
PCB Congener #49	0.56	0.82	0.83	0.43	0.54
PCB Congener #52	0.56	0.82	0.83	0.43	0.54
PCB Congener #66	0.56	0.82	0.83	0.43	0.54
PCB Congener #77	0.56	0.82	0.83	0.43	0.54
PCB Congener #87	0.56	0.82	0.83	0.43	0.54
PCB Congener #101	0.56	0.82	0.83	0.43	0.54
PCB Congener #105	0.56	0.82	0.83	0.43	0.54
PCB Congener #118	0.56	0.82	0.83	0.43	0.54
PCB Congener #126	0.56	0.82	0.83	0.43	0.54
PCB Congener #128	0.56	0.82	0.83	0.43	0.54
PCB Congener #138	0.56	0.82	0.83	0.43	0.54
PCB Congener #153	0.56	0.82	0.83	0.43	0.54
PCB Congener #156	0.56	0.82	0.83	0.43	0.54
PCB Congener #169	0.56	0.82	0.83	0.43	0.54
PCB Congener #170	0.56	0.82	0.83	0.43	0.54
PCB Congener #180	0.56	0.82	0.83	0.43	0.54
PCB Congener #183	0.56	0.82	0.83	0.43	0.54
PCB Congener #184	0.56	0.82	0.83	0.43	0.54
PCB Congener #187	0.56	0.82	0.83	0.43	0.54
PCB Congener #195	0.56	0.82	0.83	0.43	0.54
PCB Congener #206	0.56	0.82	0.83	0.43	0.54
PCB Congener #209	0.56	0.82	0.83	0.43	0.54

NOTE: all values were "U" flagged (analyte not detected at or above reporting limit…the number is the minimum quantitation limit.)
*Numbers in bold and italic type exceeded the target detection limit.

Table C5. Sediment Dioxin Analyses - Pascagoula ODMDS, April 2006.
(concentrations are reported in ng/kg)

	Inside- East	Inside-West	Outside-East	Outside-West
2,3,7,8-Tetrachlorodibenzodioxin	0.28 J	0.48 U	0.14 U	0.19 U
Tetrachlorodibenzodioxin (Total)	36 J	78 J	22 J	37 J
1,2,3,7,8-Pentachlorodibenzodioxin	0.77 J	1.7 J	0.38 J	0.68 J
Pentachlorodibenzodioxin (Total)	63 J	150 J	31 J	64 J
1,2,3,4,7,8-Hexachlorodibenzodioxin	2.5 J	5.7	1.3 J	2.2 J
1,2,3,6,7,8-Hexachlorodibenzodioxin	4.8 J	10	2.5 J	4.1 J
1,2,3,7,8,9-Hexachlorodibenzodioxin	10	21	4.9	8.2
Hexachlorodibenzodioxin (Total)	420 J	990 J	200 J	390 J
1,2,3,4,6,7,8-Heptachlorodibenzodioxin	220	430	110	180
Heptachlorodibenzodioxin (Total)	900 J	1900 J	430 J	790 J
Octachlorodibenzodioxin	4200 J	7300 J	2100	3300
2,3,7,8-Tetrachlorodibenzofuran	0.56	1.2	0.51 U	0.53 J
Tetrachlorodibenzofuran (Total)	3.3 J	8.7 J	1.2 J	3.4 J
1,2,3,7,8-Pentachlorodibenzofuran	0.2 U	0.36 U	0.11 U	0.16 U
2,3,4,7,8-Pentachlorodibenzofuran	0.27 U	0.56 J	0.14 U	0.25 U
Pentachlorodibenzofuran (Total)	2.5 J	6.3 J	1.3 J	2.5 J
1,2,3,4,7,8-Hexachlorodibenzofuran	0.44 U	0.82 J	0.23 U	0.35 U
1,2,3,6,7,8-Hexachlorodibenzofuran	0.44 U	0.81 J	0.23 U	0.35 U
1,2,3,7,8,9-Hexachlorodibenzofuran	0.15 U	0.3 U	0.063 U	0.13 U
2,3,4,6,7,8-Hexachlorodibenzofuran	0.47 U	1.1 J	0.26 U	0.4 U
Hexachlorodibenzofuran (Total)	5.1 J	14 J	2.6 J	4.2 J
1,2,3,4,6,7,8-Heptachlorodibenzofuran	5.1	9.2	2.5 J	3.8 J
1,2,3,4,7,8,9-Heptachlorodibenzofuran	0.38 U	0.76 J	0.22 U	0.32 U
Heptachlorodibenzofuran (Total)	11 J	22 J	4.9 J	8.2 J
Octachlorodibenzofuran	7 J	11	3.6 U	5.7 J
TEQ (Avian Toxic. Equiv. Value, From WHO TEQ-98)	4 J	8.1 J	2.2 J	3.3 J
TEQ (Fish Toxic. Equiv.)	3.5 J	7.3 J	1.8 J	2.9 J
TEQ (Mammalian Toxic. Equiv.)	5.9 J	12 J	2.9 J	4.8 J

U - Analyte not detected at or above reporting limit. The number is the minimum quantitation limit.
J – Identification of analyte is acceptable; reported value is an estimate.

APPENDIX D

Water Quality/CTD Data/Water Chemistry - Metals, Extractables, Pesticides, PCBs and Dioxins

Table D1. Station PASW04, April 2006.

Depth (feet)	DO (mg/L)	Salinity (ppt)	Temperature ©	Turbidity (ntu's)
3.00	6.99	27.53	25.80	0.49
4.00	6.98	27.53	25.81	0.48
5.00	6.99	27.53	25.82	0.49
6.00	7.00	27.53	25.83	0.46
7.00	6.99	27.50	25.82	0.45
8.00	6.99	27.53	25.82	0.45
9.00	7.00	27.53	25.81	0.48
10.00	6.99	27.53	25.82	0.43
11.00	7.00	27.55	25.81	0.42
12.00	7.00	27.55	25.81	0.43
13.00	7.00	27.56	25.81	0.44
14.00	7.01	27.57	25.80	0.45
15.00	7.01	27.56	25.81	0.45
16.00	7.02	27.59	25.78	0.44
17.00	7.03	28.44	25.33	0.47
18.00	7.05	28.30	24.83	0.46
19.00	6.98	29.17	24.89	0.42
20.00	6.91	29.13	24.90	0.41
21.00	6.88	30.01	24.45	0.42
22.00	6.85	29.54	24.68	0.41
23.00	6.80	29.58	24.67	0.46
24.00	6.81	29.81	24.55	0.44
25.00	6.81	31.25	23.79	0.43
26.00	6.71	32.76	23.08	0.52
27.00	6.54	33.00	22.00	0.33
28.00	6.24	34.78	21.08	0.31
29.00	6.11	34.80	21.02	0.20
30.00	6.18	34.83	20.98	0.28
31.00	6.24	34.96	20.88	0.21
32.00	6.20	35.11	20.72	0.35
33.00	6.11	35.27	20.54	0.38
34.00	5.84	35.40	20.41	0.48
35.00	5.47	35.44	20.36	0.82
36.00	5.13	35.45	20.33	1.22
37.00	5.04	35.45	20.33	1.31
38.00	4.98	35.45	20.32	1.32
39.00	4.95	35.45	20.32	1.44
40.00	4.92	35.45	20.32	1.61
41.00	4.89	35.45	20.32	1.81

Table D2. Station PASE05, April 2006.

Depth (feet)	Temperature ©	Salinity (ppt)	DO (mg/L)	Turbidity (ntu's)
3.00	25.89	27.53	7.10	0.65
4.00	25.89	27.53	7.10	0.52
5.00	25.87	27.55	7.10	0.54
6.00	25.74	27.82	7.11	0.52
7.00	25.67	27.96	7.11	0.52
8.00	25.70	27.92	7.12	0.54
9.00	25.71	27.92	7.14	0.64
10.00	25.30	28.87	7.13	0.61
11.00	24.87	29.73	7.11	0.51
12.00	24.83	29.86	7.06	0.51
13.00	24.78	29.94	7.03	0.53
14.00	24.68	30.08	7.02	0.50
15.00	24.46	30.69	7.01	0.79
16.00	24.24	31.46	7.01	0.54
17.00	23.94	31.96	7.00	0.65
18.00	23.57	32.60	6.96	0.45
19.00	23.14	32.88	6.88	0.28
20.00	22.65	33.19	6.73	0.35
21.00	22.26	33.44	6.55	0.36
22.00	21.99	33.68	6.47	0.31
23.00	21.88	33.85	6.39	0.26
24.00	21.87	33.92	6.32	0.18
25.00	21.51	34.35	6.32	0.21
26.00	21.21	34.66	6.33	0.21
27.00	21.01	34.91	6.34	0.18
28.00	20.97	34.94	6.31	0.34
29.00	20.84	35.06	6.17	0.26
30.00	20.76	35.15	6.02	0.49
31.00	20.61	35.30	5.93	0.78
32.00	20.55	35.34	5.80	1.31
33.00	20.53	35.35	5.65	1.33
34.00	20.49	35.38	5.47	1.30
35.00	20.48	35.37	5.32	1.34
36.00	20.47	35.38	5.21	1.42
37.00	20.46	35.38	5.11	1.71
38.00	20.45	35.39	5.01	1.93
39.00	20.45	35.39	4.90	1.45
40.00	20.47	35.37	4.65	2.85

Table D3. Water Metals Analyses - Pascagoula ODMDS, April 2006.

(concentrations are ug/l except Iron - mg/l)

	West - top	West - bottom	East - top	East - bottom
Aluminum	200	200	200	200
Antimony	***10***	***10***	***10***	***10***
Arsenic	***28***	***31***	***26***	***31***
Beryllium	5	5	5	5
Cadmium	***5***	***5***	***5***	***5***
Chromium	10	10	10	10
Copper	***10***	***10***	***10***	***10***
Iron	0.4	0.4	0.4	0.4
Lead	***10***	***10***	***10***	***10***
Manganese	20	20	20	20
Nickel	10	10	10	10
Selenium	***20***	***20***	***20***	***20***
Silver	1.2	1.2	1.2	1.2
Thallium	***10***	***10***	***10***	***10***
Total Mercury	0.2	0.2	0.2	0.2
Zinc	20	20	20	20

NOTE: all values were "U" flagged; The number is the minimum quantitation limit.

*values in bold and italics exceeded target detection limits.

Table D4. Water Extractables Analyses - Pascagoula ODMDS, April 2006.

(values are ug/l)

	West - top	West - bottom	East - top	East - bottom
2-Methylnaphthalene	9.7	9.7	10	9.8
Acenaphthene	9.7	9.7	10	9.8
Acenaphthylene	9.7	9.7	10	9.8
Anthracene	9.7	9.7	10	9.8
Benzo(a)Anthracene	9.7	9.7	10	9.8
Benzo(b)Fluoranthene	9.7	9.7	10	9.8
Benzo(ghi)Perylene	9.7	9.7	10	9.8
Benzo(k)Fluoranthene	9.7	9.7	10	9.8
Benzo-a-Pyrene	9.7	9.7	10	9.8
Chrysene	9.7	9.7	10	9.8
Dibenzo(a,h)Anthracene	9.7	9.7	10	9.8
Fluoranthene	9.7	9.7	10	9.8
Fluorene	9.7	9.7	10	9.8
Indeno (1,2,3-cd) Pyrene	9.7	9.7	10	9.8
Naphthalene	9.7	9.7	10	9.8
Phenanthrene	9.7	9.7	10	9.8
Pyrene	9.7	9.7	10	9.8

NOTE: all values were "U" flagged; The number is the minimum quantitation limit.

Table D5. Water Pesticides Analyses - Pascagoula ODMDS, April 2006.

(values are ug/l)

	West - top	West - bottom	East - top	East - bottom
4,4'-DDD (p,p'-DDD)	0.05	0.05	0.05	0.05
4,4'-DDE (p,p'-DDE)	0.02	0.02	0.02	0.02
4,4'-DDT (p,p'-DDT)	0.05	0.05	0.05	0.05
Aldrin	0.02	0.02	0.025	0.02
alpha-BHC	0.02	0.02	0.02	0.02
alpha-Chlordane /2	0.02	0.02	0.02	0.02
beta-BHC	0.02	0.02	0.02	0.02
trans-Nonachlor /2	0.02	0.02	0.02	0.02
cis-Nonachlor /2	0.02	0.02	0.02	0.02
delta-BHC	0.02	0.02	0.02	0.02
Dieldrin	0.02	0.02	0.02	0.02
Endosulfan I (alpha)	0.02	0.02	0.02	0.02
Endosulfan II (beta)	0.05	0.05	0.05	0.05
Endosulfan Sulfate	0.05	0.05	0.05	0.05
Endrin	0.05	0.05	0.05	0.05
Toxaphene	2	2	2	2
Endrin Ketone	0.05	0.05	0.05	0.05
gamma-BHC (Lindane)	0.02	0.02	0.02	0.02
gamma-Chlordane /2	0.02	0.02	0.02	0.02
Heptachlor	0.02	0.02	0.02	0.02
Heptachlor Epoxide	0.02	0.02	0.02	0.02
Methoxychlor	0.1	0.1	0.1	0.1

NOTE: all values were "U" flagged; The number is the minimum quantitation limit

Table D6. Water PCBs Analyses – Pascagoula ODMDS, April 2006.

(values are ug/l)

	West - top	West - bottom	East - top	East - bottom
PCB Congener #18	0.02	0.02	0.02	0.02
PCB Congener #28	0.02	0.02	0.02	0.02
PCB Congener #44	0.02	0.02	0.02	0.02
PCB Congener #49	0.02	0.02	0.02	0.02
PCB Congener #52	0.02	0.02	0.02	0.02
PCB Congener #66	0.02	0.02	0.02	0.02
PCB Congener #77	0.02	0.02	0.02	0.02
PCB Congener #87	0.02	0.02	0.02	0.02
PCB Congener #101	0.02	0.02	0.02	0.02
PCB Congener #105	0.02	0.02	0.02	0.02
PCB Congener #118	0.02	0.02	0.02	0.02
PCB Congener #126	0.02	0.02	0.02	0.02
PCB Congener #128	0.02	0.02	0.02	0.02
PCB Congener #138	0.02	0.02	0.02	0.02
PCB Congener #153	0.02	0.02	0.02	0.02
PCB Congener #156	0.02	0.02	0.02	0.02
PCB Congener #169	0.02	0.02	0.02	0.02
PCB Congener #170	0.02	0.02	0.02	0.02
PCB Congener #180	0.02	0.02	0.02	0.02
PCB Congener #183	0.02	0.02	0.02	0.02
PCB Congener #184	0.02	0.02	0.02	0.02
PCB Congener #187	0.02	0.02	0.02	0.02
PCB Congener #195	0.02	0.02	0.02	0.02
PCB Congener #206	0.02	0.02	0.02	0.02
PCB Congener #209	0.02	0.02	0.02	0.02

NOTE: all values were "U" flagged; The number is the minimum quantitation limit

Table D7. Water Dioxin Analyses – Pascagoula ODMDS, April 2006.
(concentrations reported as pg/l)

	West - bottom	East - bottom
2,3,7,8-Tetrachlorodibenzodioxin	0.0043	0.005
Tetrachlorodibenzodioxin (Total)	0.0043	0.005
1,2,3,7,8-Pentachlorodibenzodioxin	0.0039	0.0028
Pentachlorodibenzodioxin (Total)	0.0039	0.0028
1,2,3,4,7,8-Hexachlorodibenzodioxin	0.0063	0.0051
1,2,3,6,7,8-Hexachlorodibenzodioxin	0.0062	0.0049
1,2,3,7,8,9-Hexachlorodibenzodioxin	0.0067	0.0053
Hexachlorodibenzodioxin (Total)	0.0062	0.0049
1,2,3,4,6,7,8-Heptachlorodibenzodioxin	0.0086	0.0075
Heptachlorodibenzodioxin (Total)	0.0086	0.0075
Octachlorodibenzodioxin	0.03	0.0084
2,3,7,8-Tetrachlorodibenzofuran	0.0051	0.0051
Tetrachlorodibenzofuran (Total)	0.0051	0.0051
1,2,3,7,8-Pentachlorodibenzofuran	0.0024	0.0018
2,3,4,7,8-Pentachlorodibenzofuran	0.0023	0.0017
Pentachlorodibenzofuran (Total)	0.0024	0.0018
1,2,3,4,7,8-Hexachlorodibenzofuran	0.0036	0.003
1,2,3,6,7,8-Hexachlorodibenzofuran	0.0062	0.0049
1,2,3,7,8,9-Hexachlorodibenzofuran	0.005	0.004
2,3,4,6,7,8-Hexachlorodibenzofuran	0.0034	0.0031
Hexachlorodibenzofuran (Total)	0.0038	0.0032
1,2,3,4,6,7,8-Heptachlorodibenzofuran	0.0032	0.0038
1,2,3,4,7,8,9-Heptachlorodibenzofuran	0.005	0.0059
Heptachlorodibenzofuran (Total)	0.0041	0.0048
Octachlorodibenzofuran	0.008	0.0055
TEQ (Avian Toxic. Equiv. Value, From WHO TEQ-98)	0.019	0.017
TEQ (Fish Toxic. Equiv.)	0.015	0.013
TEQ (Mammalian Toxic. Equiv.)	0.014	0.012

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APPENDIX E

Benthic Macroinvertebrate Data

Table E1. Summary of overall abundance of major taxonomic groups - Pascagoula ODMDS, April 2006.

Taxa		Total Taxa	% Total	Total Individuals	% Total
Annelida					
	Polychaeta	59	45	767	33.2
Mollusca					
	Bivalvia	14	10.7	1052	45.6
	Gastropoda	18	13.7	61	2.6
Arthropoda					
	Malacostraca	26	19.8	157	6.8
Echinodermata					
	Asteroidea	1	0.8	5	0.2
	Ophiuroidea	2	1.5	39	1.7
Other Taxa					
		11	8.4	228	9.9
	Total	131		2309	

Table E2. Summary of abundance of major taxonomic groups by zone - Pascagoula ODMDS, April 2006.

Zone	Taxa	Total Taxa	% Total	Total Individuals	% Total
Inside - East					
	Annelida	33	45.8	146	44.0
	Mollusca	13	18.1	79	23.8
	Arthropoda	17	23.6	35	10.5
	Echinodermata	0	0.0	0	0.0
	Other taxa	9	12.5	72	21.7
	Total	**72**		**332**	
Inside - West					
	Annelida	21	41.2	111	54.7
	Mollusca	10	19.6	28	13.8
	Arthropoda	12	23.5	33	16.3
	Echinodermata	2	3.9	2	1.0
	Other taxa	6	11.8	29	14.3
	Total	**51**		**203**	
Outside					
	Annelida	42	45.2	510	28.7
	Mollusca	25	26.9	1006	56.7
	Arthropoda	14	15.1	89	5.0
	Echinodermata	3	3.2	42	2.4
	Other taxa	9	9.7	127	7.2
	Total	**93**		**1774**	

Table E3. Summary of macroinvertebrate data - Pascagoula ODMDS, April 2006.

Zone		Total Taxa	Total Individuals	Density	H' Diversity	J' Evenness	D Margalef
Inside - East	rep 1	17	26	650			
	rep 2	29	84	2100			
	rep 3	20	64	1600			
	rep 4	9	15	375			
	rep 5	32	116	2900			
	rep 6	5	27	675			
	Mean	**18.7**		**1383.3**	**3.56**	**0.83**	**12.23**
	SD	10.7		991.7			
Inside - West	rep 1	24	97	2425			
	rep 2	10	13	325			
	rep 3	7	9	225			
	rep 4	9	16	400			
	rep 5	4	5	125			
	rep 6	9	10	250			
	rep 7	18	23	575			
	rep 8	14	21	525			
	rep 9	7	9	225			
	Mean	**11.3**		**563.9**	**3.48**	**0.89**	**9.41**
	SD	6.3		713.3			
Outside	rep 1	42	318	7950			
	rep 2	38	372	9300			
	rep 3	26	108	2700			
	rep 4	4	5	125			
	rep 5	48	804	20100			
	rep 6	41	167	4175			
	Mean	**33.2**		**7391.7**	**3.02**	**0.67**	**12.3**
	SD	16		7079.8			

Table E4 . Macroinvertebrate biomass data - Pascagoula ODMDS, April 2006.

Inside - East	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Average
Annelida	0.4471	0.6549	0.6871	0.4946	0.6065	0.5633	0.5756
Mollusca	0.4557	0.5351	0.4721	0.0000	1.7929	0.0000	0.5426
Arthropoda	0.4312	0.4794	0.4416	0.4894	0.4904	0.0000	0.3887
Echinodermata	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Other Taxa	0.4315	0.6190	0.4392	0.5020	0.5026	0.5946	0.5148
Total	1.7655	2.2884	2.0400	1.4860	3.3924	1.1579	2.0217

Inside - West	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8	Rep 9	Average
Annelida	2.7236	0.5281	0.4549	0.4959	0.4548	0.5282	0.5353	0.4905	0.5331	0.7494
Mollusca	0.4754	0.4581	0.5006	0.0000	0.0000	0.0000	0.4539	0.4829	0.4530	0.3138
Arthropoda	0.6892	0.0000	0.4527	0.0000	0.0000	0.4534	0.4529	0.4529	0.0000	0.2779
Echinodermata	0.4539	0.0000	0.0000	0.0000	0.0000	0.0000	0.4576	0.0000	0.0000	0.1013
Other Taxa	0.7012	0.4614	0.4537	0.4985	0.4572	0.4666	0.4667	0.4683	0.4741	0.4942
Total	5.0433	1.4476	1.8619	0.9944	0.9120	1.4482	2.3664	1.8946	1.4602	1.9365

Outside	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Average
Annelida	0.5610	0.9033	1.0861	0.5739	0.6094	0.6812	0.7358
Mollusca	0.5416	0.7071	1.5757	0.4961	2.2221	0.5920	1.0224
Arthropoda	0.4995	0.4990	0.4932	0.4884	0.4947	0.4663	0.4902
Echinodermata	0.4889	0.6434	0.4954	0.0000	0.4677	0.5128	0.4347
Other Taxa	0.5005	0.8860	0.6152	0.0000	0.4681	0.4642	0.4890
Total	2.5915	3.6388	4.2656	1.5584	4.2620	2.7165	3.1721

APPENDIX F

Target Detection Limits

ANALYTE	Water ug/L (ppb)	Sediment mg/kg (ppm)
Antimony	2.5	2
Arsenic	5	1
Aluminum	500	50
Beryllium	30	0.5
Cadmium	2.5	0.5
Chromium	50	1
Copper*	4.8	1
Iron	500	25
Lead	5	0.5
Manganese	100	1
Mercury	0.2	0.05
Nickel*	74	2
Selenium	10	4
Silver*	1.9	1
Thallium	5	0.5
Zinc*	50	1
Ammonia	0.05	2.5
Nitrate+Nitrite	0.05	12.5
Phosphorus, Total	0.01	25
Phosphorus, Ortho	0.01	25
Sulfate	0.1	1
Sulfide	0.04	0.4
Kjeldahl Nitrogen	0.05	12.5
Total Solids/dry weight		0.01
Total Org. Carbon	5 (0.0005%)	0.001

ANALYTE	Water ug/L(ppb)	Soil/Sed* ug/kg(ppb)
2-Methylnaphthalene	10	20
Acenaphthene	10	10
Acenaphthylene	10	20
Anthracene	10	20
Benzo(a)anthracene	10	20
Benzo(a)pyrene	10	20
Benzo(b/k)fluoranthene	10	20
Benzo(g,h,i)perylene	10	20
Chrysene	10	20
Dibenz(a,h)anthracene	10	20
Fluoranthene	10	20
Fluorene	10	10
Indeno(1,2,3,c,d)pyrene	10	20
Naphthalene	10	20
Phenanthrene	10	20
Pyrene	10	20

ANALYTE	Water ug/L(ppb)	Soil/Sed* ug/kg(ppb)
(3- and/or 4-)Methylphenol	10	100
1,2,4-Trichlorobenzene	10	200
2,4-Dimethylphenol	10	20
2-Methylphenol	10	50
Benzyl Butyl Phthalate	10	200
Bis(2-ethylhexyl)phthalate	10	200
Di-n-butylpthalate	10	200
Di-n-octylphthalate	10	200
Dibenzofuran	10	200
Diethyl phthalate	10	200
Dimethyl Phthalate	10	200
Hexachlorobenzene	10	200
Hexachlorobutadiene	10	200
Hexachlorocyclopentadiene	10	200
Hexachloroethane	10	200
N-Nitrosodiphenylamine	10	200
Pentachlorophenol	20	100
Phenol	10	100

ANALYTE	Water ug/L (ppb)	Sediment ug/kg (ppb)
Aldrin	0.5	20
Heptachlor*	0.05	20
Hept. Epoxide*	0.05	20
alpha-BHC	0.5	20
beta-BHC	0.5	20
gamma-BHC*	0.1	20
delta-BHC	0.5	20
Endosulfan- I*	0.05	20
Dieldrin*	0.5	1
p,p'-DDT*	0.1	2
p,p'-DDD*	0.1	2
p,p'-DDE*	0.1	2
Endrin*	0.05	20
Endosulfan -II*	0.05	20
Endosulfan- SO4*	0.5	20
Endrin Ketone	0.5	20
Methoxychlor	1	50
g-chlordane*	0.1	5
a-chlordane*	0.1	5
trans-nonachlor*	0.1	20
cis-nonachlor	0.5	20
Toxaphene*	2	50
PCB (as Congeners - see list)	0.02	1

PCB Congenger	Water ug/L (ppb)	Sediment ug/kg (ppb)
8	0.02	1
18	0.02	1
28	0.02	1
44	0.02	1
49	0.02	1
52	0.02	1
66	0.02	1
77	0.02	1
87	0.02	1
101	0.02	1
105	0.02	1
118	0.02	1
126	0.02	1
128	0.02	1
138	0.02	1
153	0.02	1
156	0.02	1
169	0.02	1
170	0.02	1
180	0.02	1
183	0.02	1
184	0.02	1
187	0.02	1
195	0.02	1
206	0.02	1
209	0.02	1

Congener	Sediment Target RL (ng/Kg)	Water Target RL (pg/L)
2,3,7,8-TCDD	1	10
1,2,3,7,8-PentaCDD	2.5	50
1,2,3,4,7,8-HexaCDD	5	50
1,2,3,6,7,8-HexaCDD	5	50
1,2,3,7,8,9-HexaCDD	5	50
1,2,3,4,6,7,8-HeptaCDD	5	50
1,2,3,4,6,7,8,9-OCDD	10	100
2,3,7,8-TetraCDF	1	10
1,2,3,7,8-PentaCDF	2.5	50
2,3,4,7,8-PentaCDF	2.5	50
1,2,3,4,7,8-HexaCDF	5	50
1,2,3,6,7,8-HexaCDF	5	50
1,2,3,7,8,9-HexaCDF	5	50
2,3,4,6,7,8-HexaCDF	5	50
1,2,3,4,6,7,8-HeptaCDF	5	50
1,2,3,4,7,8,9-HeptaCDF	5	50
1,2,3,4,6,7,8,9-OCDF	10	100