APPENDIX 1

PRE-OILING INFORMATION

Table A1.1. Nearshore Forensic Classification Codes for Pre-Oil Samples Collected in 2010.

Category	Louisiana	Mississippi	Alabama	Florida	All States
Total Samples	30	67	38	41	176
MC252 Matches A+B+C	0	0	0	0	0
MC252 Match A	0	0	0	0	0
MC252 Match B	0	0	0	0	0
MC252 Match C	0	0	0	0	0
Indeterminate	30	67	38	41	176
Non-Match	0	0	0	0	0
% MC252 Matches A+B+C	0%	0%	0%	0%	0%
MC252 Match A	0%	0%	0%	0%	0%
MC252 Match B	0%	0%	0%	0%	0%
MC252 Match C	0%	0%	0%	0%	0%
Indeterminate	100%	100%	100%	100%	100%
Non-Match	0%	0%	0%	0%	0%

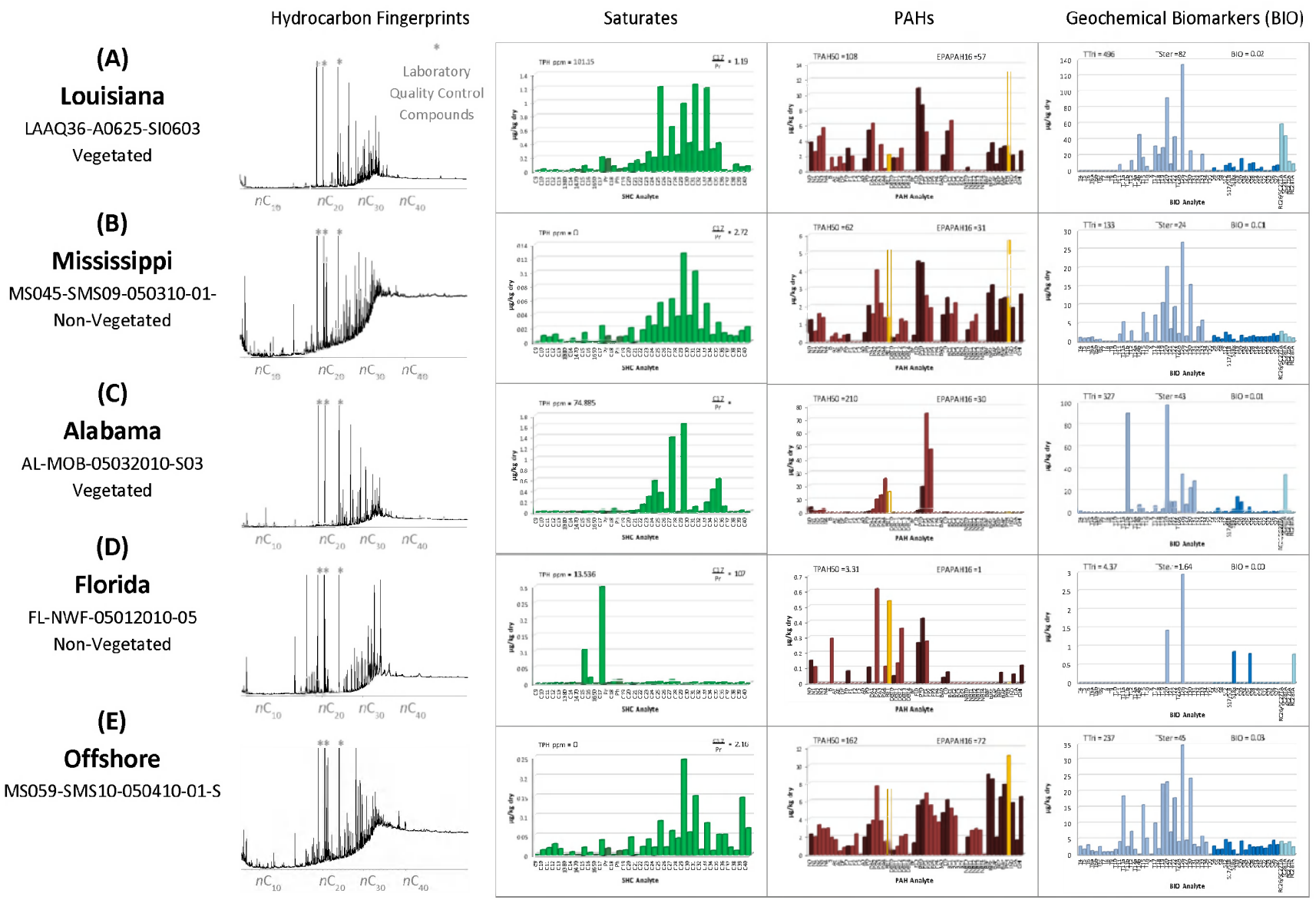

Figure A1.1. Ambient Background Hydrocarbon Signatures in Pre-Oil Sediments.

APPENDIX 2

SHORELINE COASTAL WETLAND VEGETATION INFORMATION

Shoreline TWG Coastal Wetland Vegetation Sampling Work Plan Summary

The shoreline technical work group (TWG) drafted the coastal wetland vegetation (CWV) sampling work plans (SWPs) to design and implement procedures needed to complete the NRDA process for assessing oil impacts from Macondo crude oil along the northern GOM shoreline. The selection of site locations and sampling procedures was based on dominant vegetation, pre-assessment activities and oiling extent categories. The sampling strategies in 2010 and 2011 differ slightly in their objectives, and consequently, their sample design and strategies. A summary of these work plans follows.

Sampling and Monitoring Plan for the Assessment of MC 252 Oil Impacts to Coastal Wetland Vegetation in the Gulf of Mexico

This field sampling plan collected ephemeral data for use in assessing the effects of Macondo oil on CWV along the Gulf of Mexico coast (focused in LA, MS, AL) as part of the NRDA for the Deepwater Horizon oil spill (DWHOS). This area of focus was divided into several broad sampling regions that were further categorized into oiling extent designations using SCAT data, aerial photographs and other field observations. Official sites were randomly selected from each of the oiling extent categories and consisted of both herbaceous coastal wetland vegetation and black mangrove coastal wetland vegetation habitats. At each site, transects were established perpendicular to the shoreline along which up to three zones were assigned; edge, mid and inland. Productivity and cover plots were placed in the zones according to guidelines specific to the aforementioned habitat types (Figure A2.1a; Figure A2.1b). In addition to collecting data for chemical and physical health metrics, four soil scoops were collected at each productivity plot for contaminant characterization. Sampling was performed in two separate sampling periods; 2010 (hereafter referred to as 2010 Survey) and Spring 2011 (hereafter referred to as Spring 2011 Survey). In 2010, samples were evaluated for oil impact using dichloromethane extractable material (DEM) screening; samples with the greatest DEM results (MAX DEM) per plot were analyzed for petroleum hydrocarbons and biomarkers. In 2011, samples included MAX DEM samples and sample composites from the four samples per plot. Again, samples were analyzed for petroleum hydrocarbons and biomarkers.

Protocol for Monitoring Marsh Cleanup Response: Addendum to the Sampling and Monitoring Plan for the Assessment of MC 252 Oil Impacts to Coastal Wetland Vegetation in the Gulf of Mexico (2011 Marsh Cleanup Survey)

The Deepwater Horizon response led by the US Coast Guard (Response) identified oiled North Barataria Bay marshes for cleanup. Areas were sampled both before and after treatment to assess the combined effects of oiling and treatment on herbaceous coastal wetland vegetation along the Gulf of Mexico, supplementing the CWV Field Sampling Plan. The sites sampled under the CWV Field Sampling Plan (above) represented untreated sites while additional sites were established and sampled for the both the collection of pre-cleanup information and the assessment of post-cleanup conditions. Overall, metrics and procedures were consistent with those used for herbaceous marsh sites in the CWV Field Sampling Plan. However, for pre-cleanup characterization, only one 1 m2 cover plot was established for all metrics at each site and an additional zone was added to capture impacts resulting from the removal of wrack during

the cleanup process. Permanent cleanup transects borrowed from the CWV Field Sampling Plan and included herbaceous marsh paired plots in each zone including the pre-wrack zone added under this addendum (Figure A2.1c). Fourteen sites were selected by the NRDA Shoreline TWG group in February 2011 for pre-cleanup characterization, with 12 sites treated to assess the combined effects of oiling and cleanup treatment. Through the assessment of plots both before and after treatment, the effects of oiling and oiling related cleanup on coastal wetland vegetation were determined. The sites with confirmed oiling that were sampled in February, 2011 for pre-cleanup characterization are summarized in this report.

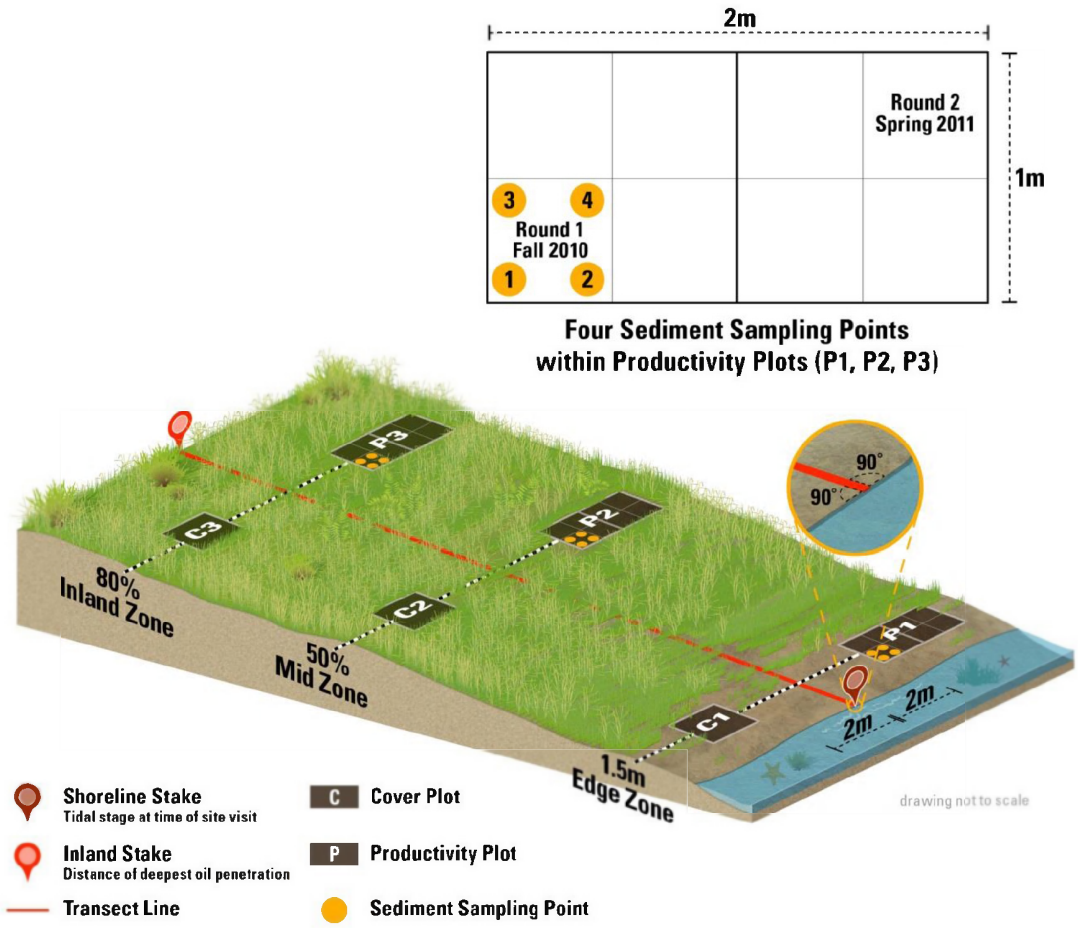

Figure A2.1a. Pictorial Depiction of Coastal Wetland Vegetation Field Sampling Strategies: Placement of Cover Plots, Productivity Plots and Associated Chemical Characterization Sampling Along a Transect in Herbaceous Sites.

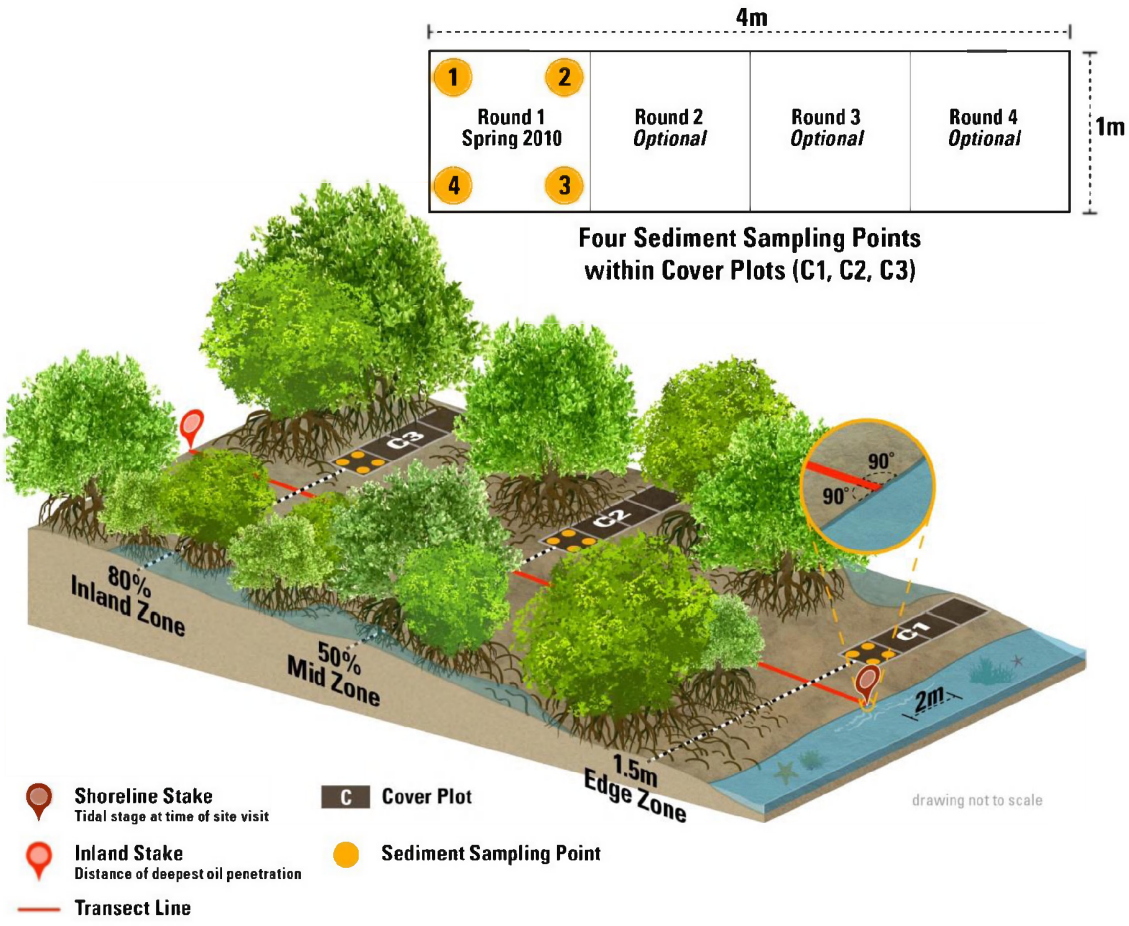

Figure A2.1b. Pictorial Depiction of Coastal Wetland Vegetation Field Sampling Strategies: Placement of Cover Plots and Associated Chemical Characterization Sampling in Mangrove Sites.

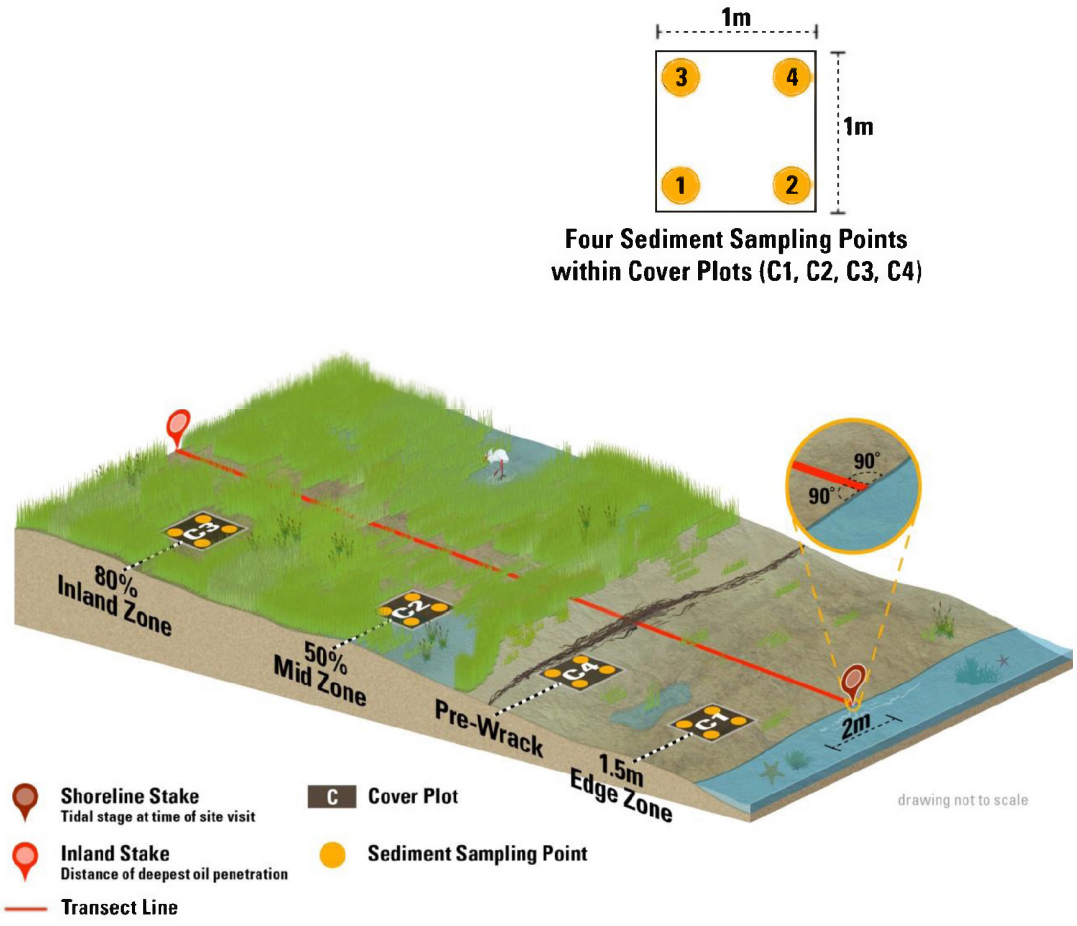

Figure A2.1c. Pictorial Depiction of Coastal Wetland Vegetation Field Sampling Strategies: Placement of Cover Plots and Associated Chemical Characterization Sampling in Marsh Clean-up Sites.

Table A2.1. Nearshore Forensic Classification Codes in All Coastal Wetland Vegetation Investigations.

a. Breakdown by Sample.

Category	Louisiana	Mississippi	Alabama	Florida	All States
Total Samples	1,031	85	56	-	1,172
Classification Codes A+B+C	671	17	2	-	690
Classification Code A	256	3	-	-	259
Classification Code B	290	7	1	-	298
Classification Code C	125	7	1	-	133
Indeterminate Code D	360	68	54	-	482
Non-Match Code E	-	-	-	-	-
% Classification Codes A+B+C	65%	20%	4%	na	59%
Classification Code A	25%	4%	0%	na	22%
Classification Code B	28%	8%	2%	na	25%
Classification Code C	12%	8%	2%	na	11%
Indeterminate Code D	35%	80%	96%	na	41%
Non-Match Code E	0%	0%	0%	na	0%

na - not analyzed nd - not detected no - not observed

b. Breakdown by Site.

Category	Louisiana	Mississippi	Alabama	Florida	All Sites
Total Sites	164	22	16	-	202
Classification Codes A+B+C	138	7	1	-	146
Maximum Match Per Site					
Classification Code A	76	3	-	-	79
Classification Code B	51	2	1	-	54
Classification Code C	11	2	-	-	13
Indeterminate Code D	26	15	15	-	56
Non-Match Code E	-	-	-	-	-
% Classification Codes A+B+C	84%	32%	6%	na	72%
Classification Code A	46%	14%	0%	na	39%
Classification Code B	31%	9%	6%	na	27%
Classification Code C	7%	9%	0%	na	6%
Indeterminate Code D	16%	68%	94%	na	28%
Non-Match Code E	0%	0%	0%	na	0%

na - not analyzed nd - not detected no - not observed

Table A2.1. Nearshore Forensic Classification Codes in All Coastal Wetland Vegetation Investigations.

c. Summary of PAH Concentrations in Impacted Coastal Wetland Vegetation Samples

Category	Louisiana	Mississippi	Alabama	Florida	All States
Solid (Soil, Sediments, Particulates) $PetPAH_{27}$ µg/kg dry in Classification Codes A+B+C					
Count	671	17	2	na	690
Minimum	nd	18	26	na	nd
5th Percentile	56	25	175	na	51
25th Percentile	197	89	771	na	195
50th Percentile (Median)	641	215	1,520	na	594
75th Percentile	4,530	316	2,260	na	4,250
95th Percentile	70,200	710	2,860	na	67,400
Maximum	1,520,000	1,020	3,010	na	1,520,000

na - not analyzed nd - not detected no - not observed

d. Summary of $PetPAH_{27}$ Percent Depletion in Impacted Samples

Category	Louisiana	Mississippi	Alabama	Florida	All States
Percent Depletion Solid (Soil, Sediments, Particulates) Matches A+B+C					
Count	671	17	2	na	690
Minimum	12	86	75	na	12
5th Percentile	91	91	76	na	91
25th Percentile	96	97	81	na	96
50th Percentile (Median)	97	98	87	na	97
75th Percentile	98	98	93	na	98
95th Percentile	99	99	98	na	99
Maximum	100	99	99	na	100

na - not analyzed nd - not detected no - not observed

Table A2.2. Nearshore Forensic Classification Codes in Coastal Wetland Vegetation Samples by Sampling Plan.

a. Breakdown of 2010 CWV Sampling Plan Samples by State

Category	Louisiana	Mississippi	Alabama	Florida	All States
Total Samples	601	-	-	-	601
Classification Codes A+B+C	359	-	-	-	359
Classification Code A	131	-	-	-	131
Classification Code B	173	-	-	-	173
Classification Code C	55	-	-	-	55
Indeterminate Code D	242	-	-	-	242
Non-Match Code E	-	-	-	-	-
% Classification Codes A+B+C	60%	na	na	na	60%
Classification Code A	22%	na	na	na	22%
Classification Code B	29%	na	na	na	29%
Classification Code C	9%	na	na	na	9%
Indeterminate Code D	40%	na	na	na	40%
Non-Match Code E	0%	na	na	na	0%

na - not analyzed nd - not detected no - not observed

b. Breakdown of Spring 2011 CWV Sampling Plan Samples by State

Category	Louisiana	Mississippi	Alabama	Florida	All States
Total Samples	374	85	56	-	515
Classification Codes A+B+C	256	17	2	-	275
Classification Code A	75	3	-	-	78
Classification Code B	111	7	1	-	119
Classification Code C	70	7	1	-	78
Indeterminate Code D	118	68	54	-	240
Non-Match Code E	-	-	-	-	-
% Classification Codes A+B+C	68%	20%	4%	na	53%
Classification Code A	20%	4%	0%	na	15%
Classification Code B	30%	8%	2%	na	23%
Classification Code C	19%	8%	2%	na	15%
Indeterminate Code D	32%	80%	96%	na	47%
Non-Match Code E	0%	0%	0%	na	0%

na - not analyzed nd - not detected no - not observed

Table A2.2. Nearshore Forensic Classification Codes in Coastal Wetland Vegetation Samples by Sampling Plan.

c. Breakdown of February 2011 Marsh Cleanup Samples by State

Category	Louisiana	Mississippi	Alabama	Florida	All States
Total Samples	56	-	-	-	56
Classification Codes A+B+C	56	-	-	-	56
Classification Code A	50	-	-	-	50
Classification Code B	6	-	-	-	6
Classification Code C	-	-	-	-	-
Indeterminate Code D	-	-	-	-	-
Non-Match Code E	-	-	-	-	-
% Classification Codes A+B+C	100%	na	na	na	100%
Classification Code A	89%	na	na	na	89%
Classification Code B	11%	na	na	na	11%
Classification Code C	0%	na	na	na	0%
Indeterminate Code D	0%	na	na	na	0%
Non-Match Code E	0%	na	na	na	0%

na - not analyzed nd - not detected no - not observed

Table A2.3. Nearshore Forensic Classification Codes in Coastal Wetland Vegetation Herbaceous and Mangrove Samples by Sampling Plan and Zone.

a. Breakdown of 2010 and Spring 2011 Herbaceous Samples by Zone

Category	Edge	Mid	Inland	All Zones
Total Samples	348	274	227	849
Classification Codes A+B+C	187	155	132	474
Classification Code A	80	53	44	177
Classification Code B	71	72	63	206
Classification Code C	36	30	25	91
Indeterminate Code D	161	119	95	375
Non-Match Code E	-	-	-	-
% Classification Codes A+B+C	54%	57%	58%	56%
Classification Code A	23%	19%	19%	21%
Classification Code B	20%	26%	28%	24%
Classification Code C	10%	11%	11%	11%
Indeterminate Code D	46%	43%	42%	44%
Non-Match Code E	0%	0%	0%	0%

b. Breakdown of 2010 and Spring 2011 Mangrove Samples by Zone

Category	Edge	Mid	Inland	All Zones
Total Samples	93	86	87	266
Classification Codes A+B+C	46	55	58	159
Classification Code A	8	7	16	31
Classification Code B	21	35	30	86
Classification Code C	17	13	12	42
Indeterminate Code D	47	31	29	107
Non-Match Code E	-	-	-	-
% Classification Codes A+B+C	49%	64%	67%	60%
Classification Code A	9%	8%	18%	12%
Classification Code B	23%	41%	34%	32%
Classification Code C	18%	15%	14%	16%
Indeterminate Code D	51%	36%	33%	40%
Non-Match Code E	0%	0%	0%	0%

Table A2.3. Nearshore Forensic Classification Codes in Coastal Wetland Vegetation Herbaceous and Mangrove Samples by Sampling Plan and Zone.

c. Breakdown of February 2011 Marsh Cleanup Samples by Zone

Zone	Edge	Mid	Inland	Pre-Wrack	All Zones
Total Samples	14	14	14	14	56
Classification Codes A+B+C	14	14	14	14	56
Classification Code A	13	12	13	12	50
Classification Code B	1	2	1	2	6
Classification Code C	-	-	-	-	-
Indeterminate Code D	-	-	-	-	-
Non-Match Code E	-	-	-	-	-
% Classification Codes A+B+C	100%	100%	100%	100%	100%
Classification Code A	93%	86%	93%	86%	89%
Classification Code B	7%	14%	7%	14%	11%
Classification Code C	0%	0%	0%	0%	0%
Indeterminate Code D	0%	0%	0%	0%	0%
Non-Match Code E	0%	0%	0%	0%	0%

Table A2.4. Nearshore Forensic Classification Codes in Coastal Wetland Vegetation Samples by Investigation, Zone and State.

a. Breakdown of 2010 and 2011 Louisiana Herbaceous Samples by Zone.

Category	2010 Herbaceous			All 2010	2011 Herbaceous			All 2011
Zone	Edge	Mid	Inland	Zones	Edge	Mid	Inland	Zones
Total Samples	196	134	112	442	101	90	75	266
Classification Codes A+B+C	114	83	74	271	68	63	53	184
Classification Code A	54	33	27	114	25	19	16	60
Classification Code B	44	42	36	122	25	26	25	76
Classification Code C	16	8	11	35	18	18	12	48
Indeterminate Code D	82	51	38	171	33	27	22	82
Non-Match Code E	-	-	-	-	-	-	-	-
% Classification Codes A+B+C	58%	62%	66%	61%	67%	70%	71%	69%
Classification Code A	28%	25%	24%	26%	25%	21%	21%	23%
Classification Code B	22%	31%	32%	28%	25%	29%	33%	29%
Classification Code C	8%	6%	10%	8%	18%	20%	16%	18%
Indeterminate Code D	42%	38%	34%	39%	33%	30%	29%	31%
Non-Match Code E	0%	0%	0%	0%	0%	0%	0%	0%

b. Breakdown of 2010 and 2011 Louisiana Mangrove Samples by Zone

Category	2010 Mangrove			All 2010	2011 Mangrove			All 2011
Zone	Edge	Mid	Inland	Zones	Edge	Mid	Inland	Zones
Total Samples	57	50	52	159	36	36	35	107
Classification Codes A+B+C	26	29	33	88	20	26	25	71
Classification Code A	3	5	9	17	5	2	7	14
Classification Code B	16	18	17	51	5	17	13	35
Classification Code C	7	6	7	20	10	7	5	22
Indeterminate Code D	31	21	19	71	16	10	10	36
Non-Match Code E	-	-	-	-	-	-	-	-
% Classification Codes A+B+C	46%	58%	63%	55%	56%	72%	71%	66%
Classification Code A	5%	10%	17%	11%	14%	6%	20%	13%
Classification Code B	28%	36%	33%	32%	14%	47%	37%	33%
Classification Code C	12%	12%	13%	13%	28%	19%	14%	21%
Indeterminate Code D	54%	42%	37%	45%	44%	28%	29%	34%
Non-Match Code E	0%	0%	0%	0%	0%	0%	0%	0%

Table A2.4. Nearshore Forensic Classification Codes in Coastal Wetland Vegetation Samples by Investigation, Zone and State.

c. Breakdown of 2011 Mississippi Herbaceous Samples by Zone

Category	Herbaceous			All 2010
Zone	Edge	Mid	Inland	Zones
Total Samples	28	31	26	85
Classification Codes A+B+C	4	8	5	17
Classification Code A	1	1	1	3
Classification Code B	1	4	2	7
Classification Code C	2	3	2	7
Indeterminate Code D	24	23	21	68
Non-Match Code E	-	-	-	-
% Classification Codes A+B+C	14%	26%	19%	20%
Classification Code A	4%	3%	4%	4%
Classification Code B	4%	13%	8%	8%
Classification Code C	7%	10%	8%	8%
Indeterminate Code D	86%	74%	81%	80%
Non-Match Code E	0%	0%	0%	0%

d. Breakdown of 2011 Alabama Herbaceous Samples by Zone

Category	Herbaceous			All 2010
Zone	Edge	Mid	Inland	Zones
Total Samples	23	19	14	56
Classification Codes A+B+C	1	1	-	2
Classification Code A	-	-	-	-
Classification Code B	1	-	-	1
Classification Code C	-	1	-	1
Indeterminate Code D	22	18	14	54
Non-Match Code E	-	-	-	-
% Classification Codes A+B+C	4%	5%	0%	4%
Classification Code A	0%	0%	0%	0%
Classification Code B	4%	0%	0%	2%
Classification Code C	0%	5%	0%	2%
Indeterminate Code D	96%	95%	100%	96%
Non-Match Code E	0%	0%	0%	0%

Table A2.4. Nearshore Forensic Classification Codes in Coastal Wetland Vegetation Samples by Investigation, Zone and State.

e. Breakdown of February 2011 Marsh Cleanup Mangrove Samples by Zone

Category	Mangrove				All Zones
Zone	Edge	Mid	Inland	Pre-Wrack	
Total Samples	14	14	14	14	56
Classification Codes A+B+C	14	14	14	14	56
Classification Code A	13	12	13	12	50
Classification Code B	1	2	1	2	6
Classification Code C	-	-	-	-	-
Indeterminate Code D	-	-	-	-	-
Non-Match Code E	-	-	-	-	-
% Classification Codes A+B+C	100%	100%	100%	100%	100%
Classification Code A	93%	86%	93%	86%	89%
Classification Code B	7%	14%	7%	14%	11%
Classification Code C	0%	0%	0%	0%	0%
Indeterminate Code D	0%	0%	0%	0%	0%
Non-Match Code E	0%	0%	0%	0%	0%

Table A2.5. Breakdown of PAH Concentrations in Macondo Oil Impacted Coastal Wetland Vegetation Samples by Investigation, Zone and State.

a. Breakdown of PAH Concentrations in 2010 and 2011 Louisiana Herbaceous Samples by Zone.

Category	2010 Herbaceous			All 2010	2011 Herbaceous			All 2011
Zone	Edge	Mid	Inland	Zones	Edge	Mid	Inland	Zones
Solid (Soil, Sediments, Particulates) $PetPAH_{27}$ µg/kg dry in Classification Codes A+B+C								
Count	114	83	74	271	68	63	53	184
Minimum	15	8.0	23	8.0	24	21	31	21
5th Percentile	55	66	82	63	71	42	96	58
25th Percentile	265	225	262	258	197	199	200	199
50th Percentile (Median)	1,630	879	701	954	593	517	474	521
75th Percentile	25,100	3,950	4,150	7,600	4,270	1,870	2,440	2,630
95th Percentile	263,000	30,400	13,600	99,800	221,000	20,400	6,200	32,100
Maximum	724,000	64,900	47,400	724,000	1,520,000	32,900	22,300	1,520,000

na - not analyzed nd - not detected no - not observed

b. Breakdown of PAH Concentrations in 2010 and 2011 Louisiana Mangrove Samples by Zone.

Category	2010 Mangrove			All 2010	2011 Mangrove			All 2011
Zone	Edge	Mid	Inland	Zones	Edge	Mid	Inland	Zones
Solid (Soil, Sediments, Particulates) $PetPAH_{27}$ µg/kg dry in Classification Codes A+B+C								
Count	26	29	33	88	20	26	25	71
Minimum	54	37	nd	nd	17	2.4	40	2.4
5th Percentile	77	91	29	47	24	13	70	21
25th Percentile	137	181	111	148	66	151	107	103
50th Percentile (Median)	294	422	378	339	131	244	173	177
75th Percentile	690	814	761	775	202	409	394	361
95th Percentile	2,250	10,500	6,000	5,310	1,540	2,160	3,010	2,220
Maximum	2,610	19,500	8,960	19,500	2,120	3,940	9,460	9,460

na - not analyzed nd - not detected no - not observed

Table A2.5. Breakdown of PAH Concentrations in Macondo Oil Impacted Coastal Wetland Vegetation Samples by Investigation, Zone and State.

c. Breakdown of PAH Concentrations 2011 Mississippi Herbaceous Samples by Zone.

Category	Herbaceous			All Zones
Zone	Edge	Mid	Inland	
Solid (Soil, Sediments, Particulates) $PetPAH_{27}$ µg/kg dry in Classification Codes A+B+C				
Count	4	8	5	17
Minimum	215	18	50	18
5th Percentile	225	21	58	25
25th Percentile	266	41	89	89
50th Percentile (Median)	380	274	174	215
75th Percentile	516	358	204	316
95th Percentile	609	832	208	710
Maximum	633	1,020	209	1,020

na - not analyzed nd - not detected no - not observed

d. Breakdown of PAH Concentrations 2011 Alabama Herbaceous Samples by Zone.

Category	Herbaceous			All Zones
Zone	Edge	Mid	Inland	
Solid (Soil, Sediments, Particulates) $PetPAH_{27}$ µg/kg dry in Classification Codes A+B+C				
Count	1	1	na	2
Minimum	26	3,010	na	26
5th Percentile	26	3,010	na	175
25th Percentile	26	3,010	na	771
50th Percentile (Median)	26	3,010	na	1,520
75th Percentile	26	3,010	na	2,260
95th Percentile	26	3,010	na	2,860
Maximum	26	3,010	na	3,010

na - not analyzed nd - not detected no - not observed

Table A2.5. Breakdown of PAH Concentrations in Macondo Oil Impacted Coastal Wetland Vegetation Samples by Investigation, Zone and State.

e. Breakdown of PAH Concentrations in February 2011 Marsh Cleanup Mangrove Samples by Zone.

Category	Mangrove				All Zones
Zone	Edge	Mid	Inland	Pre-Wrack	
Solid (Soil, Sediments, Particulates) $PetPAH_{27}$ µg/kg dry in Classification Codes A+B+C					
Count	14	14	14	14	56
Minimum	1,610	1,730	1,120	994	994
5th Percentile	2,570	2,760	2,950	2,160	1,700
25th Percentile	15,400	6,810	5,620	4,930	5,680
50th Percentile (Median)	28,700	13,500	12,000	6,150	12,200
75th Percentile	65,400	44,500	17,100	7,560	30,800
95th Percentile	376,000	386,000	45,100	674,000	432,000
Maximum	640,000	481,000	74,600	1,150,000	1,150,000

na - not analyzed nd - not detected no - not observed

Table A2.6. Breakdown of PetPAH$_{27}$ Percent Depletion in Macondo Oil Impacted Samples by Sampling Plan.

a. Summary of PetPAH$_{27}$ Percent Depletion in 2010 CWV Field Sampling Plan

Category	Edge	Mid	Inland	All Zones
Percent Depletion Solid (Soil, Sediments, Particulates) Matches A+B+C				
Count	140	112	107	359
Minimum	61	87	57	57
5th Percentile	90	93	93	91
25th Percentile	95	97	97	96
50th Percentile (Median)	96	98	98	97
75th Percentile	98	98	98	98
95th Percentile	99	99	99	99
Maximum	99	99	100	100

b. Summary of PetPAH$_{27}$ Percent Depletion in 2011 CWV Field Sampling Plan Samples

Category	Edge	Mid	Inland	All Zones
Percent Depletion Solid (Soil, Sediments, Particulates) Matches A+B+C				
Count	93	98	83	274
Minimum	12	59	64	12
5th Percentile	90	86	91	89
25th Percentile	95	97	96	96
50th Percentile (Median)	97	98	98	97
75th Percentile	98	98	98	98
95th Percentile	99	99	99	99
Maximum	99	100	99	100

Table A2.6. Breakdown of PetPAH$_{27}$ Percent Depletion in Macondo Oil Impacted Samples by Sampling Plan.

c. Summary of PetPAH$_{27}$ Percent Depletion in February 2011 Marsh Cleanup Samples

Category	Edge	Mid	Inland	Pre-Wrack	All Zones
Percent Depletion Solid (Soil, Sediments, Particulates) Matches A+B+C					
Count	14	14	14	14	56
Minimum	94	96	97	91	91
5th Percentile	95	96	98	95	96
25th Percentile	97	98	98	98	98
50th Percentile (Median)	98	98	98	98	98
75th Percentile	98	99	98	99	98
95th Percentile	98	99	99	99	99
Maximum	98	99	99	99	99

APPENDIX 3

NEARSHORE INFORMATION

Nearshore TWG Sediment and Water Sampling Work Plan Summary

The Nearshore TWG drafted the sediment and water SWPs governed the collection of samples between June 21, 2010 and December 03, 2010 to characterize the pre- and post-oiling conditions. The selection of site locations and sampling procedures focused on subtidal nearshore locations with projected, suspected, or observed Macondo oil impacts.

Work Plan for Sediment and Water Collection and Analyses for Baseline NRDA Purposes in Louisiana

This work plan aimed to establish a pre-impact (baseline) characterization of the presence or absence of petroleum hydrocarbons in water and sediment samples from Louisiana's interior coastal marshes. Sampling followed a random site-selection process in which a geographic information system (GIS) was used to help select unoiled sampling sites in five major coastal hydrologic units: Lake Pontchartrain Basin Marshes, Barataria Basin Marshes, Terrebonne Basin Marshes, Vermilion-Teche Basin Marshes, and Sabine, Mermentau and Calcasieu Basins. At each sampling station, water and sediment samples were collected. To ensure that sediment samples represented a wider area than a single point, each sample was a composite of three spatially independent aliquots that represented the same vertical horizon. Specifically, samplers collected a sediment sample from the first subtidal waypoint and traveled parallel to the shore to collect two more samples before moving to the intertidal zone. In the intertidal zone, samplers traveled back along the shore to collect three intertidal samples. Each set of samples (subtidal and intertidal) was restricted to a 100 foot radius and was composited in the field (Figure A3.1a). Sediment samples were representative of the top two centimeters and water samples were collected at a depth of 15 centimeters. Accordingly, one set of composite sediment samples from the intertidal zone, one set of composite sediment samples from the subtidal zone, one water sample and three grab water samples, both typically from the subtidal zone, were collected at each site. Composite water samples were analyzed for PAH and THC, grab water samples were analyzed for VOC and sediment samples were analyzed for THC, PAH, Biomarkers, TOC and grain size. The 149 sediment samples discussed in this report were collected between June 21, 2010 and July 16, 2010. Only sediment samples are summarized in this report.

Pre-Assessment Phase Water Sampling for NRDA Purposes in Louisiana

The Nearshore Sediment and Water Sampling Technical Work Group (TWG) conducted water sampling in Louisiana's nearshore interior coastal marshes. The objective of this sampling effort was to both evaluate the exposure and potential injury to the water column due to oiling from the Deepwater Horizon oil spill and to facilitate restoration planning. To start, Shoreline Cleanup Assessment Teams (SCAT) data and pre-assessment data were used to preferentially select sites with confirmed moderate to heavy oiling that had been previously sampled by other TWGs. However, an array of oiling intensities were sampled (Light, Very Light and No Oil Observed) in addition to areas where oiling had been indicated but SCAT surveying was not conducted. At each site, a 100 foot transect was established parallel to the shoreline along which three sets of water and sediment samples were collected concurrently at 50 foot intervals (0 feet, 50 feet, 100 feet) (Figure A3.1b). Water samples were collected at a depth of 15

centimeters and analyzed for SHC, PAH and VOC. Sediment samples were a composite of the top two centimeters of two separate grab samples. Each of these composites were analyzed for SHC, PAH, Biomarkers, TOC and grain size. Between August 6, 2010 and December 3, 2010, 239 sediment samples discussed in this report were collected.

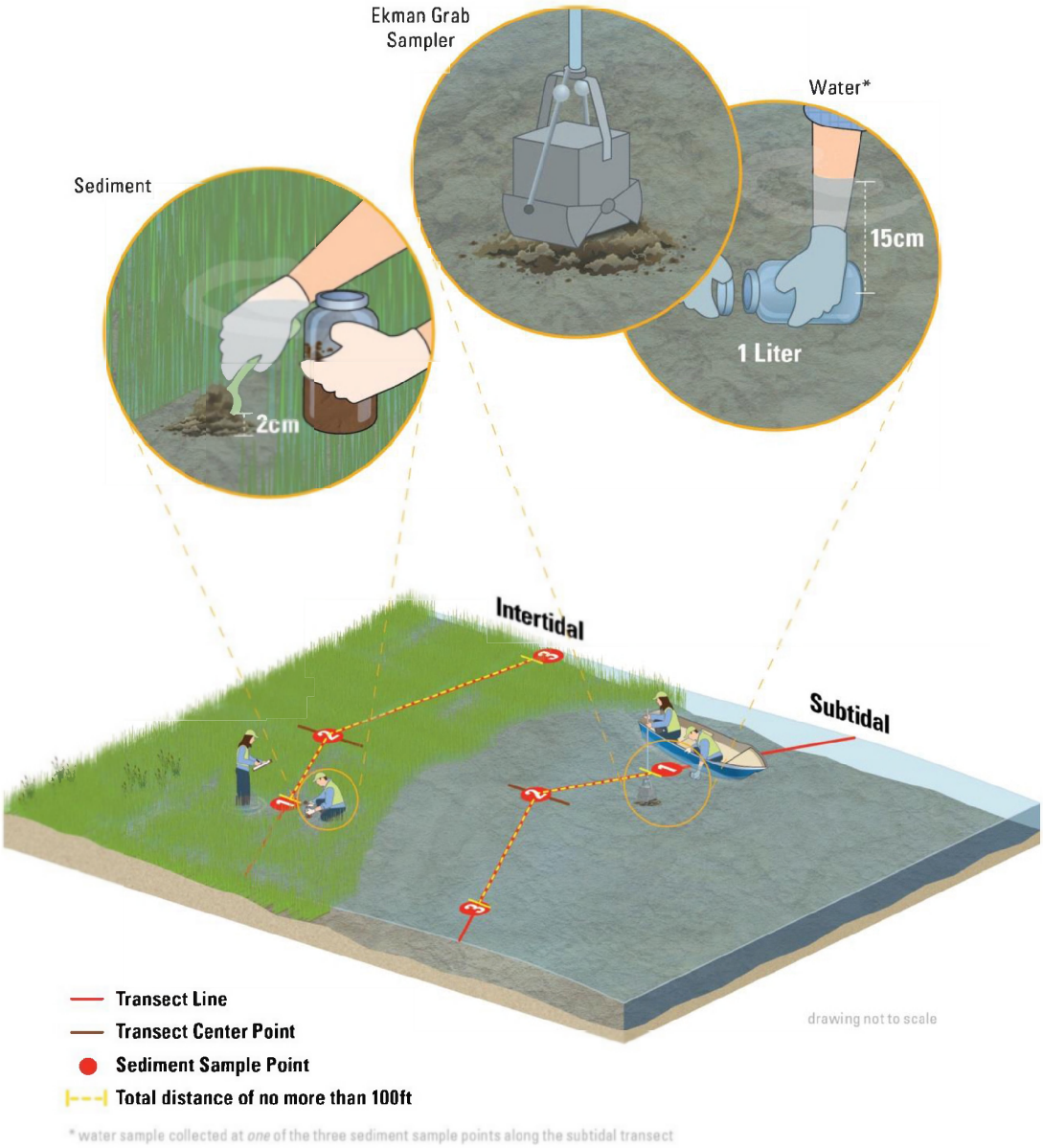

Figure A3.1a. Pictorial Depiction of Nearshore Sampling Work Plans: Pictorial Depiction of Field Methods for the Nearshore Baseline SWP.

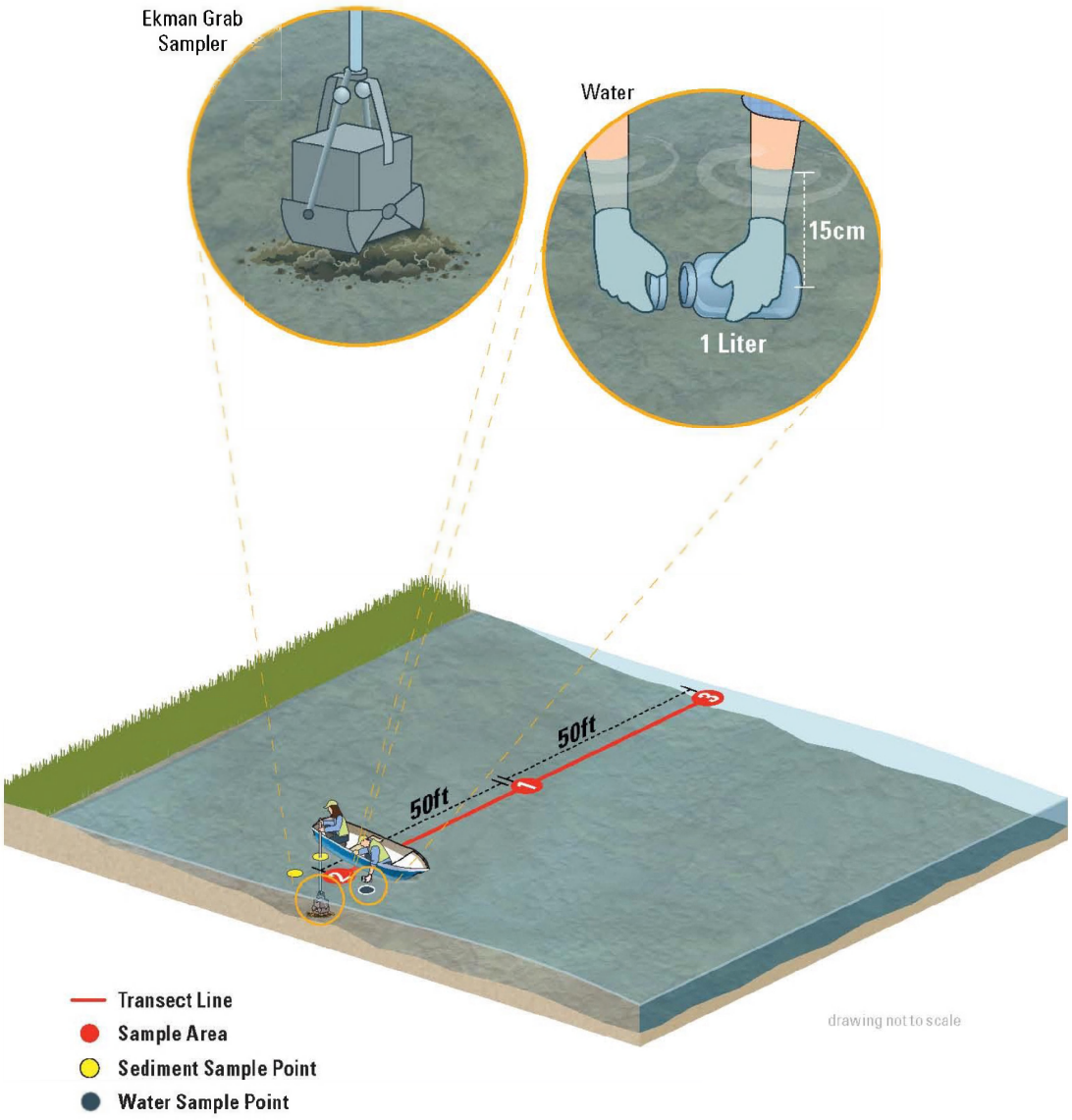

Figure A3.1b. Pictorial Depiction of Nearshore Sampling Work Plans: Pictorial Depiction of Field Methods for the Nearshore Pre-Assessment SWP.

Table A3.1. Nearshore Forensic Classification Codes in all Nearshore Investigations.

a. Breakdown of Nearshore Samples by State

Category	Louisiana	Mississippi	Alabama	Florida	All States
Total Samples	388	-	-	-	388
Classification Codes A+B+C	195	-	-	-	195
Classification Code A	24	-	-	-	24
Classification Code B	82	-	-	-	82
Classification Code C	89	-	-	-	89
Indeterminate Code D	193	-	-	-	193
Non-Match Code E	-	-	-	-	-
% Classification Codes A+B+C	50%	na	na	na	50%
Classification Code A	6%	na	na	na	6%
Classification Code B	21%	na	na	na	21%
Classification Code C	23%	na	na	na	23%
Indeterminate Code D	50%	na	na	na	50%
Non-Match Code E	0%	na	na	na	0%

na - not analyzed nd - not detected no - not observed

b. Summary of PAH Concentration in Impacted Nearshore Samples by State

Category	Louisiana	Mississippi	Alabama	Florida	All States
Solid (Soil, Sediments, Particulates) PetPAH_{27} µg/kg dry in Classification Codes A+B+C					
Count	195	na	na	na	195
Minimum	16	na	na	na	16
5th Percentile	58	na	na	na	58
25th Percentile	119	na	na	na	119
50th Percentile (Median)	246	na	na	na	246
75th Percentile	482	na	na	na	482
95th Percentile	2,030	na	na	na	2,030
Maximum	11,400	na	na	na	11,400

na - not analyzed nd - not detected no - not observed

Table A3.2. Nearshore Forensic Classification Codes in Nearshore Baseline Investigation Samples.

a. Breakdown of Nearshore Baseline Investigations Samples by State

Category	Louisiana	Mississippi	Alabama	Florida	All States
Total Samples	149	-	-	-	149
Classification Codes A+B+C	3	-	-	-	3
Classification Code A	-	-	-	-	-
Classification Code B	3	-	-	-	3
Classification Code C	-	-	-	-	-
Indeterminate Code D	146	-	-	-	146
Non-Match Code E	-	-	-	-	-
% Classification Codes A+B+C	2%	na	na	na	2%
Classification Code A	0%	na	na	na	0%
Classification Code B	2%	na	na	na	2%
Classification Code C	0%	na	na	na	0%
Indeterminate Code D	98%	na	na	na	98%
Non-Match Code E	0%	na	na	na	0%

na - not analyzed nd - not detected no - not observed

b. Summary of PAH Concentrations in Impacted Nearshore Baseline Samples

Category	Louisiana	Mississippi	Alabama	Florida	All States
Solid (Soil, Sediments, Particulates) $PetPAH_{27}$ µg/kg dry in Classification Codes A+B+C					
Count	3	na	na	na	3
Minimum	247	na	na	na	247
5th Percentile	254	na	na	na	254
25th Percentile	282	na	na	na	282
50th Percentile (Median)	318	na	na	na	318
75th Percentile	370	na	na	na	370
95th Percentile	412	na	na	na	412
Maximum	422	na	na	na	422

na - not analyzed nd - not detected no - not observed

Table A3.3. Nearshore Forensic Classification Codes and PAH Concentrations in Baseline Samples by Zone.

a. Classification Codes in Baseline Samples by Zone

Category	Zone A	Zone B	Zone C	Zone D	All Zones
Total Samples	41	14	5	89	149
Classification Codes A+B+C	-	-	1	2	3
Classification Code A	-	-	-	-	-
Classification Code B	-	-	1	2	3
Classification Code C	-	-	-	-	-
Indeterminate Code D	41	14	4	87	146
Non-Match Code E	-	-	-	-	-
% Classification Codes A+B+C	0%	0%	20%	2%	2%
Classification Code A	0%	0%	0%	0%	0%
Classification Code B	0%	0%	20%	2%	2%
Classification Code C	0%	0%	0%	0%	0%
Indeterminate Code D	100%	100%	80%	98%	98%
Non-Match Code E	0%	0%	0%	0%	0%

na - not analyzed nd - not detected no - not observed

b. PAH Concentrations in Baseline Samples by Zone

Category	Zone A	Zone B	Zone C	Zone D	All Zones
Solid (Soil, Sediments, Particulates) $PetPAH_{27}$ µg/kg dry in Classification Codes A+B+C+D					
Count	41	14	5	89	149
Minimum	9	10	1	1	1
5th Percentile	22	17	16	13	13
25th Percentile	41	72	72	47	43
50th Percentile (Median)	66	132	74	97	87
75th Percentile	126	662	205	202	178
95th Percentile	206	1,580	239	655	697
Maximum	358	2,410	247	6,040	6,040

na - not analyzed nd - not detected no - not observed

Table A3.4. Nearshore Forensic Classification Codes and PAH Concentrations in Pre-Assessment Samples.

a. Classification Codes in Pre-Assessment Samples by State.

Category	Louisiana	Mississippi	Alabama	Florida	All States
Total Samples	239	-	-	-	239
Classification Codes A+B+C	192	-	-	-	192
Classification Code A	24	-	-	-	24
Classification Code B	79	-	-	-	79
Classification Code C	89	-	-	-	89
Indeterminate Code D	47	-	-	-	47
Non-Match Code E	-	-	-	-	-
% Classification Codes A+B+C	80%	na	na	na	80%
Classification Code A	10%	na	na	na	10%
Classification Code B	33%	na	na	na	33%
Classification Code C	37%	na	na	na	37%
Indeterminate Code D	20%	na	na	na	20%
Non-Match Code E	0%	na	na	na	0%

na - not analyzed nd - not detected no - not observed

b. PAH Concentrations in Nearshore Pre-Assessment Samples containing Macondo Oil.

Category	Louisiana	Mississippi	Alabama	Florida	All States
Solid (Soil, Sediments, Particulates) $PetPAH_{27}$ µg/kg dry in Classification Codes A+B+C					
Count	192	na	na	na	192
Minimum	16	na	na	na	16
5th Percentile	58	na	na	na	58
25th Percentile	117	na	na	na	117
50th Percentile (Median)	245	na	na	na	245
75th Percentile	482	na	na	na	482
95th Percentile	2,030	na	na	na	2,030
Maximum	11,400	na	na	na	11,400

na - not analyzed nd - not detected no - not observed

Table A3.5. Nearshore Forensic Classification Codes in Nearshore Pre-Assessment Investigation Samples by Zone.

a. Breakdown of Macondo Oil Detections in Nearshore Pre-Assessment Samples by Zone

Category	Zone A	Zone B	Zone C	Zone D	All Zones
Total Samples	149	53	30	7	239
Classification Codes A+B+C	118	44	25	5	192
Classification Code A	15	6	-	3	24
Classification Code B	48	15	14	2	79
Classification Code C	55	23	11	-	89
Indeterminate Code D	31	9	5	2	47
Non-Match Code E	-	-	-	-	-
% Classification Codes A+B+C	79%	83%	83%	71%	80%
Classification Code A	10%	11%	0%	43%	10%
Classification Code B	32%	28%	47%	29%	33%
Classification Code C	37%	43%	37%	0%	37%
Indeterminate Code D	21%	17%	17%	29%	20%
Non-Match Code E	0%	0%	0%	0%	0%

na - not analyzed nd - not detected no - not observed

b. Breakdown of PAH Concentrations in Pre-assessment Samples by Zone

Category	Zone A	Zone B	Zone C	Zone D	All Zones
Solid (Soil, Sediments, Particulates) $PetPAH_{27}$ µg/kg dry in Classification Codes A+B+C+D					
Count	149	53	30	7	239
Minimum	7	48	7	56	7
5th Percentile	47	60	18	58	46
25th Percentile	117	94	74	66	94
50th Percentile (Median)	292	187	130	72	218
75th Percentile	592	448	267	173	483
95th Percentile	3,320	1,020	537	322	2,040
Maximum	35,800	5,340	1,700	384	35,800

na - not analyzed nd - not detected no - not observed

Table A3.6. Summary of Percent Depletion of $PetPAH_{27}$ in Macondo Oil Impacted Nearshore Samples.

a. Summary of Percent Depletion of $PetPAH_{27}$ in Baseline Match A+B+C

Category	Louisiana	Mississippi	Alabama	Florida	All States
Percent Depletion Solid (Soil, Sediments, Particulates) Matches A+B+C					
Count	3	na	na	na	3
Minimum	94	na	na	na	94
5th Percentile	94	na	na	na	94
25th Percentile	95	na	na	na	95
50th Percentile (Median)	96	na	na	na	96
75th Percentile	98	na	na	na	98
95th Percentile	99	na	na	na	99
Maximum	99	na	na	na	99

na - not analyzed nd - not detected no - not observed

b. Summary of Percent Depletion of $PetPAH_{27}$ in Pre-assessment Match A+B+C

Category	Louisiana	Mississippi	Alabama	Florida	All States
Percent Depletion Solid (Soil, Sediments, Particulates) Matches A+B+C					
Count	192	na	na	na	192
Minimum	85	na	na	na	85
5th Percentile	90	na	na	na	90
25th Percentile	95	na	na	na	95
50th Percentile (Median)	96	na	na	na	96
75th Percentile	97	na	na	na	97
95th Percentile	98	na	na	na	98
Maximum	99	na	na	na	99

na - not analyzed nd - not detected no - not observed

APPENDIX 4

FISH INFORMATION

Fish TWG Submerged Oil Sampling Work Plan Summary

The Fish TWG created the Submerged Oil sampling work plans (SWPs) for the collection of pom-pom and sediment samples between July, 2010 and August, 2011. The selection of sample locations included a mixture of statistical and opportunistic strategies to detect and quantify the Macondo oil using sorbent material matrices and sediment samplers. Submerged oil refers to ephemeral oil in the water column or surface sediment. The 2010 Submerged Oil work plan featured sorbent snare drags (pom-poms) to help detect submerged oil. Eventually, the pom-poms were used as passive samplers and placed for extended time intervals at 1) the sediment-water interface and 2) floating in the water column. Sediment samples were collected near pom-poms that appeared to be visually stained. A summary of the pom-pom and sediment sampling techniques created by the Fish TWG follow.

2010 Submerged Oil Sampling Work Plan

Two successive 2010 Submerged Oil Sampling Work Plans (SWP) characterized ephemeral Submerged Oil impacts in nearshore, shallow sub tidal habitats. First, the Nearshore Water Column Injury Ephemeral Data Collection: Submerged Oil Reconnaissance Plan (hereafter 2010 Submerged Oil SWP) provided an initial reconnaissance in very shallow (<3m) subtidal habitats in the very nearshore (<100 m from shoreline) water column between July and September of 2010. Sorbent pom-poms were dragged along transects that were situated 50 meters apart from one another (Figure A4.1a; Figure A4.1b). Transects outlined in the figures, as well as variations of these transects, were used. Along each transect, pom-poms were visually assessed to indicate a relative regional degree of oiling (heavy, medium, light or very light). Samples were collected at random locations along each transect. 54 pom-pom and 11 sediment samples collected under this SWP were approved for quantitative chemical analysis and summarized in this report.

Moving from these early reconnaissance efforts, the second sampling plan, the Nearshore Ephemeral Data Collection: Submerged Oil Characterization Across Multiple Habitats SWP (hereafter 2010 Submerged Oil SWP), was executed between mid-September and mid-December of 2010. It provided an assessment of the presence or absence of oil in the shallow (<20m) subtidal water column and benthic habitats . Employing variations of the sampling strategies outlined in Figures 1a-c (Appendix VI), multiple reconnaissance techniques (i.e., sorbent snare drags and stationary sentinel samples consisting of weighted chains and petroleum sorbent pom-poms) were employed to qualitatively identify potential Submerged Oil impacts in four strata (I. back-bay, II. gulf-facing shoreline, III. nearshore and IV. Mississippi River Delta). These data helped target shallow nearshore environments proximal to shorelines that exhibited potential heavy, moderate, light, very light oiling, or no evidence of oil. These qualitative oiling categories were based on the presence of oil on:

- sorbent pom-poms deployed in sentinel arrays,
- sorbent pom-poms dragged in transects across the benthos, or
- inferences of visible or UV fluorescent oiling in pom-pom and sediment grab samples.

Pom-pom, sediment and surface water samples were collected for quantitative chemical analysis

at a randomly selected subset of the sampling locations from each oiling category.

Submerged Oil Characterization Across Multiple Habitats for Assessment of Persistent Exposures in Nearshore Sediments

The nearshore field teams recognized that the degree of oiling generally decreased with increasing distance from the shoreline during the 2010 sampling season. Many nearshore impacts that resided in very shallow water (< 1 m) were inaccessible with the vessels and equipment used in 2010 (Emsbo-Mattingly 2015b). Consequently, the Submerged Oil Characterization Across Multiple Habitats for Assessment of Persistent Exposures in Nearshore Sediments (hereafter 2011 Submerged Oil SWP) focused on sediments within 500 meters of the shoreline, producing a high sampling frequency in the shallow nearshore zone. Sampling took place along 500 m transects that ran perpendicular to the shoreline and made up four zones (1-10 m from shore, 10-20 m from shore, 20-50 m from shore, 50-500 m from shore) (Figure A4.1d). From each of these zones, one sediment core was collected for contaminant characterization. Sediment samples represented two depth strata (0-2 cm and 2-4 cm) and were analyzed in the laboratory for saturated hydrocarbons (SHC)/total petroleum hydrocarbons (TPH), alkylated polynuclear aromatic hydrocarbons (alkylated PAHs), biomarkers, and total organic carbon (TOC).

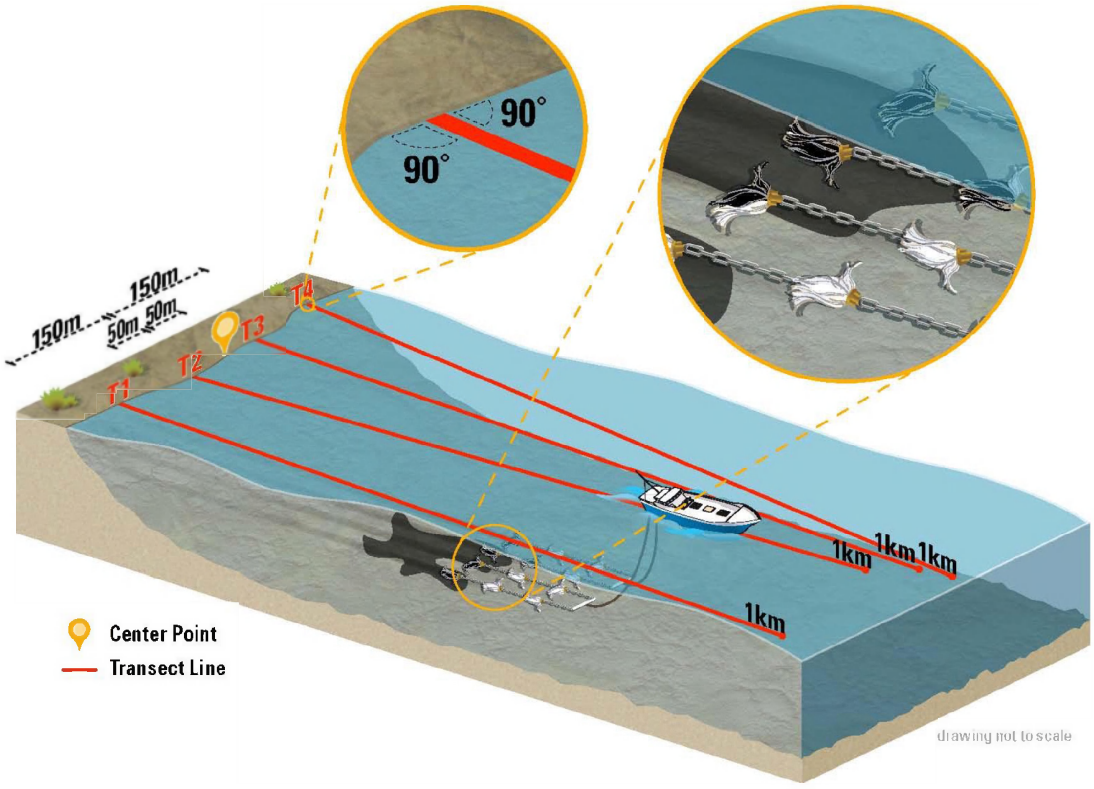

Figure A4.1a. Pictorial representation of Submerged Oil Field Sampling Plans: Pom-Pom Chain Drags Along Transects Extending from the Shoreline.

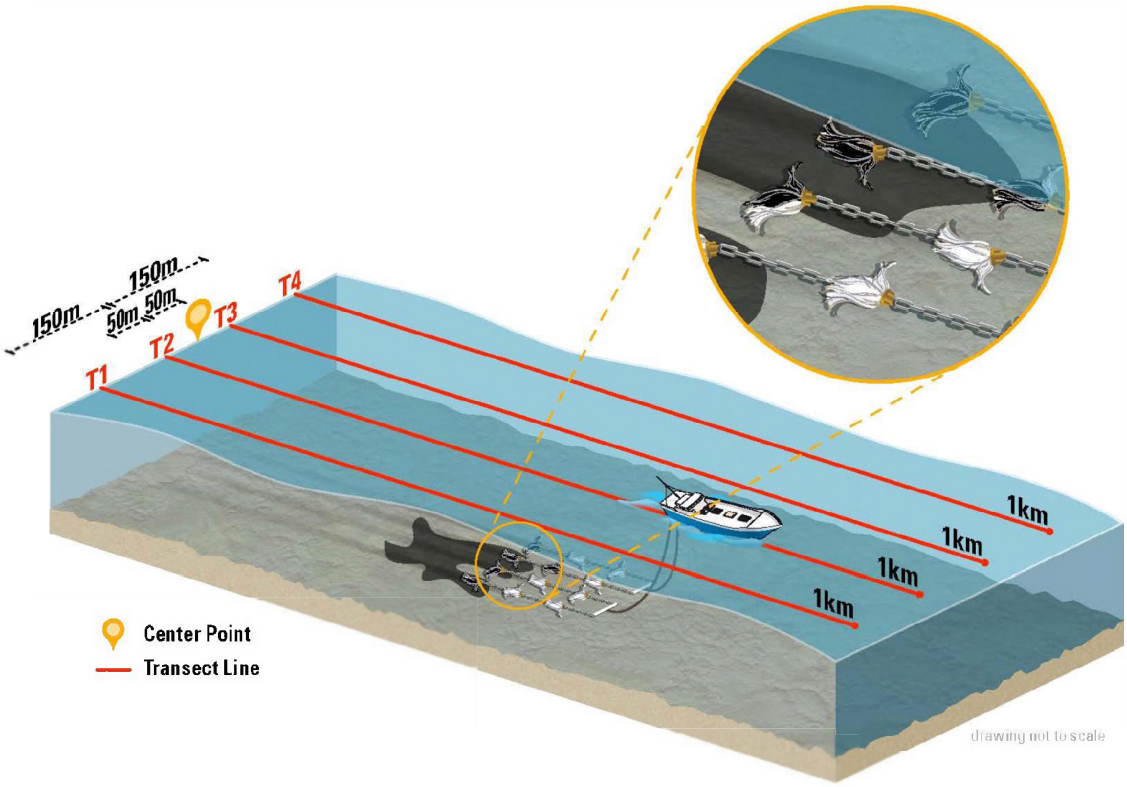

Figure A4.1b. Pictorial representation of Submerged Oil Field Sampling Plans: Pom-Pom Chain Drags Along Open Water Transects.

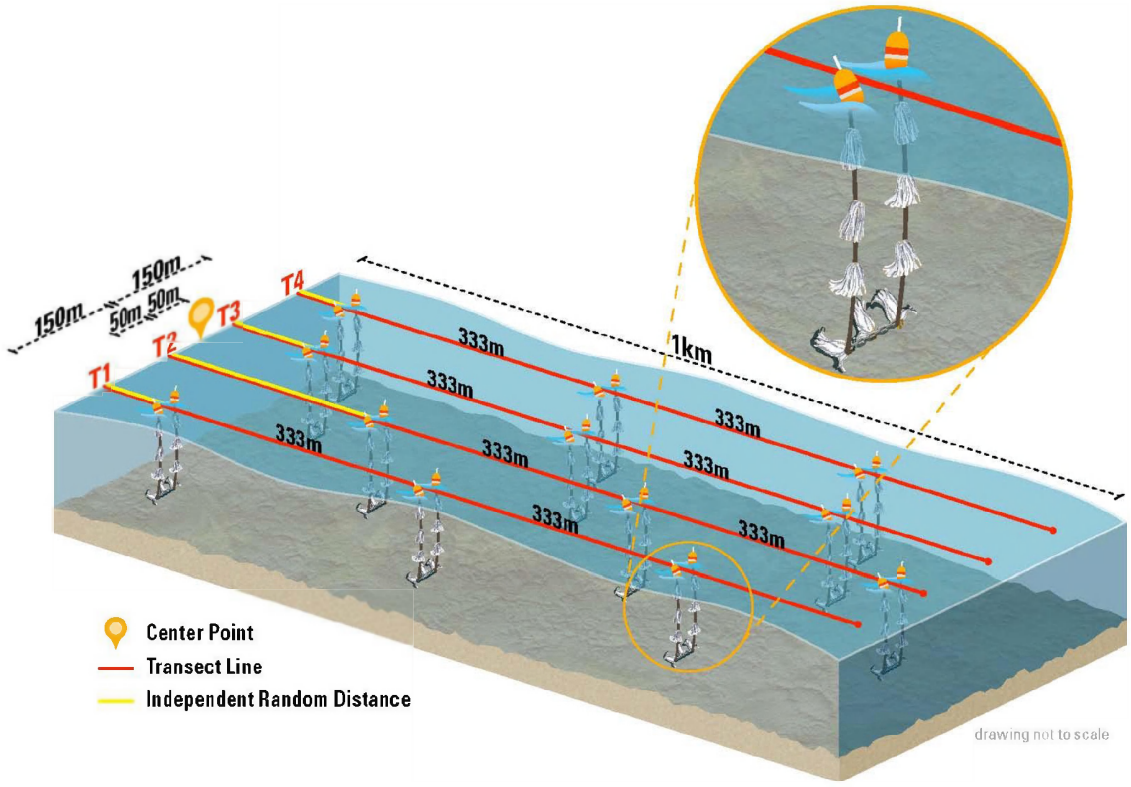

Figure A4.1c. Pictorial representation of Submerged Oil Field Sampling Plans: Pom-Pom Sentinels Along Transects.

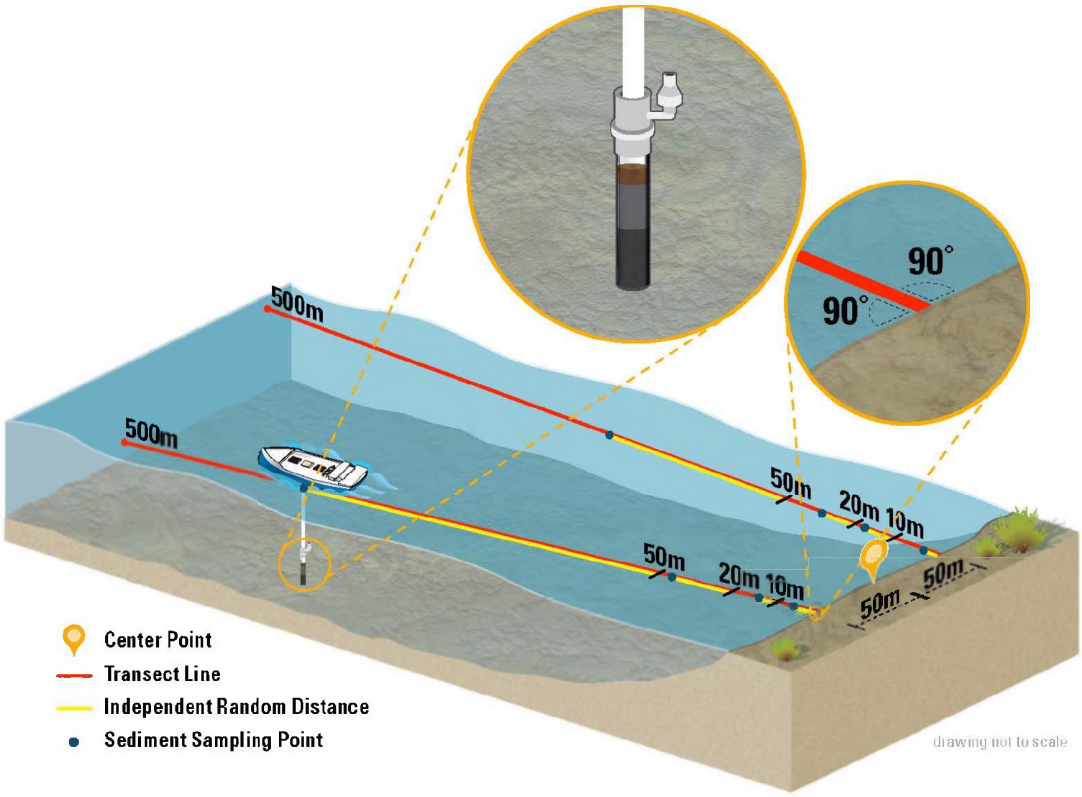

Figure A4.1d. Pictorial representation of Submerged Oil Field Sampling Plans: 2011 Sediment Sampling Transects.

Table A4.1. Nearshore Forensic Classification Codes and Concentrations in 2010 Submerged Oil Investigation Samples.

a. Breakdown by Sample.

Category	Louisiana	Mississippi	Alabama	Florida	All States
Total Samples	110	123	170	246	649
Classification Codes A+B+C	62	15	80	38	195
Classification Code A	6	4	52	15	77
Classification Code B	16	3	18	8	45
Classification Code C	40	8	10	15	73
Indeterminate Code D	48	108	90	208	454
Non-Match Code E	-	-	-	-	-
% Classification Codes A+B+C	56%	12%	47%	15%	30%
Classification Code A	5%	3%	31%	6%	12%
Classification Code B	15%	2%	11%	3%	7%
Classification Code C	36%	7%	6%	6%	11%
Indeterminate Code D	44%	88%	53%	85%	70%
Non-Match Code E	0%	0%	0%	0%	0%

na - not analyzed nd - not detected no - not observed

b. Breakdown of Pom-pom Samples by State

Category	Louisiana	Mississippi	Alabama	Florida	All States
Total Samples	54	107	106	214	481
Classification Codes A+B+C	40	14	50	31	135
Classification Code A	2	4	34	10	50
Classification Code B	4	2	10	7	23
Classification Code C	34	8	6	14	62
Indeterminate Code D	14	93	56	183	346
Non-Match Code E	-	-	-	-	-
% Classification Codes A+B+C	74%	13%	47%	14%	28%
Classification Code A	4%	4%	32%	5%	10%
Classification Code B	7%	2%	9%	3%	5%
Classification Code C	63%	7%	6%	7%	13%
Indeterminate Code D	26%	87%	53%	85%	72%
Non-Match Code E	0%	0%	0%	0%	0%

na - not analyzed nd - not detected no - not observed

Table A4.1. Nearshore Forensic Classification Codes and Concentrations in 2010 Submerged Oil Investigation Samples.

c. Breakdown of Sediment Samples by State

Category	Louisiana	Mississippi	Alabama	Florida	All States
Total Samples	56	16	64	31	167
Classification Codes A+B+C	22	1	30	6	59
Classification Code A	4	-	18	4	26
Classification Code B	12	1	8	1	22
Classification Code C	6	-	4	1	11
Indeterminate Code D	34	15	34	25	108
Non-Match Code E	-	-	-	-	-
% Classification Codes A+B+C	39%	6%	47%	19%	35%
Classification Code A	7%	0%	28%	13%	16%
Classification Code B	21%	6%	13%	3%	13%
Classification Code C	11%	0%	6%	3%	7%
Indeterminate Code D	61%	94%	53%	81%	65%
Non-Match Code E	0%	0%	0%	0%	0%

na - not analyzed nd - not detected no - not observed

Table A4.1. Nearshore Forensic Classification Codes and Concentrations in 2010 Submerged Oil Investigation Samples.

d. Summary of PAH Detections in Impacted 2010 Submerged Oil Investigation Samples

Category	Louisiana	Mississippi	Alabama	Florida	All States
Solid (Soil, Sediments, Particulates) $PetPAH_{27}$ µg/kg dry in Classification Codes A+B+C					
Count	22	1	30	6	59
Minimum	53	35	nd	3.6	nd
5th Percentile	82	35	0.18	17	0.95
25th Percentile	141	35	4.1	58	12
50th Percentile (Median)	413	35	14	109	89
75th Percentile	529	35	56	449	413
95th Percentile	670	35	511	674	674
Maximum	106,000	35	1,860	716	106,000
Pom-Pom $PetPAH_{27}$ µg Classification Codes A+B+C					
Count	12	64	123	60	259
Minimum	0.24	0.27	0.21	0.29	0.21
5th Percentile	0.24	0.32	0.34	0.32	0.33
25th Percentile	0.36	0.41	0.54	0.40	0.45
50th Percentile (Median)	0.40	0.50	0.75	0.50	0.59
75th Percentile	0.48	0.65	0.98	0.77	0.88
95th Percentile	2.5	12	1.6	1.2	1.7
Maximum	4.9	38	5.3	1.8	38
Pom-Pom Solid $PetPAH_{27}$ µg/kg Classification Codes A+B+C					
Count	na	na	na	1	1
Minimum	na	na	na	2,490,000	2,490,000
5th Percentile	na	na	na	2,490,000	2,490,000
25th Percentile	na	na	na	2,490,000	2,490,000
50th Percentile (Median)	na	na	na	2,490,000	2,490,000
75th Percentile	na	na	na	2,490,000	2,490,000
95th Percentile	na	na	na	2,490,000	2,490,000
Maximum	na	na	na	2,490,000	2,490,000

na - not analyzed nd - not detected no - not observed

Table A4.2. Nearshore Forensic Classification Codes in 2011 Submerged Oil Investigation Samples.

a. Breakdown by Sample.

Category	Louisiana	Mississippi	Alabama	Florida	All States
Total Samples	979	100	184	206	1,469
Classification Codes A+B+C	411	9	35	8	463
Classification Code A	19	3	10	5	37
Classification Code B	154	4	21	2	181
Classification Code C	238	2	4	1	245
Indeterminate Code D	568	91	149	198	1,006
Non-Match Code E	-	-	-	-	-
% Classification Codes A+B+C	42%	9%	19%	4%	32%
Classification Code A	2%	3%	5%	2%	3%
Classification Code B	16%	4%	11%	1%	12%
Classification Code C	24%	2%	2%	0%	17%
Indeterminate Code D	58%	91%	81%	96%	68%
Non-Match Code E	0%	0%	0%	0%	0%

na - not analyzed nd - not detected no - not observed

b. Breakdown by Site.

Category	Louisiana	Mississippi	Alabama	Florida	All States
Total Samples	158	41	61	87	347
Classification Codes A+B+C	90	6	12	4	112
Maximum Match Per Site					
Classification Code A	8	2	6	3	19
Classification Code B	31	3	6	1	41
Classification Code C	51	1	-	-	52
Indeterminate Code D	68	35	49	83	235
Non-Match Code E	-	-	-	-	-
% Classification Codes A+B+C	57%	15%	20%	5%	32%
Classification Code A	5%	5%	10%	3%	5%
Classification Code B	20%	7%	10%	1%	12%
Classification Code C	32%	2%	0%	0%	15%
Indeterminate Code D	43%	85%	80%	95%	68%
Non-Match Code E	0%	0%	0%	0%	0%

Table A4.2. Nearshore Forensic Classification Codes in 2011 Submerged Oil Investigation Samples.

c. Summary of PAH Detections in Impacted 2011 Submerged Oil Samples

Category	Louisiana	Mississippi	Alabama	Florida	All States
Solid (Soil, Sediments, Particulates) $PetPAH_{27}$ µg/kg dry in Classification Codes A+B+C					
Count	411	9	35	8	463
Minimum	12	11	6.1	9.0	6.1
5th Percentile	48	17	12	9.8	29
25th Percentile	102	29	22	43	91
50th Percentile (Median)	181	47	56	213	170
75th Percentile	388	77	166	359	373
95th Percentile	1,510	357	5,750	467	1,530
Maximum	58,100	429	16,400	515	58,100

na - not analyzed nd - not detected no - not observed

Table A4.3. Nearshore Forensic Classification Codes in 2010 Submerged Oil Pom-pom Samples by Zone.

a. Breakdown of All 2010 Pom-Pom Samples by Zone.

Category	Zone A	Zone B	Zone C	Zone D	All Zones
Total Samples	14	166	182	119	481
Classification Codes A+B+C	2	43	39	51	135
Classification Code A	2	18	26	4	50
Classification Code B	-	8	7	8	23
Classification Code C	-	17	6	39	62
Indeterminate Code D	12	123	143	68	346
Non-Match Code E	-	-	-	-	-
% Classification Codes A+B+C	14%	26%	21%	43%	28%
Classification Code A	14%	11%	14%	3%	10%
Classification Code B	0%	5%	4%	7%	5%
Classification Code C	0%	10%	3%	33%	13%
Indeterminate Code D	86%	74%	79%	57%	72%
Non-Match Code E	0%	0%	0%	0%	0%

na - not analyzed nd - not detected no - not observed

b. Breakdown of 2010 Louisiana Pom-Pom Samples by Zone

Category	Zone A	Zone B	Zone C	Zone D	All Zones
Total Samples	-	-	-	54	54
Classification Codes A+B+C	-	-	-	40	40
Classification Code A	-	-	-	2	2
Classification Code B	-	-	-	4	4
Classification Code C	-	-	-	34	34
Indeterminate Code D	-	-	-	14	14
Non-Match Code E	-	-	-	-	-
% Classification Codes A+B+C	na	na	na	74%	74%
Classification Code A	na	na	na	4%	4%
Classification Code B	na	na	na	7%	7%
Classification Code C	na	na	na	63%	63%
Indeterminate Code D	na	na	na	26%	26%
Non-Match Code E	na	na	na	0%	0%

na - not analyzed nd - not detected no - not observed

Table A4.3. Nearshore Forensic Classification Codes in 2010 Submerged Oil Pom-pom Samples by Zone.

c. Breakdown of 2010 Mississippi Pom-Pom Samples by Zone

Category	Zone A	Zone B	Zone C	Zone D	All Zones
Total Samples	-	24	51	32	107
Classification Codes A+B+C	-	7	3	4	14
Classification Code A	-	1	2	1	4
Classification Code B	-	1	1	-	2
Classification Code C	-	5	-	3	8
Indeterminate Code D	-	17	48	28	93
Non-Match Code E	-	-	-	-	-
% Classification Codes A+B+C	na	29%	6%	13%	13%
Classification Code A	na	4%	4%	3%	4%
Classification Code B	na	4%	2%	0%	2%
Classification Code C	na	21%	0%	9%	7%
Indeterminate Code D	na	71%	94%	88%	87%
Non-Match Code E	na	0%	0%	0%	0%

na - not analyzed nd - not detected no - not observed

d. Breakdown of 2010 Alabama Pom-Pom Samples by Zone

Category	Zone A	Zone B	Zone C	Zone D	All Zones
Total Samples	1	42	46	17	106
Classification Codes A+B+C	-	19	25	6	50
Classification Code A	-	13	20	1	34
Classification Code B	-	3	3	4	10
Classification Code C	-	3	2	1	6
Indeterminate Code D	1	23	21	11	56
Non-Match Code E	-	-	-	-	-
% Classification Codes A+B+C	0%	45%	54%	35%	47%
Classification Code A	0%	31%	43%	6%	32%
Classification Code B	0%	7%	7%	24%	9%
Classification Code C	0%	7%	4%	6%	6%
Indeterminate Code D	100%	55%	46%	65%	53%
Non-Match Code E	0%	0%	0%	0%	0%

na - not analyzed nd - not detected no - not observed

Table A4.3. Nearshore Forensic Classification Codes in 2010 Submerged Oil Pom-Pom Samples by Zone.

e. Breakdown of 2010 Florida Pom-pom Samples by Zone

Category	Zone A	Zone B	Zone C	Zone D	All Zones
Total Samples	13	100	85	16	214
Classification Codes A+B+C	2	17	11	1	31
Classification Code A	2	4	4	-	10
Classification Code B	-	4	3	-	7
Classification Code C	-	9	4	1	14
Indeterminate Code D	11	83	74	15	183
Non-Match Code E	-	-	-	-	-
% Classification Codes A+B+C	15%	17%	13%	6%	14%
Classification Code A	15%	4%	5%	0%	5%
Classification Code B	0%	4%	4%	0%	3%
Classification Code C	0%	9%	5%	6%	7%
Indeterminate Code D	85%	83%	87%	94%	86%
Non-Match Code E	0%	0%	0%	0%	0%

na - not analyzed nd - not detected no - not observed

Table A4.4. Nearshore Forensic Classification Codes in 2010 Submerged Oil Sediment Samples by Zone.

a. Breakdown of all 2010 Sediment Samples by Zone

Category	Zone A	Zone B	Zone C	Zone D	All Zones
Total Samples	15	73	55	24	167
Classification Codes A+B+C	9	30	15	5	59
Classification Code A	5	11	7	3	26
Classification Code B	3	13	4	2	22
Classification Code C	1	6	4	-	11
Indeterminate Code D	6	43	40	19	108
Non-Match Code E	-	-	-	-	-
% Classification Codes A+B+C	60%	41%	27%	21%	35%
Classification Code A	33%	15%	13%	13%	16%
Classification Code B	20%	18%	7%	8%	13%
Classification Code C	7%	8%	7%	0%	7%
Indeterminate Code D	40%	59%	73%	79%	65%
Non-Match Code E	0%	0%	0%	0%	0%

na - not analyzed nd - not detected no - not observed

b. Breakdown of 2010 Louisiana Sediment Samples by Zone

Category	Zone A	Zone B	Zone C	Zone D	All Zones
Total Samples	10	28	10	8	56
Classification Codes A+B+C	7	14	1	-	22
Classification Code A	4	-	-	-	4
Classification Code B	2	10	-	-	12
Classification Code C	1	4	1	-	6
Indeterminate Code D	3	14	9	8	34
Non-Match Code E	-	-	-	-	-
% Classification Codes A+B+C	70%	50%	10%	0%	39%
Classification Code A	40%	0%	0%	0%	7%
Classification Code B	20%	36%	0%	0%	21%
Classification Code C	10%	14%	10%	0%	11%
Indeterminate Code D	30%	50%	90%	100%	61%
Non-Match Code E	0%	0%	0%	0%	0%

na - not analyzed nd - not detected no - not observed

Table A4.4. Nearshore Forensic Classification Codes in 2010 Submerged Oil Sediment Samples by Zone.

c. Breakdown of 2010 Mississippi Sediment Samples by Zone

Category	Zone A	Zone B	Zone C	Zone D	All Zones
Total Samples	-	5	7	4	16
Classification Codes A+B+C	-	-	1	-	1
Classification Code A	-	-	-	-	-
Classification Code B	-	-	1	-	1
Classification Code C	-	-	-	-	-
Indeterminate Code D	-	5	6	4	15
Non-Match Code E	-	-	-	-	-
% Classification Codes A+B+C	na	0%	14%	0%	6%
Classification Code A	na	0%	0%	0%	0%
Classification Code B	na	0%	14%	0%	6%
Classification Code C	na	0%	0%	0%	0%
Indeterminate Code D	na	100%	86%	100%	94%
Non-Match Code E	na	0%	0%	0%	0%

na - not analyzed nd - not detected no - not observed

d. Breakdown of 2010 Alabama Sediment Samples by Zone

Category	Zone A	Zone B	Zone C	Zone D	All Zones
Total Samples	1	24	27	12	64
Classification Codes A+B+C	-	12	13	5	30
Classification Code A	-	8	7	3	18
Classification Code B	-	3	3	2	8
Classification Code C	-	1	3	-	4
Indeterminate Code D	1	12	14	7	34
Non-Match Code E	-	-	-	-	-
% Classification Codes A+B+C	0%	50%	48%	42%	47%
Classification Code A	0%	33%	26%	25%	28%
Classification Code B	0%	13%	11%	17%	13%
Classification Code C	0%	4%	11%	0%	6%
Indeterminate Code D	100%	50%	52%	58%	53%
Non-Match Code E	0%	0%	0%	0%	0%

na - not analyzed nd - not detected no - not observed

Table A4.4. Nearshore Forensic Classification Codes in 2010 Submerged Oil Sediment Samples by Zone.

e. Breakdown of 2010 Florida Sediment Samples by Zone

Category	Zone A	Zone B	Zone C	Zone D	All Zones
Total Samples	4	16	11	-	31
Classification Codes A+B+C	2	4	-	-	6
Classification Code A	1	3	-	-	4
Classification Code B	1	-	-	-	1
Classification Code C	-	1	-	-	1
Indeterminate Code D	2	12	11	-	25
Non-Match Code E	-	-	-	-	-
% Classification Codes A+B+C	50%	25%	0%	na	19%
Classification Code A	25%	19%	0%	na	13%
Classification Code B	25%	0%	0%	na	3%
Classification Code C	0%	6%	0%	na	3%
Indeterminate Code D	50%	75%	100%	na	81%
Non-Match Code E	0%	0%	0%	na	0%

na - not analyzed nd - not detected no - not observed

Table A4.5. Nearshore Forensic Classification Codes in 2011 Submerged Oil Samples by Zone.

a. Breakdown of all 2011 Submerged Oil Samples by Zone

Category	Zone A	Zone B	Zone C	Zone D	All Zones
Total Samples	409	357	364	330	1,460
Classification Codes A+B+C	155	118	134	51	458
Classification Code A	14	11	9	1	35
Classification Code B	56	45	50	28	179
Classification Code C	85	62	75	22	244
Indeterminate Code D	254	239	230	279	1,002
Non-Match Code E	-	-	-	-	-
% Classification Codes A+B+C	38%	33%	37%	15%	31%
Classification Code A	3%	3%	2%	0%	2%
Classification Code B	14%	13%	14%	8%	12%
Classification Code C	21%	17%	21%	7%	17%
Indeterminate Code D	62%	67%	63%	85%	69%
Non-Match Code E	0%	0%	0%	0%	0%
*9 samples of opportunity not assigned a zone					

na - not analyzed nd - not detected no - not observed

b. Breakdown of 2011 Submerged Oil Louisiana Samples by Zone

Category	Zone A	Zone B	Zone C	Zone D	All Zones
Total Samples	266	234	246	227	973
Classification Codes A+B+C	133	107	117	49	406
Classification Code A	5	8	3	1	17
Classification Code B	44	40	42	26	152
Classification Code C	84	59	72	22	237
Indeterminate Code D	133	127	129	178	567
Non-Match Code E	-	-	-	-	-
% Classification Codes A+B+C	50%	46%	48%	22%	42%
Classification Code A	2%	3%	1%	0%	2%
Classification Code B	17%	17%	17%	11%	16%
Classification Code C	32%	25%	29%	10%	24%
Indeterminate Code D	50%	54%	52%	78%	58%
Non-Match Code E	0%	0%	0%	0%	0%
*6 samples of opportunity not assigned a zone					

na - not analyzed nd - not detected no - not observed

Table A4.5. Nearshore Forensic Classification Codes in 2011 Submerged Oil Samples by Zone.

c. Breakdown of 2011 Submerged Oil Mississippi Samples by Zone

Category	Zone A	Zone B	Zone C	Zone D	All Zones
Total Samples	35	26	17	20	98
Classification Codes A+B+C	7	1	1	-	9
Classification Code A	3	-	-	-	3
Classification Code B	4	-	-	-	4
Classification Code C	-	1	1	-	2
Indeterminate Code D	28	25	16	20	89
Non-Match Code E	-	-	-	-	-
% Classification Codes A+B+C	20%	4%	6%	0%	9%
Classification Code A	9%	0%	0%	0%	3%
Classification Code B	11%	0%	0%	0%	4%
Classification Code C	0%	4%	6%	0%	2%
Indeterminate Code D	80%	96%	94%	100%	91%
Non-Match Code E	0%	0%	0%	0%	0%
*2 samples of opportunity not assigned a zone					

na - not analyzed nd - not detected no - not observed

d. Breakdown of 2011 Submerged Oil Alabama Samples by Zone

Category	Zone A	Zone B	Zone C	Zone D	All Zones
Total Samples	54	44	48	37	183
Classification Codes A+B+C	10	9	14	2	35
Classification Code A	3	2	5	-	10
Classification Code B	7	5	7	2	21
Classification Code C	-	2	2	-	4
Indeterminate Code D	44	35	34	35	148
Non-Match Code E	-	-	-	-	-
% Classification Codes A+B+C	19%	20%	29%	5%	19%
Classification Code A	6%	5%	10%	0%	5%
Classification Code B	13%	11%	15%	5%	11%
Classification Code C	0%	5%	4%	0%	2%
Indeterminate Code D	81%	80%	71%	95%	81%
Non-Match Code E	0%	0%	0%	0%	0%
*1 samples of opportunity not assigned a zone					

na - not analyzed nd - not detected no - not observed

Table A4.5. Nearshore Forensic Classification Codes in 2011 Submerged Oil Samples by Zone.

e. Breakdown of 2011 Submerged Oil Florida Samples by Zone

Category	Zone A	Zone B	Zone C	Zone D	All Zones
Total Samples	54	53	53	46	206
Classification Codes A+B+C	5	1	2	-	8
Classification Code A	3	1	1	-	5
Classification Code B	1	-	1	-	2
Classification Code C	1	-	-	-	1
Indeterminate Code D	49	52	51	46	198
Non-Match Code E	-	-	-	-	-
% Classification Codes A+B+C	9%	2%	4%	0%	4%
Classification Code A	6%	2%	2%	0%	2%
Classification Code B	2%	0%	2%	0%	1%
Classification Code C	2%	0%	0%	0%	0%
Indeterminate Code D	91%	98%	96%	100%	96%
Non-Match Code E	0%	0%	0%	0%	0%

na - not analyzed nd - not detected no - not observed

Table A4.6. PetPAH$_{27}$ Detections in Macondo Oil Impacted Submerged Oil Pom-Pom Samples Collected in 2010 by Zone.

a. All States.

Category	Zone A	Zone B	Zone C	Zone D	All Zones
Pom-Pom PetPAH$_{27}$ µg Classification Codes A+B+C					
Count	2	43	39	51	135
Minimum	1.6	0.01	0.23	0.17	0.01
5th Percentile	1.6	0.29	0.52	0.35	0.29
25th Percentile	1.6	0.46	0.81	0.57	0.61
50th Percentile (Median)	1.7	0.86	2.1	0.76	0.86
75th Percentile	1.7	4.6	5.1	0.99	2.6
95th Percentile	1.8	24	16	2.5	13
Maximum	1.8	35	36	5.8	36

na - not analyzed nd - not detected no - not observed

b. Louisiana.

Category	Zone A	Zone B	Zone C	Zone D	All Zones
Pom-PomPetPAH$_{27}$ µg Classification Codes A+B+C					
Count	na	na	na	40	40
Minimum	na	na	na	0.30	0.30
5th Percentile	na	na	na	0.41	0.41
25th Percentile	na	na	na	0.62	0.62
50th Percentile (Median)	na	na	na	0.76	0.76
75th Percentile	na	na	na	1.0	1.0
95th Percentile	na	na	na	1.4	1.4
Maximum	na	na	na	3.4	3.4

na - not analyzed nd - not detected no - not observed

Table A4.6. $PetPAH_{27}$ Detections in Macondo Oil Impacted Submerged Oil Pom-Pom Samples Collected in 2010 by Zone.

c. Mississippi.

Category	Zone A	Zone B	Zone C	Zone D	All Zones
Pom-Pom $PetPAH_{27}$ µg Classification Codes A+B+C					
Count	na	7	3	4	14
Minimum	na	0.29	0.45	0.29	0.29
5th Percentile	na	0.29	0.62	0.30	0.29
25th Percentile	na	0.30	1.3	0.36	0.33
50th Percentile (Median)	na	0.44	2.1	0.62	0.50
75th Percentile	na	0.86	2.2	1.3	1.9
95th Percentile	na	3.8	2.3	2.5	3.6
Maximum	na	5.0	2.3	2.8	5.0

na - not analyzed nd - not detected no - not observed

d. Alabama.

Category	Zone A	Zone B	Zone C	Zone D	All Zones
Pom-Pom $PetPAH_{27}$ µg Classification Codes A+B+C					
Count	na	19	25	6	50
Minimum	na	0.01	0.23	0.17	0.01
5th Percentile	na	0.23	0.54	0.24	0.24
25th Percentile	na	0.74	1.6	0.47	0.80
50th Percentile (Median)	na	3.8	3.6	0.62	3.5
75th Percentile	na	7.4	7.4	0.79	7.3
95th Percentile	na	29	20	4.5	26
Maximum	na	35	36	5.8	36

na - not analyzed nd - not detected no - not observed

Table A4.6. PetPAH$_{27}$ Detections in Macondo Oil Impacted Submerged Oil Pom-Pom Samples Collected in 2010 by Zone.

e. Florida.

Category	Zone A	Zone B	Zone C	Zone D	All Zones
Pom-Pom PetPAH$_{27}$ µg Classification Codes A+B+C					
Count	2	17	11	1	31
Minimum	1.6	0.29	0.60	0.57	0.29
5th Percentile	1.6	0.34	0.62	0.57	0.37
25th Percentile	1.6	0.48	0.65	0.57	0.60
50th Percentile (Median)	1.7	0.65	0.81	0.57	0.81
75th Percentile	1.7	1.5	1.3	0.57	1.6
95th Percentile	1.8	4.7	3.8	0.57	4.8
Maximum	1.8	5.1	5.8	0.57	5.8

na - not analyzed nd - not detected no - not observed

Table A4.7. PetPAH$_{27}$ Concentrations in Macondo Oil Impacted Submerged Oil Sediment Samples Collected in 2010 by Zone.

a. All States.

Category	Zone A	Zone B	Zone C	Zone D	All Zones
Solid (Soil, Sediments, Particulates) PetPAH$_{27}$ µg/kg dry in Classification Codes A+B+C					
Count	9	30	15	5	59
Minimum	57	1.0	nd	nd	nd
5th Percentile	97	2.3	0.28	1.8	0.95
25th Percentile	165	21	10	9.1	12
50th Percentile (Median)	427	120	25	11	89
75th Percentile	668	421	59	11	413
95th Percentile	64,100	609	1,030	23	674
Maximum	106,000	716	1,860	26	106,000

na - not analyzed nd - not detected no - not observed

b. Louisiana.

Category	Zone A	Zone B	Zone C	Zone D	All Zones
Solid (Soil, Sediments, Particulates) PetPAH$_{27}$ µg/kg dry in Classification Codes A+B+C					
Count	7	14	1	na	22
Minimum	165	82	53	na	53
5th Percentile	187	90	53	na	82
25th Percentile	333	127	53	na	141
50th Percentile (Median)	529	338	53	na	413
75th Percentile	669	486	53	na	529
95th Percentile	74,600	583	53	na	670
Maximum	106,000	659	53	na	106,000

na - not analyzed nd - not detected no - not observed

Table A4.7. PetPAH$_{27}$ Concentrations in Macondo Oil Impacted Submerged Oil Sediment Samples Collected in 2010 by Zone.

c. Mississippi.

Category	Zone A	Zone B	Zone C	Zone D	All Zones
Solid (Soil, Sediments, Particulates) PetPAH$_{27}$ µg/kg dry in Classification Codes A+B+C					
Count	na	na	1	na	1
Minimum	na	na	35	na	35
5th Percentile	na	na	35	na	35
25th Percentile	na	na	35	na	35
50th Percentile (Median)	na	na	35	na	35
75th Percentile	na	na	35	na	35
95th Percentile	na	na	35	na	35
Maximum	na	na	35	na	35

na - not analyzed nd - not detected no - not observed

d. Alabama.

Category	Zone A	Zone B	Zone C	Zone D	All Zones
Solid (Soil, Sediments, Particulates) PetPAH$_{27}$ µg/kg dry in Classification Codes A+B+C					
Count	na	12	13	5	30
Minimum	na	1.0	nd	nd	nd
5th Percentile	na	1.3	0.24	1.8	0.18
25th Percentile	na	3.6	9.7	9.1	4.1
50th Percentile (Median)	na	17	24	11	14
75th Percentile	na	93	65	11	56
95th Percentile	na	273	1,140	23	511
Maximum	na	318	1,860	26	1,860

na - not analyzed nd - not detected no - not observed

Table A4.7. PetPAH$_{27}$ Concentrations in Macondo Oil Impacted Submerged Oil Sediment Samples Collected in 2010 by Zone.

e. Florida.

Category	Zone A	Zone B	Zone C	Zone D	All Zones
Solid (Soil, Sediments, Particulates) PetPAH$_{27}$ µg/kg dry in Classification Codes A+B+C					
Count	2	4	na	na	6
Minimum	57	3.6	na	na	3.6
5th Percentile	62	12	na	na	17
25th Percentile	82	47	na	na	58
50th Percentile (Median)	106	304	na	na	109
75th Percentile	131	589	na	na	449
95th Percentile	151	691	na	na	674
Maximum	156	716	na	na	716

na - not analyzed nd - not detected no - not observed

Table A4.8. PetPAH$_{27}$ Concentrations in Macondo Oil Impacted Submerged Oil Sediment Samples Collected in 2011 by Zone.

a. All States.

Category	Zone A	Zone B	Zone C	Zone D	All Zones
Solid (Soil, Sediments, Particulates) PetPAH$_{27}$ µg/kg dry in Classification Codes A+B+C					
Count	155	118	134	51	458
Minimum	9.0	6.1	18	20	6.1
5th Percentile	22	29	42	51	29
25th Percentile	98	89	85	102	90
50th Percentile (Median)	189	158	169	152	168
75th Percentile	390	422	331	222	372
95th Percentile	2,270	1,560	1,180	560	1,480
Maximum	11,700	8,560	16,400	721	16,400

na - not analyzed nd - not detected no - not observed

b. Louisiana.

Category	Zone A	Zone B	Zone C	Zone D	All Zones
Solid (Soil, Sediments, Particulates) PetPAH$_{27}$ µg/kg dry in Classification Codes A+B+C					
Count	133	107	117	49	406
Minimum	12	13	19	45	12
5th Percentile	47	48	48	57	48
25th Percentile	117	93	92	104	102
50th Percentile (Median)	197	158	189	160	179
75th Percentile	421	440	372	222	385
95th Percentile	2,310	1,660	1,060	561	1,450
Maximum	11,700	8,560	5,850	721	11,700

na - not analyzed nd - not detected no - not observed

Table A4.8. PetPAH$_{27}$ Concentrations in Macondo Oil Impacted Submerged Oil Sediment Samples Collected in 2011 by Zone.

c. Mississippi.

Category	Zone A	Zone B	Zone C	Zone D	All Zones
Solid (Soil, Sediments, Particulates) PetPAH$_{27}$ µg/kg dry in Classification Codes A+B+C					
Count	7	1	1	na	9
Minimum	11	37	77	na	11
5th Percentile	16	37	77	na	17
25th Percentile	28	37	77	na	29
50th Percentile (Median)	47	37	77	na	47
75th Percentile	157	37	77	na	77
95th Percentile	375	37	77	na	357
Maximum	429	37	77	na	429

na - not analyzed nd - not detected no - not observed

d. Alabama.

Category	Zone A	Zone B	Zone C	Zone D	All Zones
Solid (Soil, Sediments, Particulates) PetPAH$_{27}$ µg/kg dry in Classification Codes A+B+C					
Count	10	9	14	2	35
Minimum	13	6.1	18	20	6.1
5th Percentile	14	7.2	21	21	12
25th Percentile	24	18	52	25	22
50th Percentile (Median)	69	23	63	30	56
75th Percentile	191	186	136	34	166
95th Percentile	6,120	234	8,130	38	5,750
Maximum	10,700	247	16,400	39	16,400

na - not analyzed nd - not detected no - not observed

Table A4.8. PetPAH$_{27}$ Concentrations in Macondo Oil Impacted Submerged Oil Sediment Samples Collected in 2011 by Zone.

e. Florida

Category	Zone A	Zone B	Zone C	Zone D	All Zones
Solid (Soil, Sediments, Particulates) PetPAH$_{27}$ µg/kg dry in Classification Codes A+B+C					
Count	5	1	2	na	8
Minimum	9.0	515	54	na	9.0
5th Percentile	9.5	515	66	na	9.8
25th Percentile	11	515	116	na	43
50th Percentile (Median)	123	515	178	na	213
75th Percentile	353	515	240	na	359
95th Percentile	372	515	290	na	467
Maximum	377	515	302	na	515

na - not analyzed nd - not detected no - not observed

Table A4.9. Comparison of 2010 and 2011 Submerged Oil Impacted Samples by Equivalent Sampling Zones.

State	Louisiana		Mississippi		Alabama		Florida	
Sample Year	2010	2011	2010	2011	2010	2011	2010	2011
0-50 meters Sample Count	10	746	0	78	1	146	4	160
0-50 meters	70%	48%	na	12%	0%	23%	50%	5%
50-500 meters Sample Count	28	227	5	20	24	37	16	46
50-500 meters	50%	22%	0%	0%	50%	5%	25%	0%
All Zone Samples	55%	42%	na	9%	48%	19%	30%	4%
All Samples	39%	42%	6%	9%	47%	19%	19%	4%

Table A4.10. Comparison of 2010 and 2011 Submerged Oil Sediment Samples by Depth and Zone

a. Breakdown of 2010 Sediment Samples by Depth and Zone

Zone	Zone A		Zone B		Zone C		Zone D		All Zones	
Depth Category	0-2 cm	2-4 cm	0-2 cm	2-4 cm	0-2 cm	2-4 cm	0-2 cm	2-4 cm	0-2 cm	2-4 cm
Total Samples	5	2	15	6	6	2	8	-	34	10
Classification Codes A+B+C	5	1	10	3	1	-	-	-	16	4
Classification Code A	3	-	-	-	-	-	-	-	3	-
Classification Code B	1	1	8	2	-	-	-	-	9	3
Classification Code C	1	-	2	1	1	-	-	-	4	1
Indeterminate Code D	-	1	5	3	5	2	8	-	18	6
Non-Match Code E	-	-	-	-	-	-	-	-	-	-
% Classification Codes A+B+C	100%	50%	67%	50%	17%	0%	0%	na	47%	40%
Classification Code A	60%	0%	0%	0%	0%	0%	0%	na	9%	0%
Classification Code B	20%	50%	53%	33%	0%	0%	0%	na	26%	30%
Classification Code C	20%	0%	13%	17%	17%	0%	0%	na	12%	10%
Indeterminate Code D	0%	50%	33%	50%	83%	100%	100%	na	53%	60%
Non-Match Code E	0%	0%	0%	0%	0%	0%	0%	na	0%	0%

na - not analyzed nd - not detected no - not observed

b. Breakdown of 2011 Sediment Samples by Depth and Zone

Zone	Zone A		Zone B		Zone C		Zone D		All Zones	
Depth Category	0-2 cm	2-4 cm	0-2 cm	2-4 cm	0-2 cm	2-4 cm	0-2 cm	2-4 cm	0-2 cm	2-4 cm
Total Samples	140	126	122	112	120	126	115	111	497	475
Classification Codes A+B+C	68	65	56	51	59	58	25	24	208	198
Classification Code A	2	3	3	5	-	3	1	-	6	11
Classification Code B	26	18	24	16	24	18	12	14	86	66
Classification Code C	40	44	29	30	35	37	12	10	116	121
Indeterminate Code D	72	61	66	61	61	68	90	87	289	277
Non-Match Code E	-	-	-	-	-	-	-	-	-	-
% Classification Codes A+B+C	49%	52%	46%	46%	49%	46%	22%	22%	42%	42%
Classification Code A	1%	2%	2%	4%	0%	2%	1%	0%	1%	2%
Classification Code B	19%	14%	20%	14%	20%	14%	10%	13%	17%	14%
Classification Code C	29%	35%	24%	27%	29%	29%	10%	9%	23%	25%
Indeterminate Code D	51%	48%	54%	54%	51%	54%	78%	78%	58%	58%
Non-Match Code E	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%

na - not analyzed nd - not detected no - not observed

Table A3.11. Summary of Percent Depletion of $PetPAH_{27}$ in Macondo Oil Impacted Submerged Oil Samples.

a. Summary of Percent Depletion of $PetPAH_{27}$ in 2010 Match A+B+C

Category	Louisiana	Mississippi	Alabama	Florida	All States
Percent Depletion Solid (Soil, Sediments, Particulates) and Pom-pom Matches A+B+C					
Count	22	1	30	7	60
Minimum	83	93	75	78	75
5th Percentile	88	93	88	87	88
25th Percentile	93	94	93	92	93
50th Percentile (Median)	95	95	95	94	95
75th Percentile	97	96	98	95	97
95th Percentile	98	97	100	96	99
Maximum	99	97	100	97	100

na - not analyzed nd - not detected no - not observed

b. Summary of Percent Depletion of $PetPAH_{27}$ in 2011 Match A+B+C

Category	Louisiana	Mississippi	Alabama	Florida	All States
Percent Depletion Solid (Soil, Sediments, Particulates) Matches A+B+C					
Count	411	9	35	8	463
Minimum	74	93	91	92	74
5th Percentile	88	93	94	93	89
25th Percentile	95	93	96	95	95
50th Percentile (Median)	97	95	97	96	97
75th Percentile	98	96	98	98	98
95th Percentile	99	98	99	98	99
Maximum	99	99	99	98	99

na - not analyzed nd - not detected no - not observed

APPENDIX 5

OYSTER INFORMATION

Oyster TWG Sediment and Tissue Sampling Work Plan Summary

The Oyster TWG created the Oyster Bed SWPs for the collection of tissue and sediment samples between July, 2010 and March, 2012. The selection of sample locations included a mixture of statistical and opportunistic strategies to detect and quantify the Macondo oil within and proximal to the nearshore oyster beds. A summary of the tissue and sediment sampling techniques created by the Oyster TWG follow.

Mississippi Canyon 252 Spill Oyster Sampling Plan Phase I – High Priority Sites

The Oyster TWG developed the 2010 Oyster Sampling Plan Phase I – High Priority Sites SWP (hereafter Phase I Plan) and associated addendums to govern the collection of ephemeral data on the pre-oiling (baseline) condition of oyster beds in the nearshore study area. The focus of this plan was to continue sampling at historical collection locations of each States' resource management agencies. Sample sites were 4 ha grid cells (200 meters x 200 meters) in two regions that represented oiled and reference areas, respectively. To ensure the presence of oysters, the working group selected sites previously established as 1) Stratum A (mapped oyster reefs) or 2) Stratum B (potential oyster habitat) in Tier 2 areas (known or potential oyster habitats). Based on oiling observations, an amendment to this field sampling plan extended the scope of the study to include Chandeleur Sound. However, there was not a strong presence of oysters in this area. Therefore, a second amendment added more sampling sites in LA, MS, AL and FL, broadening the range of oiling conditions. The impact of the oil on oyster health was characterized by abundance of life stages (settlement plates), biological condition metrics and environmental/chemical measurements. Samples were collected from a shallow subtidal oyster reef and, if possible, at the closest intertidal (<1 m deep) oyster reef.

In regards to contaminant characterization, 8 contact points were selected for tissue sampling and sediment sampling at each site (16 total contact points). Using the results of a side-scan sonar, tissue contact points were selected based on the likely presence of oysters and sediment contact points were selected to be in the direct vicinity of the selected oyster beds. Tissue samples were collected until 4 of 8 pre-determined contact points were successfully sampled. A 0.5 meter x 0.5 meter quadrat was placed at a contact point, and a diver collected surface sediment within the quadrat. An adequate sample contained 20 market sized oysters. Sediment samples were collected using a ponar sampler. Ideally, sediment samples were collected from the oyster bed, but this was not always possible, in which case sediment sampling was conducted until 4 of 8 pre-determined contact points were successfully sampled (Figure A5.1a). Both tissue and sediment samples were analyzed for PAHs and geochemical biomarkers. Sediment samples were also analyzed for saturated hydrocarbons (SHC). Sampling took place between July, 2010 and November, 2010 (Table A5.6). The results of this field sampling plan were used to assist in the planning and implementation of the other oyster sampling plans discussed in this report.

Mississippi Canyon 252 Spill Oyster Sampling Transition Plan

The Oyster TWG determined that there was a need to collect further data to document the potential exposure of oysters to oil and dispersants released into the environment as a result of the Deepwater Horizon Oil Spill (DWHOS) after reviewing the progress of the Phase I work plan and its amendments.

The oyster TWG designed The Oyster Sampling Transition Plan (hereafter Transition Plan) to sample additional locations for both the identification of known oyster habitats and to temporally bridge Phase I sampling and subsequent 2011 injury assessments. A generalized random tessellation stratified (GRTS) sampling procedure was used to probabilistically select 600 x 600 meter grid cells in Louisiana and Mississippi as sampling sites. An amendment to this sampling plan added 20 supplemental sites in Louisiana based on observed oiling. At each of the established sites, four types of sampling events were carried out; recruitment sampling, mapping, dredging and sediment sampling. Mapping efforts took place along up to 8 transect lines oriented in a north to south direction. From these mapping efforts, 8 tissue contact points and 8 sediment sampling contact points were generated along the transect lines based on the likely presence of oysters or sediment. For contaminant analysis, market sized oysters were retained from three dredges per contact point and four spatially independent sediment samples representing two depth strata (0-2 cm, 2-4 cm) were collected at every site (Figure A5.1b). Site procedures employed a combination of those used during Phase I sampling and Transition Plan sampling (Figure A5.1a; Figure A5.1b). Oyster tissue samples were analyzed for PAHs and biomarkers and sediment samples were analyzed for grain size, total petroleum hydrocarbons (TPH), total organic carbon (TOC), PAHs, and geochemical biomarkers (steranes and triterpanes). A second amendment to this work plan added a TPH screening protocol in the lab to expedite the processing of sediment samples and changed the sediment analysis protocols so that all samples were analyzed individually rather than making composites. Sampling took place during February, 2011 (Table A5.7).

Spring 2011 Oyster Recruitment Sampling Plan

This work plan continued the monitoring of sites sampled under the Phase 1 Plan and Transition Plan to determine the degree of spatial and temporal reproductive injury and recruitment impacts due to exposure to contaminants from the Deepwater Horizon Oil Spill and low salinities resulting from actions undertaken by the state of Louisiana in response to the spill. Under this Oyster Recruitment Sampling Plan (hereafter Recruitment Plan), non-random sites were selected from Phase I sites and a combination of random and non-random sites were selected from Transition Plan sites. Impact assessment was initially achieved through the collection of samples during the spring oyster reproductive season. However, a series of two amendments extended sampling into the summer and fall of 2011 to evaluate the persistence of low settlement rates observed in the spring. Summer and spring sampling efforts quantified oyster recruitment measurements using settlement plates over multiple sampling rounds. In addition, three dredges were conducted at a portion of the sites during each sampling round to quantify the presence or absence of live oysters. If live oysters were present they were collected and analyzed for contaminant burden and gonad/disease condition metrics (Figure A5.1a; Figure A5.1b). Fall sampling efforts focused on larval recruitment/settlement and disease and gonadal analysis therefore minimal tissues were collected and no sediments. In total, two tissue samples were collected in June, 2011 for chemical characterization (Table A5.8).

Oyster Sampling Plan 2012 Intertidal Oyster Quadrat Sampling

Due to high TPH values reported in sediments under the Assessment Plan for Marsh Edges and Sandy Shoreline (Marsh Edge Plan), this 2012 Intertidal Oyster Quadrat Sampling Plan (hereafter Intertidal

Plan) focused on sampling oysters from Marsh Edge Plan Sites. The purpose of this Intertidal Plan was to determine whether oysters in the intertidal study area exhibited evidence of degradation resulting from the DWHOS and whether oysters in the intertidal study area showed evidence of continued, chronic exposure to contaminants from the DWHOS. These objectives were evaluated using 58 sites that were selected for sampling based on the presence of oysters and total petroleum hydrocarbon concentrations that were greater than (level A) or equal to (level B) naturally-occurring organic matter (NOM) as determined by the Marsh Edge Plan. At each site, transects were established at the mean high water line for oyster resource mapping. Along each transect, a measuring tape with rebar attached to the end was thrown 15 to 20 meters off the shoreline. As the tape was pulled back to shore, each meter was designated as either an oyster resource segment or a non-oyster resource segment. At each oyster resource segment, a 1 m x 1 m quadrat was used to collect oyster tissue samples for quantitative chemical analyses (Figure A5.1c). Sampling occurred between February, 2012 and March, 2012 (Table A5.9). Results were used to support the assessment of injury to oyster abundance and biomass and to inform and support restoration efforts.

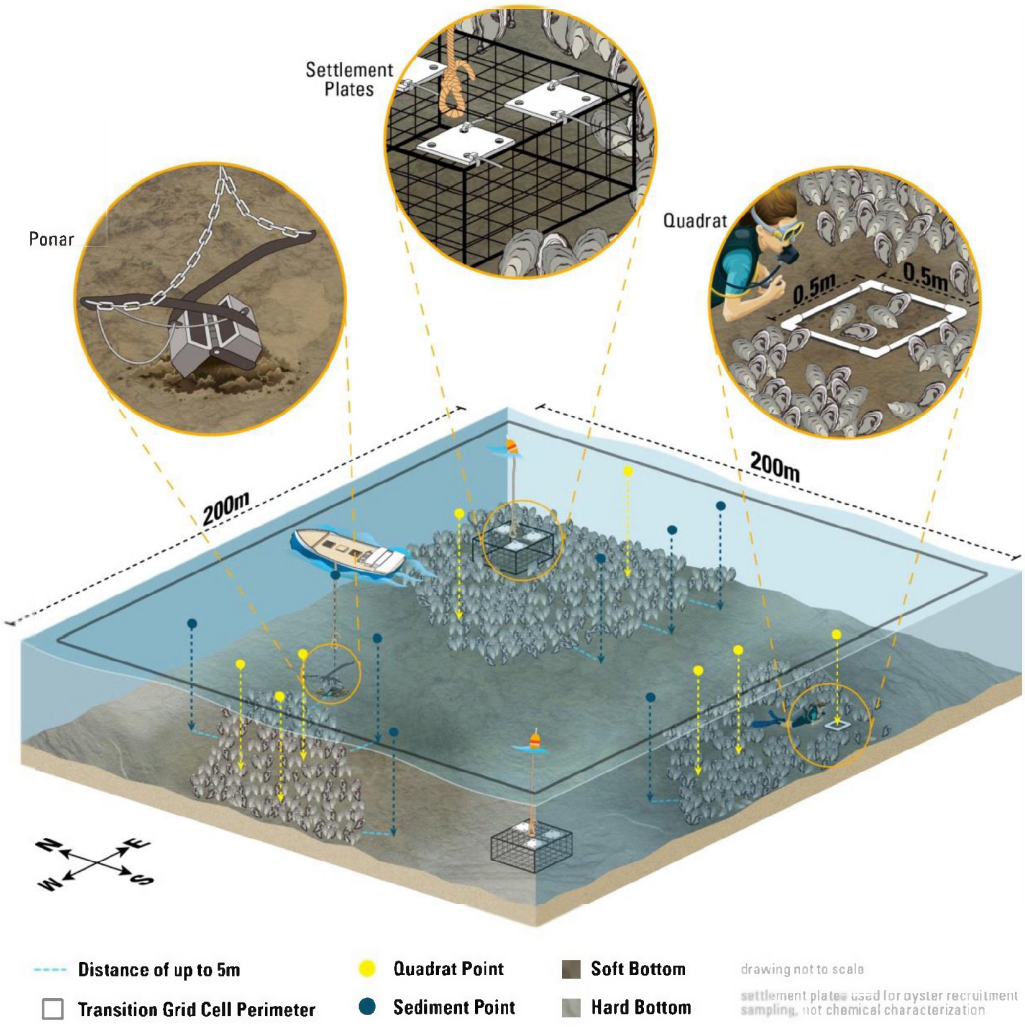

Figure A5.1a. Pictorial Depiction of Oyster Field Sampling Plan Strategies: Phase I Sampling Plan.

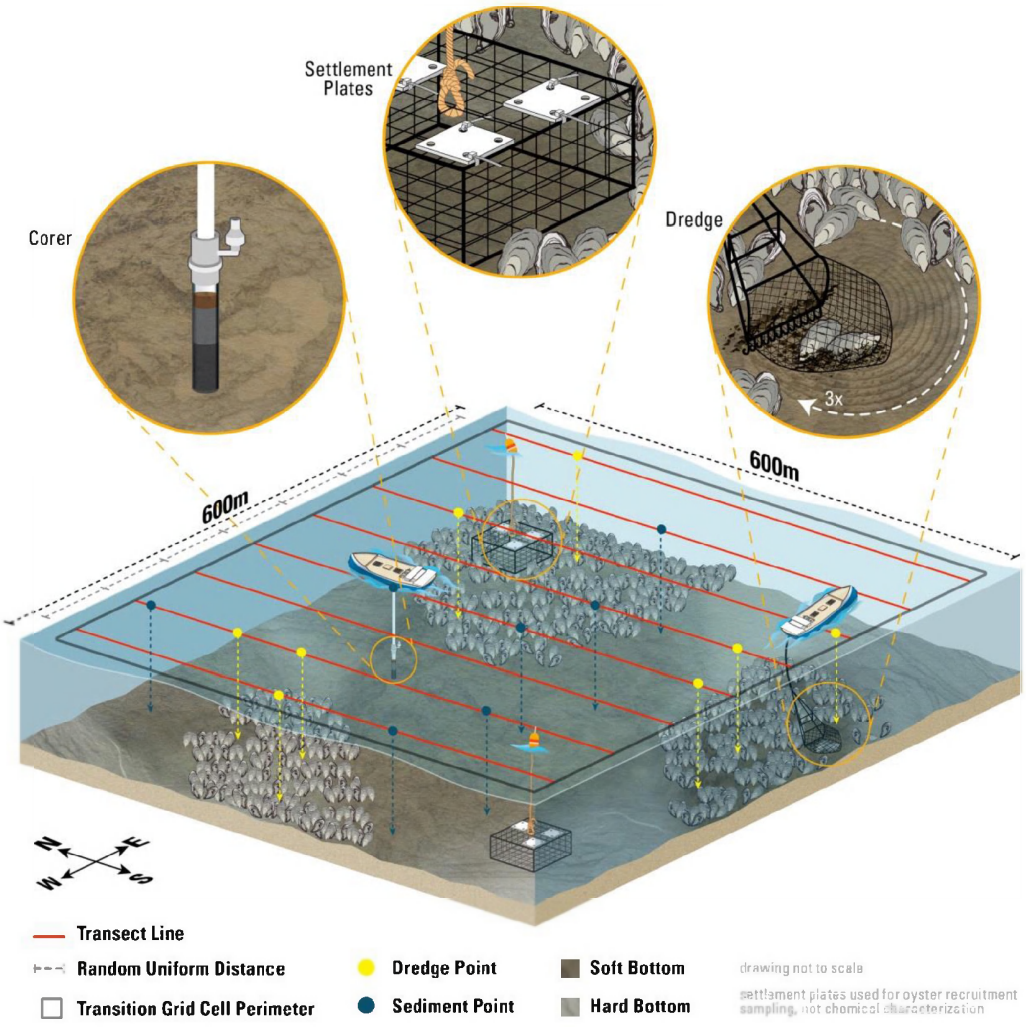

Figure A5.1b. Pictorial Depiction of Oyster Field Sampling Plan Strategies: Transition Plan.

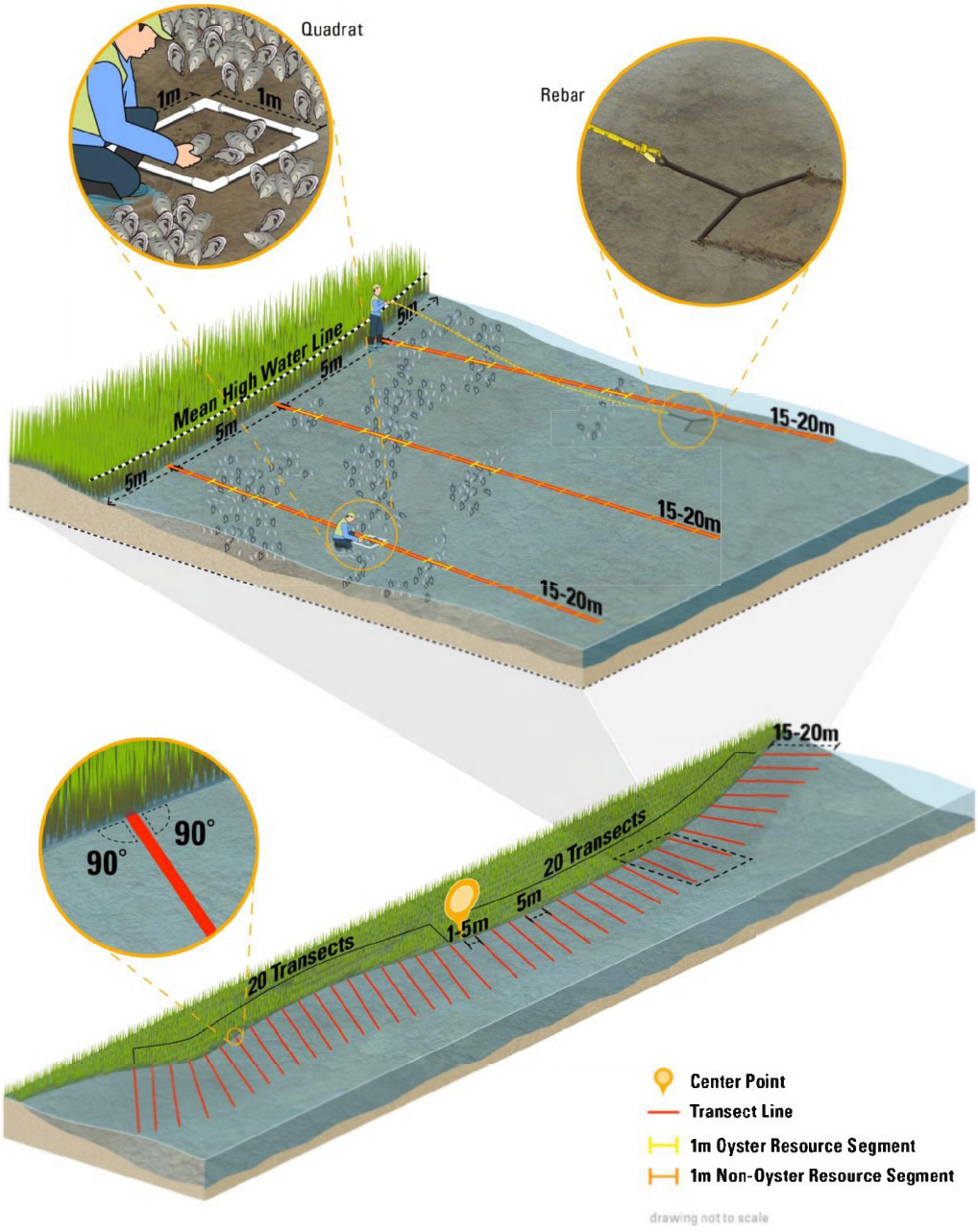

Figure A5.1c. Pictorial Depiction of Oyster Field Sampling Plan Strategies: Quadrat Plan.

Table A5.1. Nearshore Forensic Classification Codes in Oyster Tissue and Sediment.

a. Breakdown of all Oyster Investigation Samples by State

Category	Louisiana	Mississippi	Alabama	Florida	All States
Total Samples	277	66	30	71	444
Classification Codes A+B+C	8	-	-	-	8
Classification Code A	-	-	-	-	-
Classification Code B	7	-	-	-	7
Classification Code C	1	-	-	-	1
Indeterminate Code D	268	66	30	71	435
Non-Match Code E	1	-	-	-	1
% Classification Codes A+B+C	3%	0%	0%	0%	2%
Classification Code A	0%	0%	0%	0%	0%
Classification Code B	3%	0%	0%	0%	2%
Classification Code C	0%	0%	0%	0%	0%
Indeterminate Code D	97%	100%	100%	100%	98%
Non-Match Code E	0%	0%	0%	0%	0%

na - not analyzed nd - not detected no - not observed

b. Breakdown of all Oyster Investigation Sites by State and Maximum Match Classification

Category	Louisiana	Mississippi	Alabama	Florida	All States
Total Samples	164	53	23	60	300
Classification Codes A+B+C	1	-	-	-	1
Maximum Match Per Site					
Classification Code A	-	-	-	-	-
Classification Code B	-	-	-	-	-
Classification Code C	1	-	-	-	1
Indeterminate Code D	162	53	23	60	298
Non-Match Code E	1	-	-	-	1
% Classification Codes A+B+C	1%	0%	0%	0%	0%
Classification Code A	0%	0%	0%	0%	0%
Classification Code B	0%	0%	0%	0%	0%
Classification Code C	1%	0%	0%	0%	0%
Indeterminate Code D	99%	100%	100%	100%	99%
Non-Match Code E	1%	0%	0%	0%	0%
*Site Information Unavailable for 7 Detections and 124 Indeterminate Samples					

na - not analyzed nd - not detected no - not observed

Table A5.1. Nearshore Forensic Classification Codes in Oyster Tissue and Sediment.

c. Summary of PAH Concentrations in Impacted Oyster Samples

Category	Louisiana	Mississippi	Alabama	Florida	All States
Solid (Soil, Sediments, Particulates) and Tissue PetPAH$_{27}$ µg/kg dry in Classification Codes A+B+C					
Count	8	na	na	na	8
Minimum	30	na	na	na	30
5th Percentile	46	na	na	na	46
25th Percentile	87	na	na	na	87
50th Percentile (Median)	108	na	na	na	108
75th Percentile	230	na	na	na	230
95th Percentile	607	na	na	na	607
Maximum	705	na	na	na	705

na - not analyzed nd - not detected no - not observed

Table A5.2. Summary of the Percent Depletion of $PetPAH_{27}$ in Impacted Samples.

a. Summary of the Percent Depletion of $PetPAH_{27}$ in Phase I Match A+B+C Samples

Category	Louisiana	Mississippi	Alabam	Florida	All States
Percent Depletion Solid (Soil, Sediments, Particulates) Matches A+B+C					
Count	7	na	na	na	7
Minimum	95	na	na	na	95
5th Percentile	96	na	na	na	96
25th Percentile	97	na	na	na	97
50th Percentile (Median)	97	na	na	na	97
75th Percentile	98	na	na	na	98
95th Percentile	98	na	na	na	98
Maximum	98	na	na	na	98

na - not analyzed nd - not detected no - not observed

a. Summary of the Percent Depletion of $PetPAH_{27}$ in Intertidal Oyster Quadrat Match A+B+C Samples

Category	Louisiana	Mississippi	Alabam	Florida	All States
Percent Depletion Tissue Matches A+B+C					
Count	1	na	na	na	1
Minimum	73	na	na	na	73
5th Percentile	73	na	na	na	73
25th Percentile	73	na	na	na	73
50th Percentile (Median)	73	na	na	na	73
75th Percentile	73	na	na	na	73
95th Percentile	73	na	na	na	73
Maximum	73	na	na	na	73

na - not analyzed nd - not detected no - not observed

Table A5.3. B Nearshore Forensic Classification Codes in all Oyster Investigation Samples by Matrix.

b. Breakdown of Oyster Sediment Samples by State

Category	Louisiana	Mississippi	Alabama	Florida	All States
Total Samples	114	15	9	10	148
Classification Codes A+B+C	7	-	-	-	7
Classification Code A	-	-	-	-	-
Classification Code B	7	-	-	-	7
Classification Code C	-	-	-	-	-
Indeterminate Code D	107	15	9	10	141
Non-Match Code E	-	-	-	-	-
% Classification Codes A+B+C	6%	0%	0%	0%	5%
Classification Code A	0%	0%	0%	0%	0%
Classification Code B	6%	0%	0%	0%	5%
Classification Code C	0%	0%	0%	0%	0%
Indeterminate Code D	94%	100%	100%	100%	95%
Non-Match Code E	0%	0%	0%	0%	0%

na - not analyzed nd - not detected no - not observed

c. Breakdown of Oyster Tissue Samples by State

Category	Louisiana	Mississippi	Alabama	Florida	All States
Total Samples	163	51	21	61	296
Classification Codes A+B+C	1	-	-	-	1
Classification Code A	-	-	-	-	-
Classification Code B	-	-	-	-	-
Classification Code C	1	-	-	-	1
Indeterminate Code D	161	51	21	61	294
Non-Match Code E	1	-	-	-	1
% Classification Codes A+B+C	1%	0%	0%	0%	0%
Classification Code A	0%	0%	0%	0%	0%
Classification Code B	0%	0%	0%	0%	0%
Classification Code C	1%	0%	0%	0%	0%
Indeterminate Code D	99%	100%	100%	100%	99%
Non-Match Code E	1%	0%	0%	0%	0%

na - not analyzed nd - not detected no - not observed

Table A5.4. Breakdown of PAH Concentrations in Macondo Oil Impacted Oyster Samples by Matrix.

a. Breakdown of PAH Concentrations in Impacted Oyster Sediment Samples

Category	Louisiana	Mississippi	Alabama	Florida	All States
Solid (Soil, Sediments, Particulates) $PetPAH_{27}$ µg/kg dry in Classification Codes A+B+C					
Count	7	na	na	na	7
Minimum	30	na	na	na	30
5th Percentile	48	na	na	na	48
25th Percentile	92	na	na	na	92
50th Percentile (Median)	124	na	na	na	124
75th Percentile	295	na	na	na	295
95th Percentile	621	na	na	na	621
Maximum	705	na	na	na	705

na - not analyzed nd - not detected no - not observed

b. Breakdown of PAH Concentrations in Impacted Oyster Tissue Samples

Category	Louisiana	Mississippi	Alabama	Florida	All States
$PetPAH_{27}$ µg/kg dry Tissue Classification Codes A+B+C					
Count	1	na	na	na	1
Minimum	75	na	na	na	75
5th Percentile	75	na	na	na	75
25th Percentile	75	na	na	na	75
50th Percentile (Median)	75	na	na	na	75
75th Percentile	75	na	na	na	75
95th Percentile	75	na	na	na	75
Maximum	75	na	na	na	75

na - not analyzed nd - not detected no - not observed

Table A5.5. Nearshore Forensic Classification Codes in all Phase 1 Samples.

a. Breakdown of Phase I Samples by State

Category	Louisiana	Mississippi	Alabama	Florida	All States
Total Samples	214	63	30	70	377
Classification Codes A+B+C	7	-	-	-	7
Classification Code A	-	-	-	-	-
Classification Code B	7	-	-	-	7
Classification Code C	-	-	-	-	-
Indeterminate Code D	206	63	30	70	369
Non-Match Code E	1	-	-	-	1
% Classification Codes A+B+C	3%	0%	0%	0%	2%
Classification Code A	0%	0%	0%	0%	0%
Classification Code B	3%	0%	0%	0%	2%
Classification Code C	0%	0%	0%	0%	0%
Indeterminate Code D	96%	100%	100%	100%	98%
Non-Match Code E	0%	0%	0%	0%	0%

na - not analyzed nd - not detected no - not observed

b. Breakdown by Site

Category	Louisiana	Mississippi	Alabama	Florida	All States
Total Samples	126	50	23	59	258
Classification Codes A+B+C	-	-	-	-	-
Maximum Match Per Site					
Classification Code A	-	-	-	-	-
Classification Code B	-	-	-	-	-
Classification Code C	-	-	-	-	-
Indeterminate Code D	125	50	23	59	257
Non-Match Code E	1	-	-	-	1
% Classification Codes A+B+C	0%	0%	0%	0%	0%
Classification Code A	0%	0%	0%	0%	0%
Classification Code B	0%	0%	0%	0%	0%
Classification Code C	0%	0%	0%	0%	0%
Indeterminate Code D	99%	100%	100%	100%	100%
Non-Match Code E	1%	0%	0%	0%	0%
*Site Information Unavailable for 7 Detections and 99 Indeterminate Samples					

na - not analyzed nd - not detected no - not observed

Table A5.5. Nearshore Forensic Classification Codes in all Phase 1 Samples.

c. Summary of PAH Concentrations in Impacted Phase I Samples

Category	Louisiana	Mississippi	Alabama	Florida	All States
Solid (Soil, Sediments, Particulates) $PetPAH_{27}$ µg/kg dry in Classification Codes A+B+C					
Count	7	na	na	na	7
Minimum	30	na	na	na	30
5th Percentile	48	na	na	na	48
25th Percentile	92	na	na	na	92
50th Percentile (Median)	124	na	na	na	124
75th Percentile	295	na	na	na	295
95th Percentile	621	na	na	na	621
Maximum	705	na	na	na	705

na - not analyzed nd - not detected no - not observed

Table A5.6. Nearshore Forensic Classification Codes in Oyster Sampling Transition Plan Samples.

a. Breakdown of Oyster Sampling Transition Plan Samples by State

Category	Louisiana	Mississippi	Alabama	Florida	All States
Total Samples	29	-	-	-	29
Classification Codes A+B+C	-	-	-	-	-
Classification Code A	-	-	-	-	-
Classification Code B	-	-	-	-	-
Classification Code C	-	-	-	-	-
Indeterminate Code D	29	-	-	-	29
Non-Match Code E	-	-	-	-	-
% Classification Codes A+B+C	0%	na	na	na	0%
Classification Code A	0%	na	na	na	0%
Classification Code B	0%	na	na	na	0%
Classification Code C	0%	na	na	na	0%
Indeterminate Code D	100%	na	na	na	100%
Non-Match Code E	0%	na	na	na	0%

na - not analyzed nd - not detected no - not observed

b. Breakdown by Site

Category	Louisiana	Mississippi	Alabama	Florida	All States
Total Samples	4	-	-	-	4
Classification Codes A+B+C	-	-	-	-	-
Maximum Match Per Site					
Classification Code A	-	-	-	-	-
Classification Code B	-	-	-	-	-
Classification Code C	-	-	-	-	-
Indeterminate Code D	4	-	-	-	4
Non-Match Code E	-	-	-	-	-
% Classification Codes A+B+C	0%	na	na	na	0%
Classification Code A	0%	na	na	na	0%
Classification Code B	0%	na	na	na	0%
Classification Code C	0%	na	na	na	0%
Indeterminate Code D	100%	na	na	na	100%
Non-Match Code E	0%	na	na	na	0%
*Site Information Unavailable for 25 Indeterminate Samples					

na - not analyzed nd - not detected no - not observed

Table A5.7. Nearshore Forensic Classification Codes in Spring 2011 Recruitment Sampling Plan Samples.

a. Breakdown of Spring 2011 Recruitment Plan Samples by State

Category	Louisiana	Mississippi	Alabama	Florida	All States
Total Samples	2	-	-	-	2
Classification Codes A+B+C	-	-	-	-	-
Classification Code A	-	-	-	-	-
Classification Code B	-	-	-	-	-
Classification Code C	-	-	-	-	-
Indeterminate Code D	2	-	-	-	2
Non-Match Code E	-	-	-	-	-
% Classification Codes A+B+C	0%	na	na	na	0%
Classification Code A	0%	na	na	na	0%
Classification Code B	0%	na	na	na	0%
Classification Code C	0%	na	na	na	0%
Indeterminate Code D	100%	na	na	na	100%
Non-Match Code E	0%	na	na	na	0%

na - not analyzed nd - not detected no - not observed

b. Breakdown by Site

Category	Louisiana	Mississippi	Alabama	Florida	All States
Total Samples	2	-	-	-	2
Classification Codes A+B+C	-	-	-	-	-
Maximum Match Per Site					
Classification Code A	-	-	-	-	-
Classification Code B	-	-	-	-	-
Classification Code C	-	-	-	-	-
Indeterminate Code D	2	-	-	-	2
Non-Match Code E	-	-	-	-	-
% Classification Codes A+B+C	0%	na	na	na	0%
Classification Code A	0%	na	na	na	0%
Classification Code B	0%	na	na	na	0%
Classification Code C	0%	na	na	na	0%
Indeterminate Code D	100%	na	na	na	100%
Non-Match Code E	0%	na	na	na	0%

na - not analyzed nd - not detected no - not observed

Table A5.8. Nearshore Forensic Classification Codes in 2012 Intertidal Oyster Quadrat Samples.

a. Breakdown of 2012 Intertidal Oyster Quadrat Samples by State

Category	Louisiana	Mississippi	Alabama	Florida	All States
Total Samples	32	3	-	1	36
Classification Codes A+B+C	1	-	-	-	1
Classification Code A	-	-	-	-	-
Classification Code B	-	-	-	-	-
Classification Code C	1	-	-	-	1
Indeterminate Code D	31	3	-	1	35
Non-Match Code E	-	-	-	-	-
% Classification Codes A+B+C	3%	0%	na	0%	3%
Classification Code A	0%	0%	na	0%	0%
Classification Code B	0%	0%	na	0%	0%
Classification Code C	3%	0%	na	0%	3%
Indeterminate Code D	97%	100%	na	100%	97%
Non-Match Code E	0%	0%	na	0%	0%

na - not analyzed nd - not detected no - not observed

b. Breakdown by Site

Category	Louisiana	Mississippi	Alabama	Florida	All States
Total Samples	32	3	-	1	36
Classification Codes A+B+C	1	-	-	-	1
Maximum Match Per Site					
Classification Code A	-	-	-	-	-
Classification Code B	-	-	-	-	-
Classification Code C	1	-	-	-	1
Indeterminate Code D	31	3	-	1	35
Non-Match Code E	-	-	-	-	-
% Classification Codes A+B+C	3%	0%	na	0%	3%
Classification Code A	0%	0%	na	0%	0%
Classification Code B	0%	0%	na	0%	0%
Classification Code C	3%	0%	na	0%	3%
Indeterminate Code D	97%	100%	na	100%	97%
Non-Match Code E	0%	0%	na	0%	0%

na - not analyzed nd - not detected no - not observed

Table A5.8. Nearshore Forensic Classification Codes in 2012 Intertidal Oyster Quadrat Samples.

c. Summary of PAH Concentrations in Impacted 2012 Intertidal Oyster Quadrat Tissue Samples

Category	Louisiana	Mississippi	Alabama	Florida	All States
Tissue PetPAH$_{27}$ µg/kg dry in Classification Codes A+B+C					
Count	1	na	na	na	1
Minimum	75	na	na	na	75
5th Percentile	75	na	na	na	75
25th Percentile	75	na	na	na	75
50th Percentile (Median)	75	na	na	na	75
75th Percentile	75	na	na	na	75
95th Percentile	75	na	na	na	75
Maximum	75	na	na	na	75

na - not analyzed nd - not detected no - not observed

APPENDIX 6

SUBMERGED AQUATIC VEGETATION INFORMATION

Submerged Aquatic Vegetation TWG Sampling Work Plan Summary

The Submerged Aquatic Vegetation (SAV) TWG created four SWPs for the collection of tissue, sediment, and other opportunistic samples from a variety of SAV areas between July, 2010 and March, 2012. The selection of sample locations included a mixture of statistical and opportunistic strategies to detect and quantify the Macondo oil within and proximal to the SAV sites. A summary of the sampling techniques follow.

Mississippi Canyon 252 Oil Spill Submerged Aquatic Vegetation Tier 1 Pre-Assessment Plan Pre-Impact Baseline Characterization

The Tier 1 field sampling plan was designed to help characterize the SAV using representative nearshore and estuarine habitats. Many federal, state and local resource management agencies routinely monitor SAV (Consentino-Manning et al. 2010). Therefore, the primary scope of this plan was to both compile relevant, existing data and to fill in data gaps with additional sampling efforts. Sampling focused on five tasks; SAV aerial coverage, SAV biological characterization, chemistry, invertebrate densities, species composition and SAV associated fauna.

The SAV field teams collected sediment, water, solid and tissue samples from nine sites between May, 2010 and June, 2010 (Figure A6.1). The sampling plan targeted likely intertidal SAV beds that were at least 5 m x 5 m in size based on the available aerial imagery. The sediment samples were collected by Ponar grab sampler from a boat. The sediment samples were collected from the 0 to 2 cm depth interval. One liter water samples were collected by using either a Van Dorn water sampler or lowering a glass jar into the water by hand (Figure A6.1b). Invertebrate tissue samples were collected using a D-Frame Dip Net. A field scientist slowly walked around the site until a 250 mL wide-mouth glass jar could be filled with captured invertebrates. A snorkeler collected SAV samples in sufficient quantity to fill a 250 mL wide-mouth glass jar. Sediment, water, SAV and invertebrate samples were analyzed for TPH and PAHs as well as other constituents as needed.

Mississippi Canyon 252 Oil Spill Submerged Aquatic Vegetation Tier 2 Pre-Assessment Post Spill Exposure Characterization Plan

The Tier 2 sampling plan targeted SAV habitats with likely Macondo oil impacts based on NOAA surface oil trajectories, SCAT data, and submerged oil sentinels. Field teams evaluated the Macondo oil impacts using SAV rapid assessment protocols, polyethylene membrane devices (PEMD; not covered under this report), pom-poms, and sediment samples. Sediment, tissue, solid, pom-pom, and sheen samples covered under this report were collected between August, 2010 and September, 2010.

Sampling methods followed the procedures outlined in Tier 1 (Figure A6.1). The field teams recorded additional oiling information and added sampling stations to cover more of the oiled shoreline. In addition, they deployed pom-pom sentinels at each site consisting of approximately 7 pom-poms attached to a 3 m chain at the seaward edge of the SAV beds. York barbells anchored the ends of the chain and a buoy marked the sentinel's location to facilitate its recovery after the pom-poms floated in the water column for 3 days. The field teams collected sediment, invertebrate, vegetation and pom-pom samples at each site. The laboratory analyzed these samples for TPH and PAHs, and other constituents as needed.

Tier 3: Injury Assessment Plan for Submerged Aquatic Vegetation: Chandeleur Island, Louisiana

The Tier 3 work plan focused on the extent and persistence of Macondo oil in the SAV beds around the Chandeleur Islands, Louisiana in response to observations of impacts observed during the Tier 2 plan.

Field teams collected additional samples at Tier 1 and Tier 2 locations plus new stations along the heavily oiled southern shoreline. The field sampling protocols were adopted from the Tier 1 and Tier 2 plans. Tier 3 sampling took place in June, 2011. The field teams collected sediment, tissue, and solid samples. The laboratory analyzed the sediment, SAV tissue, detritus and invertebrate samples for TPH and PAHs. Sediment samples were also analyzed for total organic carbon (TOC) and grain size (GS).

Natural Resource Damage Assessment Work Plan for Assessing Potential Impact to Fresh and Brackish Water Submerged Aquatic Vegetation Communities from the Deepwater Horizon (MC 252) Oil Spill

This plan focused on the exposure of fresh and brackish water SAV communities in southeastern Louisiana in response to observations of oiling by SCAT teams and other reliable sources of field information from the Mississippi River Delta (Pass a Loutre), Terrebonne Bay and Barataria Bay. This plan also identified reference sites at Atchafalaya Delta and Marsh Island with no observed or documented oil impacts. The field team collected sediment and tissue samples between December, 2010 and January, 2011 using the sampling protocols from Tier 1 (Figure A6.1). The laboratory analyzed selected samples from the Mississippi River Delta for TPH and PAHs.

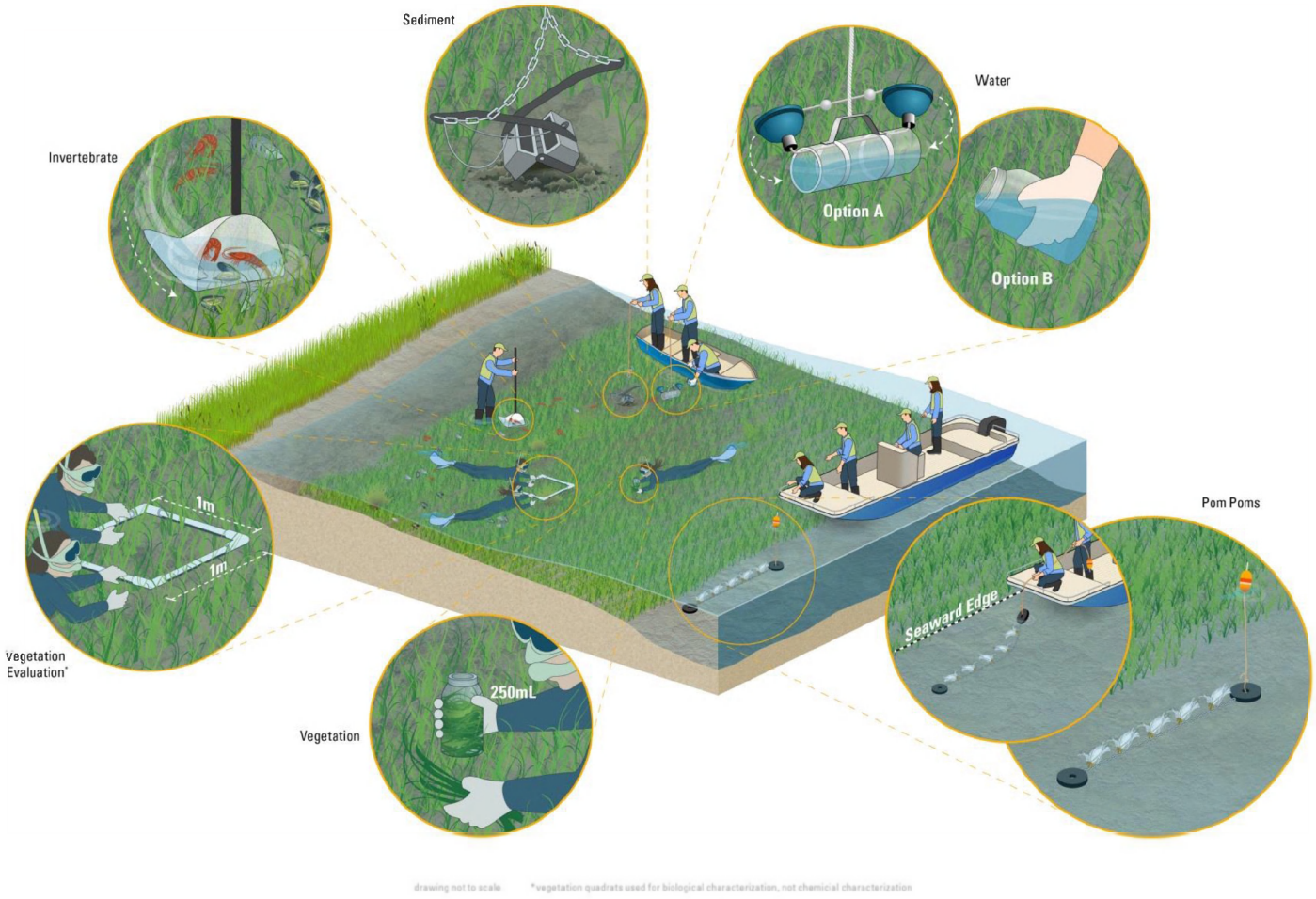

Figure A6.1. Pictorial Depiction of Submerged Aquatic Vegetation Field Sampling Plan Strategies.

Table A6.1. Nearshore Forensic Classification Codes in Submerged Aquatic Vegetation Investigations.

a. Breakdown of Submerged Aquatic Vegetation Samples by State

Category	Louisiana	Mississippi	Alabama	Florida	All States
Total Samples	396	268	282	332	1,278
Classification Codes A+B+C	59	70	128	61	318
Classification Code A	14	8	4	-	26
Classification Code B	20	10	77	12	119
Classification Code C	25	52	47	49	173
Indeterminate Code D	337	198	154	271	960
Non-Match Code E	-	-	-	-	-
% Classification Codes A+B+C	15%	26%	45%	18%	25%
Classification Code A	4%	3%	1%	0%	2%
Classification Code B	5%	4%	27%	4%	9%
Classification Code C	6%	19%	17%	15%	14%
Indeterminate Code D	85%	74%	55%	82%	75%
Non-Match Code E	0%	0%	0%	0%	0%

na - not analyzed nd - not detected no - not observed

Table A6.1. Nearshore Forensic Classification Codes in Submerged Aquatic Vegetation Investigations.

b. Breakdown of Submerged Aquatic Vegetation Tier 1 Samples by State

Category	Louisiana	Mississippi	Alabama	Florida	All States
Total Samples	56	49	44	133	282
Classification Codes A+B+C	-	-	-	-	-
Classification Code A	-	-	-	-	-
Classification Code B	-	-	-	-	-
Classification Code C	-	-	-	-	-
Indeterminate Code D	56	49	44	133	282
Non-Match Code E	-	-	-	-	-
% Classification Codes A+B+C	0%	0%	0%	0%	0%
Classification Code A	0%	0%	0%	0%	0%
Classification Code B	0%	0%	0%	0%	0%
Classification Code C	0%	0%	0%	0%	0%
Indeterminate Code D	100%	100%	100%	100%	100%
Non-Match Code E	0%	0%	0%	0%	0%

na - not analyzed nd - not detected no - not observed

c. Breakdown of Submerged Aquatic Vegetation Tier 2 Samples by State

Category	Louisiana	Mississippi	Alabama	Florida	All States
Total Samples	152	219	238	199	808
Classification Codes A+B+C	43	70	128	61	302
Classification Code A	13	8	4	-	25
Classification Code B	12	10	77	12	111
Classification Code C	18	52	47	49	166
Indeterminate Code D	109	149	110	138	506
Non-Match Code E	-	-	-	-	-
% Classification Codes A+B+C	28%	32%	54%	31%	37%
Classification Code A	9%	4%	2%	0%	3%
Classification Code B	8%	5%	32%	6%	14%
Classification Code C	12%	24%	20%	25%	21%
Indeterminate Code D	72%	68%	46%	69%	63%
Non-Match Code E	0%	0%	0%	0%	0%

na - not analyzed nd - not detected no - not observed

Table A6.1. Nearshore Forensic Classification Codes in Submerged Aquatic Vegetation Investigations.

d. Breakdown of Submerged Aquatic Vegetation Tier 3 Samples by State

Category	Louisiana	Mississippi	Alabama	Florida	All States
Total Samples	133	-	-	-	133
Classification Codes A+B+C	9	-	-	-	9
Classification Code A	1	-	-	-	1
Classification Code B	7	-	-	-	7
Classification Code C	1	-	-	-	1
Indeterminate Code D	124	-	-	-	124
Non-Match Code E	-	-	-	-	-
% Classification Codes A+B+C	7%	na	na	na	7%
Classification Code A	1%	na	na	na	1%
Classification Code B	5%	na	na	na	5%
Classification Code C	1%	na	na	na	1%
Indeterminate Code D	93%	na	na	na	93%
Non-Match Code E	0%	na	na	na	0%

na - not analyzed nd - not detected no - not observed

e. Breakdown of Submerged Aquatic Vegetation Fresh and Brackish Water Samples by State

Category	Louisiana	Mississippi	Alabama	Florida	All States
Total Samples	55	-	-	-	55
Classification Codes A+B+C	7	-	-	-	7
Classification Code A	-	-	-	-	-
Classification Code B	1	-	-	-	1
Classification Code C	6	-	-	-	6
Indeterminate Code D	48	-	-	-	48
Non-Match Code E	-	-	-	-	-
% Classification Codes A+B+C	13%	na	na	na	13%
Classification Code A	0%	na	na	na	0%
Classification Code B	2%	na	na	na	2%
Classification Code C	11%	na	na	na	11%
Indeterminate Code D	87%	na	na	na	87%
Non-Match Code E	0%	na	na	na	0%

na - not analyzed nd - not detected no - not observed

Table A6.2 Maximum Match Classification Per Site in Submerged Aquatic Vegetation Investigations.

a. Breakdown of Submerged Aquatic Vegetation Tier 2 Maximum Match Classification Per Site

Category	Louisiana	Mississippi	Alabama	Florida	All States
Total Sites	1	4	3	2	10
Classification Codes A+B+C	1	4	2	2	9
Maximum Match Per Site					
Classification Code A	1	3	1	-	5
Classification Code B	-	1	-	2	3
Classification Code C	-	-	1	-	1
Indeterminate Code D	-	-	1	-	1
Non-Match Code E	-	-	-	-	-
% Classification Codes A+B+C	100%	100%	67%	100%	90%
Classification Code A	100%	75%	33%	0%	50%
Classification Code B	0%	25%	0%	100%	30%
Classification Code C	0%	0%	33%	0%	10%
Indeterminate Code D	0%	0%	33%	0%	10%
Non-Match Code E	0%	0%	0%	0%	0%

na - not analyzed nd - not detected no - not observed

b. Breakdown of Submerged Aquatic Vegetation Tier 3 Maximum Match Classification Per Site

Category	Louisiana	Mississippi	Alabama	Florida	All States
Total Sites	1	-	-	-	1
Classification Codes A+B+C	1	-	-	-	1
Maximum Match Per Site					
Classification Code A	1	-	-	-	1
Classification Code B	-	-	-	-	-
Classification Code C	-	-	-	-	-
Indeterminate Code D	-	-	-	-	-
Non-Match Code E	-	-	-	-	-
% Classification Codes A+B+C	100%	no	no	no	100%
Classification Code A	100%	no	no	no	100%
Classification Code B	0%	no	no	no	0%
Classification Code C	0%	no	no	no	0%
Indeterminate Code D	0%	no	no	no	0%
Non-Match Code E	0%	no	no	no	0%

na - not analyzed nd - not detected no - not observed

Table A6.2. Maximum Match Classification Per Site in Submerged Aquatic Vegetation Investigations.

c. Breakdown of Submerged Aquatic Vegetation Fresh and Brackish Water Maximum Match Classification Per Site.

Category	Louisiana	Mississippi	Alabama	Florida	All States
Total Sites	2	-	-	-	2
Classification Codes A+B+C	1	-	-	-	1
Maximum Match Per Site					
Classification Code A	-	-	-	-	-
Classification Code B	1	-	-	-	1
Classification Code C	-	-	-	-	-
Indeterminate Code D	-	-	-	-	-
Non-Match Code E	-	-	-	-	-
% Classification Codes A+B+C	50%	na	na	na	50%
Classification Code A	0%	na	na	na	0%
Classification Code B	50%	na	na	na	50%
Classification Code C	0%	na	na	na	0%
Indeterminate Code D	0%	na	na	na	0%
Non-Match Code E	0%	na	na	na	0%

na - not analyzed nd - not detected no - not observed

Table A6.3. Breakdown of PAH Detections in Macondo Oil Impacted Samples by Submerged Aquatic Vegetation Sampling Plan and State

a. Summary of PAH Detections in All Impacted Submerged Aquatic Vegetation Samples

Category	Louisiana	Mississippi	Alabama	Florida	All States
Solid (Soil, Sediments, Particulates) $PetPAH_{27}$ µg/kg dry in Classification Codes A+B+C					
Count	29	5	5	1	40
Minimum	9.4	4.3	2.8	361,000	2.8
5th Percentile	13	8.6	3.2	361,000	4.7
25th Percentile	37	26	4.7	361,000	22
50th Percentile (Median)	82	161,000	6.4	361,000	81
75th Percentile	330	766,000	12	361,000	953
95th Percentile	786,000	1,170,000	272,000	361,000	952,000
Maximum	1,590,000	1,280,000	340,000	361,000	1,590,000
Tissue $PetPAH_{27}$ µg/kg dry in Classification Codes A+B+C					
Count	18	1	na	na	19
Minimum	8.0	569	na	na	8.0
5th Percentile	20	569	na	na	21
25th Percentile	48	569	na	na	50
50th Percentile (Median)	108	569	na	na	110
75th Percentile	721	569	na	na	689
95th Percentile	8,490	569	na	na	7,310
Maximum	28,500	569	na	na	28,500
Pom-pom/Sheen $PetPAH_{27}$ µg in Classification Codes A+B+C					
Count	12	64	123	60	259
Minimum	0.24	0.27	0.21	0.29	0.21
5th Percentile	0.24	0.32	0.34	0.32	0.33
25th Percentile	0.36	0.41	0.54	0.40	0.45
50th Percentile (Median)	0.40	0.50	0.75	0.50	0.59
75th Percentile	0.48	0.65	0.98	0.77	0.88
95th Percentile	2.5	12	1.6	1.2	1.7
Maximum	4.9	38	5.3	1.8	38

na - not analyzed nd - not detected no - not observed

Table A6.3. Breakdown of PAH Detections in Macondo Oil Impacted Samples by Submerged Aquatic Vegetation Sampling Plan and State.

b. Breakdown of PAH Detections in Impacted Submerged Aquatic Vegetation Tier 2 Samples

Category	Louisiana	Mississippi	Alabama	Florida	All States
Solid (Soil, Sediments, Particulates) $PetPAH_{27}$ µg/kg dry in Classification Codes A+B+C					
Count	18	5	5	1	29
Minimum	9.4	4.3	2.8	361,000	2.8
5th Percentile	12	8.6	3.2	361,000	4.4
25th Percentile	18	26	4.7	361,000	13
50th Percentile (Median)	65	161,000	6.4	361,000	60
75th Percentile	294	766,000	12	361,000	2,750
95th Percentile	1,030,000	1,170,000	272,000	361,000	1,140,000
Maximum	1,590,000	1,280,000	340,000	361,000	1,590,000
Tissue $PetPAH_{27}$ µg/kg dry in Classification Codes A+B+C					
Count	13	1	na	na	14
Minimum	8.0	569	na	na	8.0
5th Percentile	17	569	na	na	17
25th Percentile	34	569	na	na	37
50th Percentile (Median)	77	569	na	na	92
75th Percentile	226	569	na	na	399
95th Percentile	14,400	569	na	na	13,200
Maximum	28,500	569	na	na	28,500
Pom-pom/Sheen $PetPAH_{27}$ µg in Classification Codes A+B+C					
Count	12	64	123	60	259
Minimum	0.24	0.27	0.21	0.29	0.21
5th Percentile	0.24	0.32	0.34	0.32	0.33
25th Percentile	0.36	0.41	0.54	0.40	0.45
50th Percentile (Median)	0.40	0.50	0.75	0.50	0.59
75th Percentile	0.48	0.65	0.98	0.77	0.88
95th Percentile	2.5	12	1.6	1.2	1.7
Maximum	4.9	38	5.3	1.8	38

na - not analyzed nd - not detected no - not observed

Table A6.3. Breakdown of PAH Concentrations in Macondo Oil Impacted Samples by Submerged Aquatic Vegetation Sampling Plan and State.

c. Breakdown of PAH Concentrations in Impacted Submerged Aquatic Vegetation Tier 3 Samples

Category	Louisiana	Mississippi	Alabama	Florida	All States
Solid (Soil, Sediments, Particulates) $PetPAH_{27}$ µg/kg dry in Classification Codes A+B+C					
Count	8	na	na	na	8
Minimum	44	na	na	na	44
5th Percentile	52	na	na	na	52
25th Percentile	69	na	na	na	69
50th Percentile (Median)	120	na	na	na	120
75th Percentile	207	na	na	na	207
95th Percentile	365,000	na	na	na	365,000
Maximum	562,000	na	na	na	562,000
Tissue $PetPAH_{27}$ µg/kg dry in Classification Codes A+B+C					
Count	1	na	na	na	1
Minimum	110	na	na	na	110
5th Percentile	110	na	na	na	110
25th Percentile	110	na	na	na	110
50th Percentile (Median)	110	na	na	na	110
75th Percentile	110	na	na	na	110
95th Percentile	110	na	na	na	110
Maximum	110	na	na	na	110

na - not analyzed nd - not detected no - not observed

Table A6.3. Breakdown of PAH Concentrations in Macondo Oil Impacted Samples by Submerged Aquatic Vegetation Sampling Plan and State.

d. Breakdown of PAH Concentrations in Impacted Submerged Aquatic Vegetation Fresh and Brackish Water Samples

Category	Louisiana	Mississippi	Alabama	Florida	All States
Solid (Soil, Sediments, Particulates) PetPAH$_{27}$ µg/kg dry in Classification Codes A+B+C					
Count	3	na	na	na	3
Minimum	80	na	na	na	80
5th Percentile	115	na	na	na	115
25th Percentile	256	na	na	na	256
50th Percentile (Median)	432	na	na	na	432
75th Percentile	976	na	na	na	976
95th Percentile	1,410	na	na	na	1,410
Maximum	1,520	na	na	na	1,520
Tissue PetPAH$_{27}$ µg/kg dry in Classification Codes A+B+C					
Count	4	na	na	na	4
Minimum	54	na	na	na	54
5th Percentile	167	na	na	na	167
25th Percentile	621	na	na	na	621
50th Percentile (Median)	934	na	na	na	934
75th Percentile	1,090	na	na	na	1,090
95th Percentile	1,160	na	na	na	1,160
Maximum	1,180	na	na	na	1,180

na - not analyzed nd - not detected no - not observed

Table A6.4. Breakdown of Nearshore Forensic Classification Codes in Submerged Aquatic Vegetation Tier 1 Samples by Matrix.

Category	Pom-Pom	Solid	Sediment	Sheen	Tissue	All Matrices
Total Samples	-	12	93	-	177	282
Classification Codes A+B+C	-	-	-	-	-	-
Classification Code A	-	-	-	-	-	-
Classification Code B	-	-	-	-	-	-
Classification Code C	-	-	-	-	-	-
Indeterminate Code D	-	12	93	-	177	282
Non-Match Code E	-	-	-	-	-	-
% Classification Codes A+B+C	na	0%	0%	na	0%	0%
Classification Code A	na	0%	0%	na	0%	0%
Classification Code B	na	0%	0%	na	0%	0%
Classification Code C	na	0%	0%	na	0%	0%
Indeterminate Code D	na	100%	100%	na	100%	100%
Non-Match Code E	na	0%	0%	na	0%	0%

na - not analyzed nd - not detected no - not observed

Table A6.5. Breakdown of Nearshore Forensic Classification Codes in Submerged Aquatic Vegetation Tier 2 Samples by Matrix.

a. Breakdown of Macondo Oil Detections in Submerged Aquatic Vegetation Tier 2 Samples by Matrix

Category	Pom-Pom	Solid	Sediment	Sheen	Tissue	All Matrices
Total Samples	508	88	73	2	137	808
Classification Codes A+B+C	257	7	22	2	14	302
Classification Code A	8	4	6	2	5	25
Classification Code B	97	2	10	-	2	111
Classification Code C	152	1	6	-	7	166
Indeterminate Code D	251	81	51	-	123	506
Non-Match Code E	-	-	-	-	-	-
% Classification Codes A+B+C	51%	8%	30%	100%	10%	37%
Classification Code A	2%	5%	8%	100%	4%	3%
Classification Code B	19%	2%	14%	0%	1%	14%
Classification Code C	30%	1%	8%	0%	5%	21%
Indeterminate Code D	49%	92%	70%	0%	90%	63%
Non-Match Code E	0%	0%	0%	0%	0%	0%

na - not analyzed nd - not detected no - not observed

b. Breakdown of Macondo Oil Detections in Submerged Aquatic Vegetation Tier 2 Louisiana Samples by Matrix

Category	Pom-Pom	Solid	Sediment	Sheen	Tissue	All Matrices
Total Samples	52	27	23	-	50	152
Classification Codes A+B+C	12	2	16	-	13	43
Classification Code A	1	2	5	-	5	13
Classification Code B	2	-	9	-	1	12
Classification Code C	9	-	2	-	7	18
Indeterminate Code D	40	25	7	-	37	109
Non-Match Code E	-	-	-	-	-	-
% Classification Codes A+B+C	23%	7%	70%	na	26%	28%
Classification Code A	2%	7%	22%	na	10%	9%
Classification Code B	4%	0%	39%	na	2%	8%
Classification Code C	17%	0%	9%	na	14%	12%
Indeterminate Code D	77%	93%	30%	na	74%	72%
Non-Match Code E	0%	0%	0%	na	0%	0%

na - not analyzed nd - not detected no - not observed

Table A4.8. PetPAH$_{27}$ Concentrations in Macondo Oil Impacted Submerged Oil Sediment Samples Collected in 2011 by Zone.

c. Breakdown of Macondo Oil Detections in Submerged Aquatic Vegetation Tier 2 Mississippi Samples by Matrix

Category	Pom-Pom	Solid	Sediment	Sheen	Tissue	All Matrices
Total Samples	148	23	19	1	28	219
Classification Codes A+B+C	63	3	2	1	1	70
Classification Code A	4	2	1	1	-	8
Classification Code B	8	-	1	-	1	10
Classification Code C	51	1	-	-	-	52
Indeterminate Code D	85	20	17	-	27	149
Non-Match Code E	-	-	-	-	-	-
% Classification Codes A+B+C	43%	13%	11%	100%	4%	32%
Classification Code A	3%	9%	5%	100%	0%	4%
Classification Code B	5%	0%	5%	0%	4%	5%
Classification Code C	34%	4%	0%	0%	0%	24%
Indeterminate Code D	57%	87%	89%	0%	96%	68%
Non-Match Code E	0%	0%	0%	0%	0%	0%

na - not analyzed nd - not detected no - not observed

d. Breakdown of Macondo Oil Detections in Submerged Aquatic Vegetation Tier 2 Alabama Samples by Matrix

Category	Pom-Pom	Solid	Sediment	Sheen	Tissue	All Matrices
Total Samples	195	12	11	1	19	238
Classification Codes A+B+C	122	1	4	1	-	128
Classification Code A	3	-	-	1	-	4
Classification Code B	76	1	-	-	-	77
Classification Code C	43	-	4	-	-	47
Indeterminate Code D	73	11	7	-	19	110
Non-Match Code E	-	-	-	-	-	-
% Classification Codes A+B+C	63%	8%	36%	100%	0%	54%
Classification Code A	2%	0%	0%	100%	0%	2%
Classification Code B	39%	8%	0%	0%	0%	32%
Classification Code C	22%	0%	36%	0%	0%	20%
Indeterminate Code D	37%	92%	64%	0%	100%	46%
Non-Match Code E	0%	0%	0%	0%	0%	0%

na - not analyzed nd - not detected no - not observed

Table A6.5. Breakdown of Nearshore Forensic Classification Codes in Submerged Aquatic Vegetation Tier 2 Samples by Matrix.

e. Breakdown of Macondo Oil Detections in Submerged Aquatic Vegetation Tier 2 Florida Samples by Matrix

Category	Pom-Pom	Solid	Sediment	Sheen	Tissue	All Matrices
Total Samples	113	26	20	-	40	199
Classification Codes A+B+C	60	1	-	-	-	61
Classification Code A	-	-	-	-	-	-
Classification Code B	11	1	-	-	-	12
Classification Code C	49	-	-	-	-	49
Indeterminate Code D	53	25	20	-	40	138
Non-Match Code E	-	-	-	-	-	-
% Classification Codes A+B+C	53%	4%	0%	na	0%	31%
Classification Code A	0%	0%	0%	na	0%	0%
Classification Code B	10%	4%	0%	na	0%	6%
Classification Code C	43%	0%	0%	na	0%	25%
Indeterminate Code D	47%	96%	100%	na	100%	69%
Non-Match Code E	0%	0%	0%	na	0%	0%

na - not analyzed nd - not detected no - not observed

Table A6.6. Breakdown of Nearshore Forensic Classification Codes in Submerged Aquatic Vegetation Tier 3 Samples by Matrix

Category	Pom-Pom	Solid	Sediment	Sheen	Tissue	All Matrices
Total Samples	-	25	52	-	56	133
Classification Codes A+B+C	-	1	7	-	1	9
Classification Code A	-	1	-	-	-	1
Classification Code B	-	-	7	-	-	7
Classification Code C	-	-	-	-	1	1
Indeterminate Code D	-	24	45	-	55	124
Non-Match Code E	-	-	-	-	-	-
% Classification Codes A+B+C	na	4%	13%	na	2%	7%
Classification Code A	na	4%	0%	na	0%	1%
Classification Code B	na	0%	13%	na	0%	5%
Classification Code C	na	0%	0%	na	2%	1%
Indeterminate Code D	na	96%	87%	na	98%	93%
Non-Match Code E	na	0%	0%	na	0%	0%

na - not analyzed nd - not detected no - not observed

Table A6.7. Breakdown of Nearshore Forensic Classification Codes in Submerged Aquatic Vegetation Fresh and Brackish Water Samples by Matrix

Category	Pom-Pom	Solid	Sediment	Sheen	Tissue	All Matrices
Total Samples	-	-	11	-	44	55
Classification Codes A+B+C	-	-	3	-	4	7
Classification Code A	-	-	-	-	-	-
Classification Code B	-	-	1	-	-	1
Classification Code C	-	-	2	-	4	6
Indeterminate Code D	-	-	8	-	40	48
Non-Match Code E	-	-	-	-	-	-
% Classification Codes A+B+C	na	na	27%	na	9%	13%
Classification Code A	na	na	0%	na	0%	0%
Classification Code B	na	na	9%	na	0%	2%
Classification Code C	na	na	18%	na	9%	11%
Indeterminate Code D	na	na	73%	na	91%	87%
Non-Match Code E	na	na	0%	na	0%	0%

na - not analyzed nd - not detected no - not observed

Table A6.8. Breakdown of Nearshore Forensic Classification Codes in Submerged Aquatic Vegetation Sampling Plan Tier 2 Samples by Zone.

a. Breakdown of Macondo Oil Detections in Submerged Aquatic Vegetation Tier 2 Samples by Zone

Category	Zone A	Zone B	Zone C	Zone D	All Zones
Total Samples	279	275	155	99	808
Classification Codes A+B+C	126	103	47	26	302
Classification Code A	15	4	3	3	25
Classification Code B	63	35	4	9	111
Classification Code C	48	64	40	14	166
Indeterminate Code D	153	172	108	73	506
Non-Match Code E	-	-	-	-	-
% Classification Codes A+B+C	45%	37%	30%	26%	37%
Classification Code A	5%	1%	2%	3%	3%
Classification Code B	23%	13%	3%	9%	14%
Classification Code C	17%	23%	26%	14%	21%
Indeterminate Code D	55%	63%	70%	74%	63%
Non-Match Code E	0%	0%	0%	0%	0%

na - not analyzed nd - not detected no - not observed

b. Breakdown of Macondo Oil Detections in Submerged Aquatic Vegetation Tier 2 Louisiana Samples by Zone

Category	Zone A	Zone B	Zone C	Zone D	All Zones
Total Samples	32	36	13	71	152
Classification Codes A+B+C	16	6	6	15	43
Classification Code A	9	-	1	3	13
Classification Code B	3	4	1	4	12
Classification Code C	4	2	4	8	18
Indeterminate Code D	16	30	7	56	109
Non-Match Code E	-	-	-	-	-
% Classification Codes A+B+C	50%	17%	46%	21%	28%
Classification Code A	28%	0%	8%	4%	9%
Classification Code B	9%	11%	8%	6%	8%
Classification Code C	13%	6%	31%	11%	12%
Indeterminate Code D	50%	83%	54%	79%	72%
Non-Match Code E	0%	0%	0%	0%	0%

na - not analyzed nd - not detected no - not observed

Table A6.8. Breakdown of Nearshore Forensic Classification Codes in Submerged Aquatic Vegetation Sampling Plan Tier 2 Samples by Zone.

c. Breakdown of Macondo Oil Detections in Submerged Aquatic Vegetation Tier 2 Mississippi Samples by Zone

Category	Zone A	Zone B	Zone C	Zone D	All Zones
Total Samples	9	96	108	6	219
Classification Codes A+B+C	8	35	25	2	70
Classification Code A	2	4	2	-	8
Classification Code B	2	6	1	1	10
Classification Code C	4	25	22	1	52
Indeterminate Code D	1	61	83	4	149
Non-Match Code E	-	-	-	-	-
% Classification Codes A+B+C	89%	36%	23%	33%	32%
Classification Code A	22%	4%	2%	0%	4%
Classification Code B	22%	6%	1%	17%	5%
Classification Code C	44%	26%	20%	17%	24%
Indeterminate Code D	11%	64%	77%	67%	68%
Non-Match Code E	0%	0%	0%	0%	0%

na - not analyzed nd - not detected no - not observed

d. Breakdown of Macondo Oil Detections in Submerged Aquatic Vegetation Tier 2 Alabama Samples by Zone

Category	Zone A	Zone B	Zone C	Zone D	All Zones
Total Samples	150	60	6	22	238
Classification Codes A+B+C	83	32	4	9	128
Classification Code A	4	-	-	-	4
Classification Code B	51	20	2	4	77
Classification Code C	28	12	2	5	47
Indeterminate Code D	67	28	2	13	110
Non-Match Code E	-	-	-	-	-
% Classification Codes A+B+C	55%	53%	67%	41%	54%
Classification Code A	3%	0%	0%	0%	2%
Classification Code B	34%	33%	33%	18%	32%
Classification Code C	19%	20%	33%	23%	20%
Indeterminate Code D	45%	47%	33%	59%	46%
Non-Match Code E	0%	0%	0%	0%	0%

na - not analyzed nd - not detected no - not observed

Table A6.8. Breakdown of Nearshore Forensic Classification Codes in Submerged Aquatic Vegetation Sampling Plan Tier 2 Samples by Zone.

e. Breakdown of Macondo Oil Detections in Submerged Aquatic Vegetation Tier 2 Florida Samples by Zone

Category	Zone A	Zone B	Zone C	Zone D	All Zones
Total Samples	88	83	28	-	199
Classification Codes A+B+C	19	30	12	-	61
Classification Code A	-	-	-	-	-
Classification Code B	7	5	-	-	12
Classification Code C	12	25	12	-	49
Indeterminate Code D	69	53	16	-	138
Non-Match Code E	-	-	-	-	-
% Classification Codes A+B+C	22%	36%	43%	na	31%
Classification Code A	0%	0%	0%	na	0%
Classification Code B	8%	6%	0%	na	6%
Classification Code C	14%	30%	43%	na	25%
Indeterminate Code D	78%	64%	57%	na	69%
Non-Match Code E	0%	0%	0%	na	0%

na - not analyzed nd - not detected no - not observed

Table A6.9. Breakdown of Nearshore Forensic Classification Codes in Submerged Aquatic Vegetation Sampling Plan Tier 3 Samples by Zone.

Category	Zone A	Zone B	Zone C	Zone D	All Zones
Total Samples	21	18	43	51	133
Classification Codes A+B+C	6	1	2	-	9
Classification Code A	1	-	-	-	1
Classification Code B	4	1	2	-	7
Classification Code C	1	-	-	-	1
Indeterminate Code D	15	17	41	51	124
Non-Match Code E	-	-	-	-	-
% Classification Codes A+B+C	29%	6%	5%	0%	7%
Classification Code A	5%	0%	0%	0%	1%
Classification Code B	19%	6%	5%	0%	5%
Classification Code C	5%	0%	0%	0%	1%
Indeterminate Code D	71%	94%	95%	100%	93%
Non-Match Code E	0%	0%	0%	0%	0%

na - not analyzed nd - not detected no - not observed

Table A6.10. Breakdown of Nearshore Forensic Classification Codes in Submerged Aquatic Vegetation Sampling Plan Tier 3 Samples by Zone.

Category	Zone A	Zone B	Zone C	Zone D	All Zones
Total Samples	12	18	10	15	55
Classification Codes A+B+C	5	2	-	-	7
Classification Code A	-	-	-	-	-
Classification Code B	1	-	-	-	1
Classification Code C	4	2	-	-	6
Indeterminate Code D	7	16	10	15	48
Non-Match Code E	-	-	-	-	-
% Classification Codes A+B+C	42%	11%	0%	0%	13%
Classification Code A	0%	0%	0%	0%	0%
Classification Code B	8%	0%	0%	0%	2%
Classification Code C	33%	11%	0%	0%	11%
Indeterminate Code D	58%	89%	100%	100%	87%
Non-Match Code E	0%	0%	0%	0%	0%

na - not analyzed nd - not detected no - not observed

Table A6.11. Summary of Percent Depletion of $PetPAH_{27}$ in Macondo Oil Impacted Samples.

a. Summary of Percent Depletion of $PetPAH_{27}$ in Tier 2 Match A+B+C

Category	Louisiana	Mississippi	Alabama	Florida	All States
Percent Depletion Sediment/Tissue/Pom-pom/Solid/Sheen Matches A+B+C					
Count	43	70	128	61	302
Minimum	70	91	89	68	68
5th Percentile	87	93	92	82	89
25th Percentile	93	95	94	92	93
50th Percentile (Median)	94	96	95	94	95
75th Percentile	96	96	96	95	96
95th Percentile	97	98	98	96	98
Maximum	98	98	98	98	98

b. Summary of Percent Depletion of $PetPAH_{27}$ in Tier 3 Match A+B+C

Category	Louisiana	Mississippi	Alabama	Florida	All States
Percent Depletion Sediment/Tissue/Pom-pom/Solid/Sheen Matches A+B+C					
Count	9	na	na	na	9
Minimum	89	na	na	na	89
5th Percentile	90	na	na	na	90
25th Percentile	93	na	na	na	93
50th Percentile (Median)	95	na	na	na	95
75th Percentile	95	na	na	na	95
95th Percentile	96	na	na	na	96
Maximum	96	na	na	na	96

na - not analyzed nd - not detected no - not observed

Table A6.11. Summary of Percent Depletion of $PetPAH_{27}$ in Macondo Oil Impacted Samples.

c. Summary of Percent Depletion of $PetPAH_{27}$ in Fresh and Brackish Water Match A+B+C

Category	Louisiana	Mississippi	Alabama	Florida	All States
Percent Depletion Sediment/Tissue/Pom-pom/Solid/Sheen Matches A+B+C					
Count	7	na	na	na	7
Minimum	78	na	na	na	78
5th Percentile	79	na	na	na	79
25th Percentile	83	na	na	na	83
50th Percentile (Median)	86	na	na	na	86
75th Percentile	92	na	na	na	92
95th Percentile	96	na	na	na	96
Maximum	97	na	na	na	97

na - not analyzed nd - not detected no - not observed

APPENDIX 7

OTHER NOAA SAMPLING AND ANALYSIS PROJECT INFORMATION

Table A7.1. Nearshore Forensic Classification Codes in NOAA ARD Samples by State.

Category	Louisiana	Mississippi	Alabama	Florida	All States
Total Samples	5	12	6	21	44
Classification Codes A+B+C	-	-	-	-	-
Classification Code A	-	-	-	-	-
Classification Code B	-	-	-	-	-
Classification Code C	-	-	-	-	-
Indeterminate Code D	5	12	6	21	44
Non-Match Code E	-	-	-	-	-
% Classification Codes A+B+C	0%	0%	0%	0%	0%
Classification Code A	0%	0%	0%	0%	0%
Classification Code B	0%	0%	0%	0%	0%
Classification Code C	0%	0%	0%	0%	0%
Indeterminate Code D	100%	100%	100%	100%	100%
Non-Match Code E	0%	0%	0%	0%	0%

Table A7.2. Breakdown of $PetPAH_{27}$ Concentrations for All Macondo Oil All NOAA ARD Samples by State.

Category	Louisiana	Mississippi	Alabama	Florida	All States
$PetPAH_{27}$ µg/kg dry Soil/Sediment Matches A+B+C					
Count	5	12	6	21	44
Average	0.04	nd	nd	0.07	0.04
Minimum	nd	nd	nd	nd	nd
5th Percentile	nd	nd	nd	nd	nd
25th Percentile	nd	nd	nd	nd	nd
50th Percentile (Median)	0.06	nd	nd	nd	nd
75th Percentile	0.07	nd	nd	0.02	nd
95th Percentile	0.07	nd	nd	0.39	0.35
Maximum	0.07	nd	nd	0.45	0.45

na - not analyzed nd - not detected no - not observed

Table A7.3. Nearshore Forensic Classification Codes in Fish Kill Samples by State.

Category	Louisiana	Mississippi	Alabama	Florida	All States
Total Samples	20	2	-	2	24
Classification Codes A+B+C	-	-	-	2	2
Classification Code A	-	-	-	2	2
Classification Code B	-	-	-	-	-
Classification Code C	-	-	-	-	-
Indeterminate Code D	20	2	-	-	22
Non-Match Code E	-	-	-	-	-
% Classification Codes A+B+C	0%	0%	na	100%	8%
Classification Code A	0%	0%	na	100%	8%
Classification Code B	0%	0%	na	0%	0%
Classification Code C	0%	0%	na	0%	0%
Indeterminate Code D	100%	100%	na	0%	92%
Non-Match Code E	0%	0%	na	0%	0%

Table A7.4. Nearshore Forensic Classification Codes in Macondo Oil Impacted Fish Kill Samples.

Category	Louisiana	Mississippi	Alabama	Florida	All States
Solid (Soil, Sediments, Particulates) $PetPAH_{27}$ µg/kg dry in Classification Codes A+B+C					
Count	na	na	na	2	2
Minimum	na	na	na	1,080,000	1,080,000
5th Percentile	na	na	na	1,100,000	1,100,000
25th Percentile	na	na	na	1,170,000	1,170,000
50th Percentile (Median)	na	na	na	1,250,000	1,250,000
75th Percentile	na	na	na	1,340,000	1,340,000
95th Percentile	na	na	na	1,400,000	1,400,000
Maximum	na	na	na	1,420,000	1,420,000

na - not analyzed nd - not detected no - not observed

Table A7.5. Nearshore Forensic Classification Codes in Toxicity Sediment Collection Samples by State.

a. Breakdown of Macondo Oil Detections in 2010 Toxicity Sediment Collection Samples by State

Category	Louisiana	Mississippi	Alabama	Florida	All States
Total Samples	3	-	-	-	3
Classification Codes A+B+C	3	-	-	-	3
Classification Code A	3	-	-	-	3
Classification Code B	-	-	-	-	-
Classification Code C	-	-	-	-	-
Indeterminate Code D	-	-	-	-	-
Non-Match Code E	-	-	-	-	-
% Classification Codes A+B+C	100%	na	na	na	100%
Classification Code A	100%	na	na	na	100%
Classification Code B	0%	na	na	na	0%
Classification Code C	0%	na	na	na	0%
Indeterminate Code D	0%	na	na	na	0%
Non-Match Code E	0%	na	na	na	0%

na - not analyzed nd - not detected no - not observed

b. Breakdown of Macondo Oil Detections in 2011 Toxicity Sediment Collection Samples by State.

Category	Louisiana	Mississippi	Alabama	Florida	All States
Total Samples	5	-	-	-	5
Classification Codes A+B+C	2	-	-	-	2
Classification Code A	2	-	-	-	2
Classification Code B	-	-	-	-	-
Classification Code C	-	-	-	-	-
Indeterminate Code D	3	-	-	-	3
Non-Match Code E	-	-	-	-	-
% Classification Codes A+B+C	40%	na	na	na	40%
Classification Code A	40%	na	na	na	40%
Classification Code B	0%	na	na	na	0%
Classification Code C	0%	na	na	na	0%
Indeterminate Code D	60%	na	na	na	60%
Non-Match Code E	0%	na	na	na	0%

na - not analyzed nd - not detected no - not observed

Table A7.6. Breakdown of PAH Concentrations in Macondo Oil Impacted Toxicity Sediment Samples.

a. Summary of PAH Concentrations in Impacted 2010 Toxicity Sediment Collection Samples

Category	Louisiana	Mississippi	Alabama	Florida	All States
Solid (Soil, Sediments, Particulates) $PetPAH_{27}$ µg/kg dry in Classification Codes A+B+C					
Count	3	na	na	na	3
Minimum	2,490,000	na	na	na	2,490,000
5th Percentile	2,550,000	na	na	na	2,550,000
25th Percentile	2,760,000	na	na	na	2,760,000
50th Percentile (Median)	3,030,000	na	na	na	3,030,000
75th Percentile	3,150,000	na	na	na	3,150,000
95th Percentile	3,250,000	na	na	na	3,250,000
Maximum	3,280,000	na	na	na	3,280,000

na - not analyzed nd - not detected no - not observed

b. Summary of PAH Concentrations in Impacted 2011 Toxicity Sediment Collection Samples

Category	Louisiana	Mississippi	Alabama	Florida	All States
Solid (Soil, Sediments, Particulates) $PetPAH_{27}$ µg/kg dry in Classification Codes A+B+C					
Count	2	na	na	na	2
Minimum	6,280	na	na	na	6,280
5th Percentile	6,650	na	na	na	6,650
25th Percentile	8,150	na	na	na	8,150
50th Percentile (Median)	10,000	na	na	na	10,000
75th Percentile	11,900	na	na	na	11,900
95th Percentile	13,400	na	na	na	13,400
Maximum	13,800	na	na	na	13,800

na - not analyzed nd - not detected no - not observed