APPENDIX A

Source Oil Analyses

A.1. PAH analyses, analyte histogram and biomarker analyses of November 28, 2004 source oil sample (GERG Laboratory analyses).

A.2. PAH analyses, analyte histogram and trace metals analysis of November 28, 2004 source oil sample (B&B Laboratory analysis).

A.3. Analysis of source oil aromatics (Lancaster Laboratories).

A.4. December 7, 2004 LSU source oil report.

A.5. December 9, 2004 LSU source oil report.

A.6. Narcotic potency of the PAH mixture in the source oil.

A.7. PAH Analyte List by Laboratory.

A.1. PAH analyses, analyte histogram, and biomarker analyses of November 28, 2004 source oil sample taken by USCG from the *M/T Athos*. Analysis by GERG. GERG ID numbers C45279, W44253, W44254, W55259, and W442260 are replicates of the same source oil sample. The analyte histogram is the average of the five replicates.

GERG Analyses

Client Sample ID	Sample 1	Sample 1	Sample 1
Sample Descriptor	Tank Center 7	Tank Center 7	Tank Center 7
Original Sample			
GERG ID	C45279	W44253	W44254
Sample Type	SAMP	SAMP	SAMP
SDG	EC174	EC174	
Wet Weight	0.558	0.558	0.558
Sample Size Units	Milligrams	Milligrams	Milligrams
Matrix	Oil	Oil	Oil
% solid			
% Lipid			
Reporting Units	ng/mg	ng/mL	ng/mL
Calculation Basis (dry/wet)	Wet	Wet	Wet
QC Batch ID		T1465	T1465
Method	GCMS	GCMS	GCMS
Collection Date	11/28/04	11/28/04	11/28/04
Receive Date	12/15/04	12/15/04	12/15/04
Extraction Date			
Analysis Date	12/14/04	01/14/05	01/14/05
Surrogate Compounds	**%Recovery**	**%Recovery**	**%Recovery**
d8-Naphthalene	109.7	80.3	72.7
d10-Acenaphthene	107.5	85.5	74.3
d10-Phenanthrene	111.5	78.0	63.4
d12-Chrysene	97.7	73.8	57.3
d12-Perylene	92.7	83.8	79.7
Total PAHs	**Concentration**	**Concentration**	**Concentration**
Total PAHs with Perylene	4410.4	4427.0	4615.7
Total PAHs without Perylene	4401.5	4408.9	4603.1
Total NS&T PAHs	681.7	648.8	688.2

ND Not Detected
J <MDL
NA Not Applicable
Q Results Outside QC
I Interference
B Blank Contamination >3xMDL
D Dilution

Client Sample ID	Sample 1		Sample 1		Sample 1	
Sample Descriptor	Tank Center 7		Tank Center 7		Tank Center 7	
Original Sample						
GERG ID	C45279		W44253		W44254	
Sample Type	SAMP		SAMP		SAMP	
SDG	EC174		EC174			
PAH Compounds	**Concentration**	**MDL**	**Concentration**	**MDL**	**Concentration**	**MDL**
Naphthalene	60.24	10.0	58.3	10.0	61.3	10.0
C1-Naphthalenes	129.62	10.0	132.8	10.0	137.8	10.0
C2-Naphthalenes	254.17	10.0	264.6	10.0	271.9	10.0
C3-Naphthalenes	263.56	10.0	296.2	10.0	299.3	10.0
C4-Naphthalenes	188.07	10.0	212.3	10.0	201.9	10.0
Biphenyl	13.27	10.0	13.1	10.0	13.7	10.0
Acenaphthylene	8.64	10.0 J	7.8	10.0 J	8.9	10.0 J
Acenaphthene	21.45	10.0	17.9	10.0	18.9	10.0
Fluorene	50.78	10.0	46.6	10.0	46.7	10.0
C1-Fluorenes	120.08	10.0	119.5	10.0	127.9	10.0
C2-Fluorenes	227.34	10.0	219.0	10.0	220.8	10.0
C3-Fluorenes	271.21	10.0	287.7	10.0	287.9	10.0
Phenanthrene	87.19	10.0	86.0	10.0	91.6	10.0
Anthracene	8.86	10.0 J	6.7	10.0 J	7.2	10.0 J
C1-Phenanthrenes/Anthracenes	228.96	10.0	222.4	10.0	246.3	10.0
C2-Phenanthrenes/Anthracenes	338.85	10.0	314.7	10.0	333.7	10.0
C3-Phenanthrenes/Anthracenes	282.08	10.0	275.8	10.0	287.8	10.0
C4-Phenanthrenes/Anthracenes	208.45	10.0	240.5	10.0	230.5	10.0
Dibenzothiophene	40.98	10.0	36.4	10.0	42.6	10.0
C1-Dibenzothiophenes	162.97	10.0	127.3	10.0	138.0	10.0
C2-Dibenzothiophenes	367.72	10.0	348.6	10.0	369.4	10.0
C3-Dibenzothiophenes	373.04	10.0	346.5	10.0	373.2	10.0
Fluoranthene	3.95	10.0 J	3.1	10.0 J	4.1	10.0 J
Pyrene	16.44	10.0	14.3	10.0	17.5	10.0
C1-Fluoranthenes/Pyrenes	84.53	10.0	78.1	10.0	79.8	10.0
C2-Fluoranthenes/Pyrenes	123.87	10.0	124.0	10.0	137.3	10.0
C3-Fluoranthenes/Pyrenes	139.00	10.0	173.4	10.0	168.5	10.0
Benzo(a)anthracene	10.40	10.0	5.3	10.0 J	6.3	10.0 J
Chrysene	36.91	10.0	32.8	10.0	38.8	10.0
C1-Chrysenes	79.65	10.0	82.8	10.0	94.1	10.0
C2-Chrysenes	90.14	10.0	123.4	10.0	144.6	10.0
C3-Chrysenes	47.12	10.0	36.8	10.0	48.1	10.0
C4-Chrysenes	9.84	10.0 J	11.2	10.0	5.7	10.0 J
Benzo(b)fluoranthene	7.86	10.0 J	8.0	10.0 J	8.3	10.0 J
Benzo(k)fluoranthene	2.07	10.0 J	1.1	10.0 J	1.2	10.0 J
Benzo(e)pyrene	14.92	10.0	12.9	10.0	15.5	10.0
Benzo(a)pyrene	6.82	10.0 J	5.5	10.0 J	3.4	10.0 J
Perylene	8.90	10.0 J	18.1	10.0	12.6	10.0
Indeno(1,2,3-c,d)pyrene	4.99	10.0 J	4.4	10.0 J	2.7	10.0 J
Dibenz(a,h)anthracene	7.27	10.0 J	5.2	10.0 J	5.2	10.0 J
Benzo(g,h,i)perylene	8.25	10.0 J	6.2	10.0 J	4.9	10.0 J
2-Methylnaphthalene	70.02	10.0	71.8	10.0	74.4	10.0
1-Methylnaphthalene	59.60	10.0	60.9	10.0	63.4	10.0
2,6-Dimethylnaphthalene	139.18	10.0	132.1	10.0	140.7	10.0
1,6,7-Trimethylnaphthalene	101.52	10.0	95.5	10.0	100.7	10.0
1-Methylphenanthrene	65.53	10.0	58.2	10.0	66.9	10.0

ND Not Detected
J <MDL
NA Not Applicable
Q Results Outside QC
I Interference
B Blank Contamination >3xMDL
D Dilution

Client Sample ID	Sample 1	Sample 1
Sample Descriptor	Tank Center 7	Tank Center 7
Original Sample		
GERG ID	W44259	W44260
Sample Type	SAMP	SAMP
SDG		
Wet Weight	0.558	0.558
Sample Size Units	Milligrams	Milligrams
Matrix	Oil	Oil
% solid		
% Lipid		
Reporting Units	ng/mL	ng/mL
Calculation Basis (dry/wet)	Wet	Wet
QC Batch ID	T1466	T1466
Method	GCMS	GCMS
Collection Date	11/28/04	11/28/04
Receive Date	12/15/04	12/15/04
Extraction Date		
Analysis Date	01/15/05	01/15/05
Surrogate Compounds	**%Recovery**	**%Recovery**
d8-Naphthalene	101.8	117.3
d10-Acenaphthene	110.4	119.3
d10-Phenanthrene	99.7	108.0
d12-Chrysene	94.7	109.6
d12-Perylene	89.7	82.9
Total PAHs	**Concentration**	**Concentration**
Total PAHs with Perylene	4563.5	4964.3
Total PAHs without Perylene	4547.0	4947.9
Total NS&T PAHs	652.4	705.5

ND Not Detected
J <MDL
NA Not Applicable
Q Results Outside QC
I Interference
B Blank Contamination >3xMDL
D Dilution

Client Sample ID	Sample 1		Sample 1	
Sample Descriptor	Tank Center 7		Tank Center 7	
Original Sample				
GERG ID	W44259		W44260	
Sample Type	SAMP		SAMP	
SDG				

PAH Compounds	Concentration	MDL		Concentration	MDL	
Naphthalene	61.3	10.0		63.7	10.0	
C1-Naphthalenes	130.8	10.0		135.5	10.0	
C2-Naphthalenes	266.3	10.0		274.7	10.0	
C3-Naphthalenes	301.7	10.0		309.1	10.0	
C4-Naphthalenes	206.2	10.0		216.0	10.0	
Biphenyl	11.2	10.0		12.6	10.0	
Acenaphthylene	7.7	10.0	J	8.7	10.0	J
Acenaphthene	18.4	10.0		18.6	10.0	
Fluorene	46.2	10.0		49.3	10.0	
C1-Fluorenes	116.3	10.0		131.1	10.0	
C2-Fluorenes	216.7	10.0		238.4	10.0	
C3-Fluorenes	288.4	10.0		336.5	10.0	
Phenanthrene	84.2	10.0		94.4	10.0	
Anthracene	7.6	10.0	J	8.6	10.0	J
C1-Phenanthrenes/Anthracenes	225.1	10.0		260.5	10.0	
C2-Phenanthrenes/Anthracenes	328.2	10.0		358.1	10.0	
C3-Phenanthrenes/Anthracenes	290.0	10.0		316.3	10.0	
C4-Phenanthrenes/Anthracenes	255.0	10.0		258.5	10.0	
Dibenzothiophene	38.3	10.0		42.1	10.0	
C1-Dibenzothiophenes	125.5	10.0		146.4	10.0	
C2-Dibenzothiophenes	365.9	10.0		408.4	10.0	
C3-Dibenzothiophenes	369.2	10.0		406.8	10.0	
Fluoranthene	3.0	10.0	J	4.7	10.0	J
Pyrene	16.0	10.0		18.6	10.0	
C1-Fluoranthenes/Pyrenes	83.7	10.0		87.8	10.0	
C2-Fluoranthenes/Pyrenes	131.1	10.0		152.0	10.0	
C3-Fluoranthenes/Pyrenes	184.6	10.0		207.6	10.0	
Benzo(a)anthracene	7.1	10.0	J	6.0	10.0	J
Chrysene	38.7	10.0		41.0	10.0	
C1-Chrysenes	90.5	10.0		95.5	10.0	
C2-Chrysenes	135.4	10.0		141.8	10.0	
C3-Chrysenes	45.8	10.0		45.4	10.0	
C4-Chrysenes	10.8	10.0		14.4	10.0	
Benzo(b)fluoranthene	8.1	10.0	J	8.6	10.0	J
Benzo(k)fluoranthene	1.0	10.0	J	0.3	10.0	J
Benzo(e)pyrene	13.1	10.0		14.7	10.0	
Benzo(a)pyrene	5.3	10.0	J	3.8	10.0	J
Perylene	16.6	10.0		16.4	10.0	
Indeno(1,2,3-c,d)pyrene	3.3	10.0	J	2.7	10.0	J
Dibenz(a,h)anthracene	3.7	10.0	J	4.2	10.0	J
Benzo(g,h,i)perylene	5.9	10.0	J	4.5	10.0	J
2-Methylnaphthalene	70.3	10.0		73.8	10.0	
1-Methylnaphthalene	60.4	10.0		61.7	10.0	
2,6-Dimethylnaphthalene	129.2	10.0		143.8	10.0	
1,6,7-Trimethylnaphthalene	94.7	10.0		107.5	10.0	
1-Methylphenanthrene	60.2	10.0		69.7	10.0	

ND Not Detected
J <MDL
NA Not Applicable
Q Results Outside QC
I Interference
B Blank Contamination >3xMDL
D Dilution

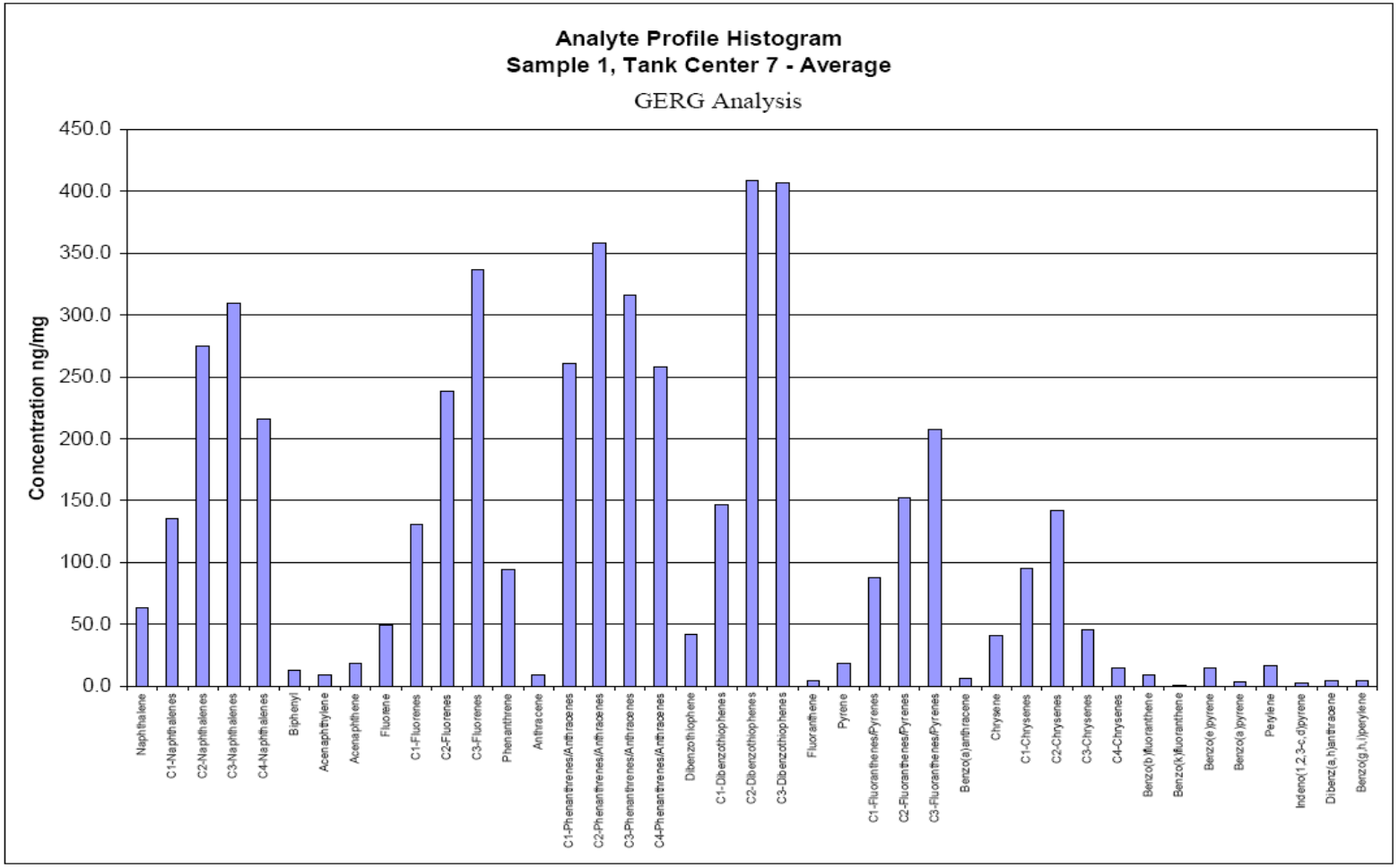
Client Sample ID					
Sample Descriptor	Tank Center 7			GERG REF OIL	
Original Sample					
GERG ID				W44231	
Sample Type	Average of 5 Injections			REF	
SDG					
Wet Weight				1.00	
Sample Size Units				Milliliter	
Matrix				Oil Solution	
% solid					
% Lipid					
Reporting Units				ng/mL	
Calculation Basis (dry/wet)				Wet	
QC Batch ID				T1463	
Method				GCMS	
Collection Date					
Receive Date					
Extraction Date					
Analysis Date				12/14/04	
Surrogate Compounds				**%Recovery**	
d8-Naphthalene					NA
d10-Acenaphthene					NA
d10-Phenanthrene					NA
d12-Chrysene	Average	Std Dev	Coef of Var		NA
d12-Perylene					NA
Total PAHs				**Concentration**	
Total PAHs with Perylene	4596.2	223.6	4.9	10591.3	
Total PAHs without Perylene	4581.7	222.5	4.9	10575.4	
Total NS&T PAHs	675.3	24.2	3.6	4268.6	

ND Not Detected
J <MDL
NA Not Applicable
Q Results Outside QC
I Interference
B Blank Contamination >3xMDL
D Dilution

Client Sample ID			
Sample Descriptor	Tank Center 7		GERG REF OIL
Original Sample			
GERG ID			W44231
Sample Type	Average of 5 Injections		REF
SDG			

PAH Compounds				Concentration	MDL	
Naphthalene	61.0	2.0	3.2	753.5	20.0	
C1-Naphthalenes	133.3	3.4	2.5	2291.9	20.0	
C2-Naphthalenes	266.3	8.0	3.0	2042.0	20.0	
C3-Naphthalenes	294.0	17.7	6.0	1666.1	20.0	
C4-Naphthalenes	204.9	10.9	5.3	904.6	20.0	
Biphenyl	12.8	1.0	7.6	58.0	20.0	
Acenaphthylene	8.4	0.6	6.8	29.2	20.0	
Acenaphthene	19.0	1.4	7.3	9.3	20.0	
Fluorene	47.9	2.0	4.2	91.1	20.0	
C1-Fluorenes	123.0	6.2	5.1	264.0	20.0	
C2-Fluorenes	224.4	8.7	3.9	344.4	20.0	
C3-Fluorenes	294.3	24.6	8.4	294.2	20.0	
Phenanthrene	88.7	4.2	4.7	142.5	20.0	
Anthracene	7.8	0.9	11.5	15.4	20.0	
C1-Phenanthrenes/Anthracenes	236.6	16.3	6.9	321.6	20.0	
C2-Phenanthrenes/Anthracenes	334.7	15.9	4.7	378.1	20.0	
C3-Phenanthrenes/Anthracenes	290.4	15.5	5.3	259.2	20.0	
C4-Phenanthrenes/Anthracenes	238.6	20.3	8.5	143.7	20.0	
Dibenzothiophene	40.1	2.6	6.5	21.7	20.0	
C1-Dibenzothiophenes	140.0	15.4	11.0	82.4	20.0	
C2-Dibenzothiophenes	372.0	22.0	5.9	75.9	20.0	
C3-Dibenzothiophenes	373.7	21.5	5.8	55.6	20.0	
Fluoranthene	3.8	0.7	19.7	6.1	20.0	
Pyrene	16.6	1.6	9.8	6.5	20.0	
C1-Fluoranthenes/Pyrenes	82.8	3.9	4.7	66.1	20.0	
C2-Fluoranthenes/Pyrenes	133.7	11.7	8.7	69.4	20.0	
C3-Fluoranthenes/Pyrenes	174.6	25.0	14.3	72.2	20.0	
Benzo(a)anthracene	7.0	2.0	28.3	7.3	20.0	
Chrysene	37.6	3.1	8.2	11.3	20.0	
C1-Chrysenes	88.5	7.0	7.9	27.3	20.0	
C2-Chrysenes	127.1	22.2	17.5	38.7	20.0	
C3-Chrysenes	44.6	4.5	10.1	13.6	20.0	
C4-Chrysenes	10.4	3.1	30.3	3.0	20.0	J
Benzo(b)fluoranthene	8.2	0.3	3.5	2.6	20.0	J
Benzo(k)fluoranthene	1.1	0.6	57.7	2.4	20.0	J
Benzo(e)pyrene	14.2	1.2	8.3	2.2	20.0	J
Benzo(a)pyrene	5.0	1.4	27.8	1.1	20.0	J
Perylene	14.5	3.7	25.6	15.9	20.0	
Indeno(1,2,3-c,d)pyrene	3.6	1.0	28.9	0.3	20.0	J
Dibenz(a,h)anthracene	5.1	1.4	26.8	0.4	20.0	J
Benzo(g,h,i)perylene	5.9	1.5	24.8	0.9	20.0	J
2-Methylnaphthalene	72.1	2.0	2.8	1382.5	20.0	
1-Methylnaphthalene	61.2	1.5	2.4	909.4	20.0	
2,6-Dimethylnaphthalene	137.0	6.1	4.4	751.6	20.0	
1,6,7-Trimethylnaphthalene	100.0	5.2	5.2	521.5	20.0	
1-Methylphenanthrene	64.1	4.8	7.4	104.8	20.0	

ND Not Detected
J <MDL
NA Not Applicable
Q Results Outside QC
I Interference
B Blank Contamination >3xMDL
D Dilution


Analyte Profile Histogram
Sample 1, Tank Center 7 - Average
GERG Analysis
Concentration ng/mg
450.0
400.0
350.0
300.0
250.0
200.0
150.0
100.0
50.0
0.0
Naphthalene
C1-Naphthalenes
C2-Naphthalenes
C3-Naphthalenes
C4-Naphthalenes
Biphenyl
Acenaphthylene
Acenaphthene
Fluorene
C1-Fluorenes
C2-Fluorenes
C3-Fluorenes
Phenanthrene
Anthracene
C1-Phenanthrenes/Anthracenes
C2-Phenanthrenes/Anthracenes
C3-Phenanthrenes/Anthracenes
C4-Phenanthrenes/Anthracenes
Dibenzothiophene
C1-Dibenzothiophenes
C2-Dibenzothiophenes
C3-Dibenzothiophenes
Fluoranthene
Pyrene
C1-Fluoranthenes/Pyrenes
C2-Fluoranthenes/Pyrenes
C3-Fluoranthenes/Pyrenes
Benzo(a)anthracene
Chrysene
C1-Chrysenes
C2-Chrysenes
C3-Chrysenes
C4-Chrysenes
Benzo(b)fluoranthene
Benzo(k)fluoranthene
Benzo(e)pyrene
Benzo(a)pyrene
Perylene
Indeno(1,2,3-c,d)pyrene
Dibenz(a,h)anthracene
Benzo(g,h,i)perylene

STERANE AND TRITERPANE BIOMARKERS

Project: ATHOS I Oil Spill
Lab Sample ID: C45279
Sample Descriptor: Sample 1, Tank Center 7
Analysis Date: 12/20/2004

PARAMETERS

A:LEVEL OF MATURITY

Steranes		Terpanes	
% 20S C29 STERANES	55.8	% 22S C31 HOMOHOPANE	60.7
% C29 ISOSTERANES (abb)	54.6	% C30 HOPANE	82.7
% REGULAR STERANES	13.9	% TS/TS+TM (C27)	41.6
% ISOSTERANES	15.7	TS/TM (C27)	0.71
% DIASTERANES	25.2	% C30 MORETANE	17.3
% SHORT-CHAIN STERANES	45.2	% C29 NORMORETANE	21.6
		DIAHOPANE INDEX (%)	9.2
		% TRICYCLIC TERPANES	45.2

B:ORGANIC FACIES AND DEPOSITIONAL ENVIRONMENT

% TOTAL C20+C21	45.2	OLEANANE INDEX (%)	14.9
% TOTAL C27	14.3	GAMMACERANE INDEX (%)	21.7
% TOTAL C28	19.6	BISNORHOPANE INDEX (%)	24.8
% TOTAL C29	16.4	25-NORHOPANE INDEX (%)	48.9
% TOTAL C30	4.5	DIAHOPANE INDEX (%)	9.2
HOPANES/STERANES	1.5	% TRICYCLIC TERPANES	45.2
% DIASTERANES	25.2	% C24 TETRACYCLIC TERPANE	24.8
TOTAL STERANES (ppm)	283	% MORETANES	19.5
		% TOTAL C31 PENTACYCLICS	41.2
Other Biological Markers		% TOTAL C32 PENTACYCLICS	24.0
		% TOTAL C33 PENTACYCLICS	15.9
b-Carotane (ppm)	0.6	% TOTAL C34 PENTACYCLICS	9.7
		% TOTAL C35 PENTACYCLICS	9.2
		C35/C34 HOMOHOPANES	0.95
		29/30 HOPANES	0.97
		TOTAL TRITERPANES (ppm)	418.2

All ratios based on concentrations

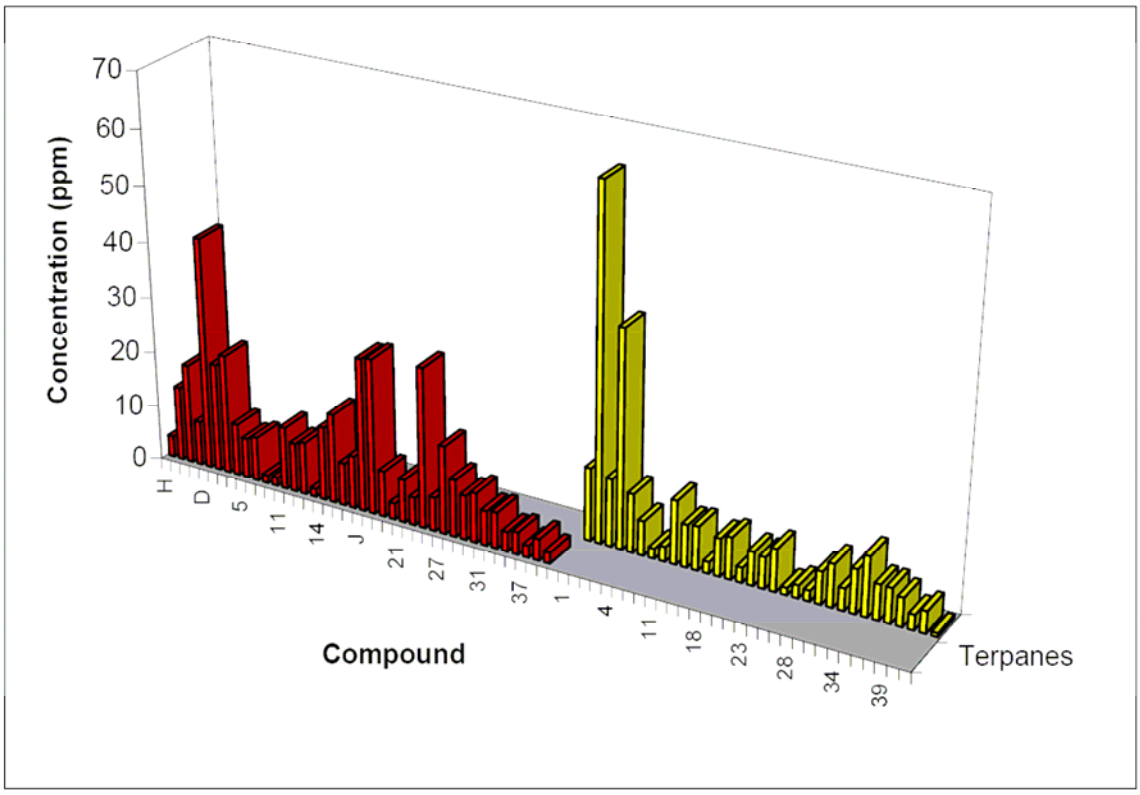
STERANE AND TRITERPANE BIOMARKERS

Project: ATHOS I Oil Spill

Lab Sample ID: C45279

Sample Descriptor: Sample 1, Tank Center 7

Analysis Date: 12/20/2004



A.2. PAH analyses, analyte histogram and trace metals analysis of November 28, 2004 source oil sample (B&B Laboratory analysis).

B&B Laboratories
Project J04447
Report 04-1353

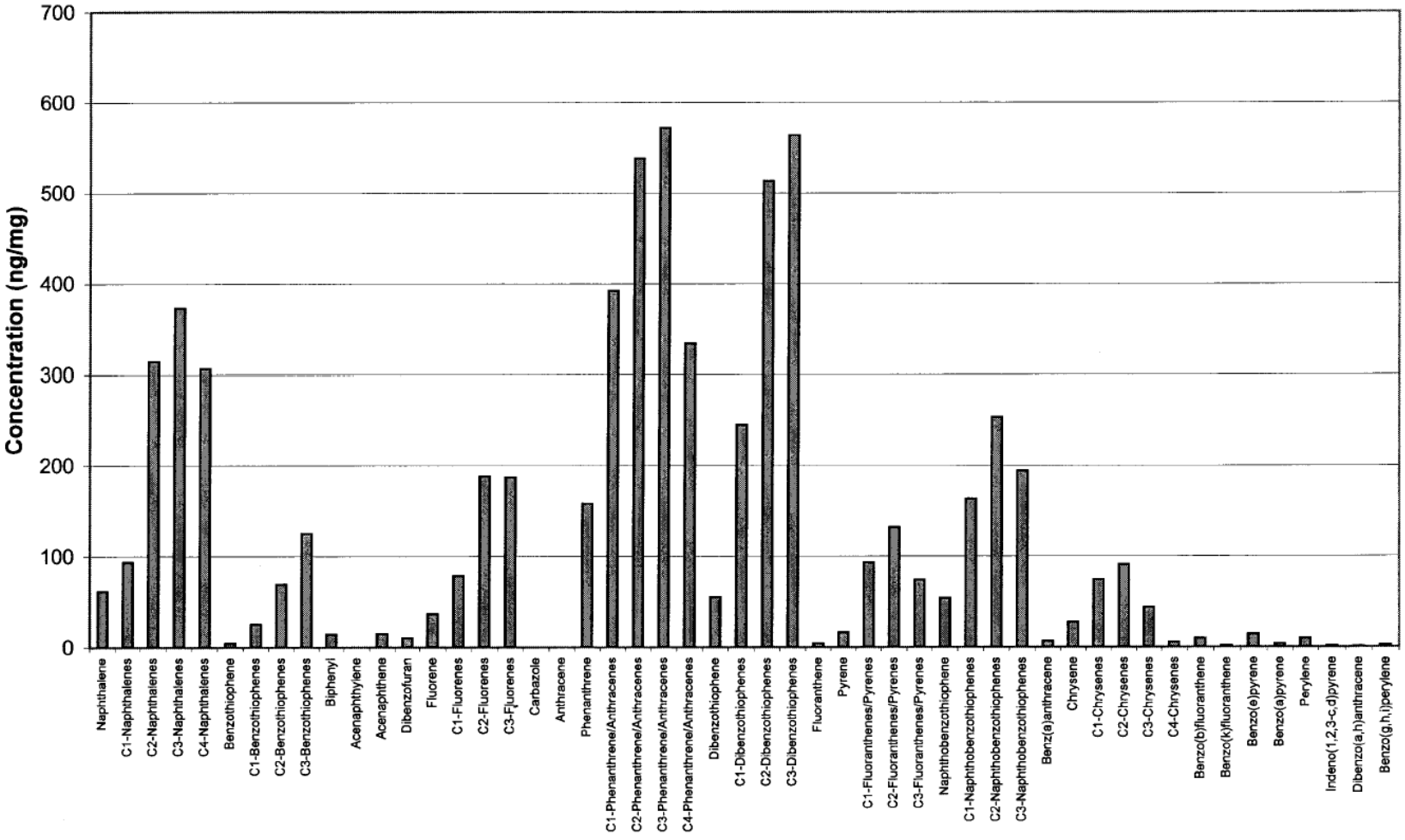
Polaris Applied Sciences, Inc.
TV Athos I Oil Spill Project
Polycyclic Aromatic Hydrocarbon Data
Client Submitted Samples

Client Project # 1146

Sample Name	ETX3872.D		ETX3872D.D	
Client Name	Sample 1 Tank Center 7		Dupl. (Sample 1 Tank Center 7)	
Matrix	Product		Product	
Collection Date	11/28/04		11/28/04	
Received Date	12/04/04		12/04/04	
Extraction Date	12/04/04		12/04/04	
Extraction Batch	ENV 1057		ENV 1057	
Date Acquired	12/04/04		12/04/04	
Method	PAH-2002		PAH-2002	
Sample Weight (mg)	11.9		11.9	
Dilution	NA		NA	
Target Compounds	Su Corrected Conc. (ng/mg)	Q	Su Corrected Conc. (ng/mg)	Q
Naphthalene	61.3		63.1	
C1-Naphthalenes	93.5		96.1	
C2-Naphthalenes	314		343	
C3-Naphthalenes	373		401	
C4-Naphthalenes	306		331	
Benzothiophene	4.1	J	4.4	J
C1-Benzothiophenes	25.4		27.7	
C2-Benzothiophenes	69.2		74.0	
C3-Benzothiophenes	125		122	
Biphenyl	14.5		16.3	
Acenaphthylene	<10	U	<10	U
Acenaphthene	14.7		16.2	
Dibenzofuran	10.3		9.5	J
Fluorene	36.6		37.9	
C1-Fluorenes	78.5		81.0	
C2-Fluorenes	188		204	
C3-Fluorenes	187		197	
Carbazole	<10	U	<10	U
Anthracene	<10	U	<10	U
Phenanthrene	158		147	
C1-Phenanthrene/Anthracenes	392		370	
C2-Phenanthrene/Anthracenes	538		499	
C3-Phenanthrene/Anthracenes	572		535	
C4-Phenanthrene/Anthracenes	334		316	
Dibenzothiophene	54.9		50.8	
C1-Dibenzothiophenes	245		225	
C2-Dibenzothiophenes	513		474	
C3-Dibenzothiophenes	564		562	
Fluoranthene	4.1	J	4.5	J
Pyrene	16.0		16.4	
C1-Fluoranthenes/Pyrenes	93.3		84.7	
C2-Fluoranthenes/Pyrenes	132		122	
C3-Fluoranthenes/Pyrenes	73.8		74.6	
Naphthobenzothiophene	54.0		55.8	
C1-Naphthobenzothiophenes	163		155	
C2-Naphthobenzothiophenes	253		254	
C3-Naphthobenzothiophenes	194		184	
Benz(a)anthracene	6.8	J	6.8	J
Chrysene	27.4		27.5	
C1-Chrysenes	74.4		75.6	
C2-Chrysenes	91.0		93	
C3-Chrysenes	43.5		43.8	
C4-Chrysenes	5.6	J	5.4	J
Benzo(b)fluoranthene	9.6	J	10.0	
Benzo(k)fluoranthene	1.3	J	1.2	J
Benzo(e)pyrene	14.1		15.1	
Benzo(a)pyrene	3.5	J	3.7	J
Perylene	9.8	J	10.2	
Indeno(1,2,3-c,d)pyrene	1.2	J	1.1	J
Dibenzo(a,h)anthracene	0.8	J	0.7	J
Benzo(g,h,i)perylene	2.0	J	2.1	J
Total PAHs	6548		6460	
Individual Alkyl Isomers and Hopanes				
2-Methylnaphthalene	76.2		79.0	
1-Methylnaphthalene	69.5		70.8	
2,6-Dimethylnaphthalene	160		174	
1,6,7-Trimethylnaphthalene	47.5		51.6	
1-Methylphenanthrene	72.1		66.8	
C29-Hopane	72.4		67.3	
18a-Oleanane	12.8		12.3	
C30-Hopane	74.0		73.4	
Surrogate (Su)	Su Recovery (%)		Su Recovery (%)	
Naphthalene-d8	91		93	
Acenaphthene-d10	95		92	
Phenanthrene-d10	90		90	
Chrysene-d12	90		85	
Perylene-d12	94		92	

Qualifiers (Q): J=Below the MDL, U=Not detected, B=In procedural blank > 3x MDL, I=Interference, D=Diluted value, NA=Not Applicable, *=Outside QA limits, refer to narrative

Sample 1 Tank Center 7 (Product)
ETX3872



Columbia Analytical Services

METALS

-1-

INORGANIC ANALYSIS DATA SHEET

Client: B&B Laboratories, Inc.
Project No.: NA
Project Name: TV Athos I
Matrix: OIL

Service Request: K2409956
Date Collected: 11/28/04
Date Received: 12/16/04
Units MG/KG
Basis Wet

Sample Name: ETX3872

Lab Code: K2409956-001

Analyte	Analysis Method	MRL	Dilution Factor	Date Extracted	Date Analyzed	Result	C	Q
Aluminum	6010B	5.0	1	12/30/04	1/6/05	8.6		
Antimony	6010B	5.0	1	12/30/04	1/6/05	5.0	U	
Arsenic	7060A	1.0	5	1/10/05	1/14/05	1.0	U	
Barium	6010B	0.5	1	12/30/04	1/6/05	1.3		
Beryllium	6010B	0.5	1	12/30/04	1/6/05	0.5	U	
Cadmium	6010B	0.5	1	12/30/04	1/6/05	0.5	U	
Calcium	6010B	5.0	1	12/30/04	1/6/05	41.8		
Chromium	6010B	1.0	1	12/30/04	1/6/05	1.5		
Cobalt	6010B	1.0	1	12/30/04	1/6/05	1.0	U	
Copper	6010B	1.0	1	12/30/04	1/6/05	1.7		
Iron	6010B	2.0	1	12/30/04	1/6/05	43.0		
Lead	6010B	10	1	12/30/04	1/6/05	10	U	
Magnesium	6010B	4.0	1	12/30/04	1/6/05	18.4		
Manganese	6010B	0.5	1	12/30/04	1/6/05	1.1		
Mercury	7471A	0.04	1	12/22/04	12/23/04	0.04	U	
Nickel	6010B	2.0	1	12/30/04	1/6/05	54.8		
Potassium	6010B	200	1	12/30/04	1/6/05	200	U	
Selenium	7740	1.0	5	1/10/05	1/12/05	1.0	U	
Silicon	6010B	50	1	12/30/04	1/6/05	50	U	
Silver	6010B	1.0	1	12/30/04	1/6/05	1.0	U	
Sodium	6010B	10	1	12/30/04	1/6/05	34.7		
Thallium	7841	0.4	2	1/10/05	1/17/05	0.4	U	
Tin	6010B	10	1	12/30/04	1/6/05	10	U	
Vanadium	6010B	1.0	1	12/30/04	1/6/05	440		
Zinc	6010B	1.0	1	12/30/04	1/6/05	3.8		

% Solids: NA

Comments:

00011

A.3. Analysis of source oil aromatics.

Analysis Report

Lancaster Laboratories

Lancaster Laboratories Sample No. G5 4419595

Sample 1 Tank Center 7 Grab Oil Sample
Delaware River Sample

Collected:11/28/2004 by SD

Account Number: 11623

Submitted: 12/03/2004 17:30
Reported: 12/17/2004 at 12:40
Discard: 01/01/2005

Entrix
10 Corporate Circle
Suite 300
New Castle DE 19720

TANK7 SDG#: DRS01-01*

CAT No.	Analysis Name	CAS Number	As Received Result		As Received Method Detection Limit	Units	Dilution Factor
03761	Naphthalene	91-20-3	40,000.	J	20,000.	ug/kg	10
03765	Acenaphthylene	208-96-8	N.D.		20,000.	ug/kg	10
03768	Fluorene	86-73-7	28,000.	J	20,000.	ug/kg	10
03775	Phenanthrene	85-01-8	78,000.	J	20,000.	ug/kg	10
03776	Anthracene	120-12-7	N.D.		20,000.	ug/kg	10
03778	Fluoranthene	206-44-0	N.D.		20,000.	ug/kg	10
03781	Benzo(a)anthracene	56-55-3	31,000.	J	20,000.	ug/kg	10
03782	Chrysene	218-01-9	N.D.		20,000.	ug/kg	10
03786	Benzo(b)fluoranthene	205-99-2	N.D.		20,000.	ug/kg	10
03787	Benzo(k)fluoranthene	207-08-9	N.D.		20,000.	ug/kg	10
03788	Benzo(a)pyrene	50-32-8	N.D.		20,000.	ug/kg	10
03789	Indeno(1,2,3-cd)pyrene	193-39-5	N.D.		20,000.	ug/kg	10
03790	Dibenz(a,h)anthracene	53-70-3	N.D.		20,000.	ug/kg	10
03791	Benzo(g,h,i)perylene	191-24-2	N.D.		20,000.	ug/kg	10

Due to sample matrix interferences observed during the extraction, the normal reporting limits could not be obtained.

Due to the sample matrix an initial dilution was necessary to perform the analysis. Therefore, the reporting limits for the GC/MS semivolatile compounds were raised.

Commonwealth of Pennsylvania Lab Certification No. 36-037

Laboratory Chronicle

CAT No.	Analysis Name	Method	Trial#	Analysis Date and Time	Analyst	Dilution Factor
08432	STARS Petroleum Contaminants S	SW-846 8021B	1	12/06/2004 18:09	Michael F Barrow	5000
07804	PAHs in Soil by GC/MS	SW-846 8270C	1	12/07/2004 12:48	Jeffrey B Smith	10
01132	GC VOA Soil Prep	SW-846 5035	1	12/06/2004 15:05	Michael F Barrow	n.a.
07806	BNA Soil Extraction	SW-846 3550B	1	12/05/2004 12:30	Olivia Arosemena	1

Lancaster Laboratories

Lancaster Laboratories Sample No. G5 4419595

Sample 1 Tank Center 7 Grab Oil Sample
Delaware River Sample

Collected:11/28/2004 by SD

Account Number: 11623

Submitted: 12/03/2004 17:30
Reported: 12/17/2004 at 12:40
Discard: 01/01/2005

Entrix
10 Corporate Circle
Suite 300
New Castle DE 19720

TANK7 SDG#: DRS01-01*

CAT No.	Analysis Name	CAS Number	As Received Result		As Received Method Detection Limit	Units	Dilution Factor
03761	Naphthalene	91-20-3	40,000.	J	20,000.	ug/kg	10
03765	Acenaphthylene	208-96-8	N.D.		20,000.	ug/kg	10
03768	Fluorene	86-73-7	28,000.	J	20,000.	ug/kg	10
03775	Phenanthrene	85-01-8	78,000.	J	20,000.	ug/kg	10
03776	Anthracene	120-12-7	N.D.		20,000.	ug/kg	10
03778	Fluoranthene	206-44-0	N.D.		20,000.	ug/kg	10
03781	Benzo(a)anthracene	56-55-3	31,000.	J	20,000.	ug/kg	10
03782	Chrysene	218-01-9	N.D.		20,000.	ug/kg	10
03786	Benzo(b)fluoranthene	205-99-2	N.D.		20,000.	ug/kg	10
03787	Benzo(k)fluoranthene	207-08-9	N.D.		20,000.	ug/kg	10
03788	Benzo(a)pyrene	50-32-8	N.D.		20,000.	ug/kg	10
03789	Indeno(1,2,3-cd)pyrene	193-39-5	N.D.		20,000.	ug/kg	10
03790	Dibenz(a,h)anthracene	53-70-3	N.D.		20,000.	ug/kg	10
03791	Benzo(g,h,i)perylene	191-24-2	N.D.		20,000.	ug/kg	10

Due to sample matrix interferences observed during the extraction, the normal reporting limits could not be obtained.

Due to the sample matrix an initial dilution was necessary to perform the analysis. Therefore, the reporting limits for the GC/MS semivolatile compounds were raised.

Commonwealth of Pennsylvania Lab Certification No. 36-037

Laboratory Chronicle

CAT No.	Analysis Name	Method	Trial#	Analysis Date and Time	Analyst	Dilution Factor
08432	STARS Petroleum Contaminants S	SW-846 8021B	1	12/06/2004 18:09	Michael F Barrow	5000
07804	PAHs in Soil by GC/MS	SW-846 8270C	1	12/07/2004 12:48	Jeffrey B Smith	10
01132	GC VOA Soil Prep	SW-846 5035	1	12/06/2004 15:05	Michael F Barrow	n.a.
07806	BNA Soil Extraction	SW-846 3550B	1	12/05/2004 12:30	Olivia Arosemena	1

A.4. December 7, 2004 LSU source oil report.

Department of Environmental Studies, Louisiana State University
1285 Energy, Coast & Environment Building, Baton Rouge, LA 70803
(225) 578-4295

IES/RCAT04-26 07 December, 2004

To: Ed Levine
NOAA SSC

From: Scott Miles
Chemistry Support Team
Louisiana State University

Re: Delaware River Oil Spill

Executive Summary

Two (2) reference oil samples (Table 1) collected from the Athos I by David Wesley (NOAA HAZMAT) were received at the Louisiana State University Response laboratory on 06 December 2004. The samples were diluted and fingerprinted upon arrival and logged-in at DES/RCAT. In addition to oil fingerprinting, density, viscosity, evaporative weathering, and standard distillation curve analysis was performed on the samples. The samples displayed a fingerprinting pattern similar to a heavy crude oil with normal alkane ranges from nC-10 to nC-26. The samples contained high concentrations of asphaltenes and other unresolved high molecular weight compounds. Initial density analyses suggest the oil samples will float if spilled in fresh water. Results from the evaporative weathering experiment indicated that it is unlikely the sample oils would sink due to natural evaporative processes. It should be noted the sample oils loss <3% (by weight) when placed under vacuum and 90 degree Celsius conditions for four (4) hours.

Table 1. Sample Identifications and LSU Identifications

NOAA	Collection Site	Time	LSU ID#	Instrument ID
Sample #1	Delaware River/Philadelphia	12/03/2004 0955	2N4341-01	GRM4341D
Sample #2	Delaware River/Philadelphia	12/03/2004 0955	2N4341-02	GRM4341E

METHODOLOGY

Once the samples were received at the LSU laboratory, they were transferred with a metal spatula into 40-milliliter (ml) extraction vials. The samples were then mixed and covered with dichloromethane (DCM). Sodium sulfate Na_2SO_4 was added to each sample, which was then shaken. The samples were then transferred, using separate disposable pipettes, into a 2 mL autosampler vial and capped with a PTFE/Aluminum crimp cap. A reference oil standard (North Slope Crude) was analyzed prior to the sample oil analyses. The extracted oil sample and reference oils were analyzed on a Hewlett Packard 5890 Series II Gas Chromatograph coupled with a Hewlett Packard 5971 Series Mass Selective Detector operated in selected ion monitoring mode.

Oil density was determined by filling a pre-weighed calibrated Teflon tube with a known volume of sample oil. The Teflon tube and oil were weighed on an analytical balance and weight recorded. Density was expressed as g/ml.

Viscosity was determined using a calibrated EZ viscosity cup and stopwatch as specified in ASTM D 4212 standards. Viscosity was expressed in cSt.

Evaporative weathering was performed by placing approximately 10 ml of each oil sample into a pre-weighed 100 ml round bottom flask followed by attachment to a rotary evaporative device. The flasks were then submersed in a 90 degree Celsius hot water bath. The flasks were removed at set time intervals (10, 30, 60, 120, 240 minutes) and weighed. The weight loss was noted and the % evaporation was calculated. After 240 minutes the flasks were removed from the rotovap and allowed to cool to room temperature. A small aliquot of oil from each flask was removed and placed in 100 ml beakers containing 50 ml of tap water. Observations were noted and recorded in laboratory notebook.

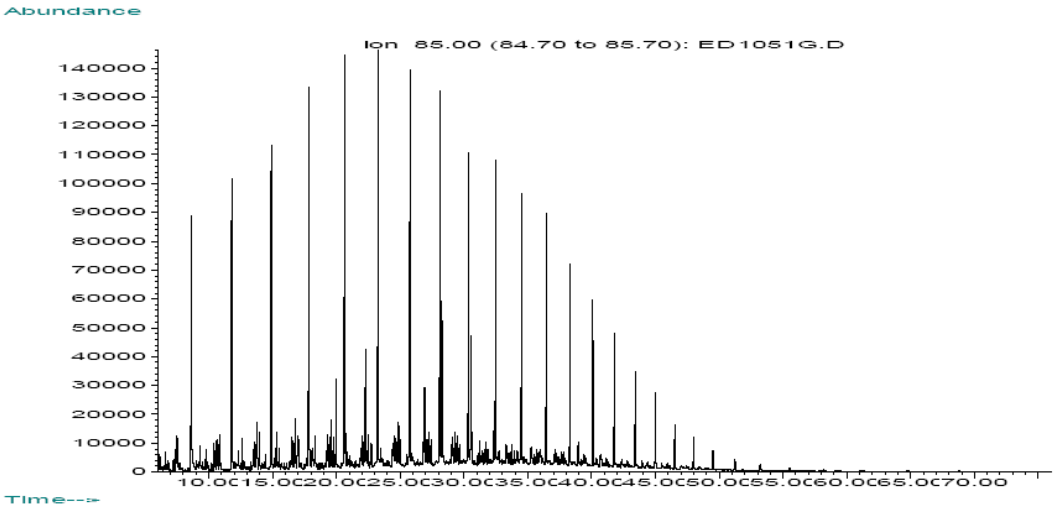
Results from the physical analyses are displayed in the results and discussion section, Table 2.

RESULTS AND DISCUSSION

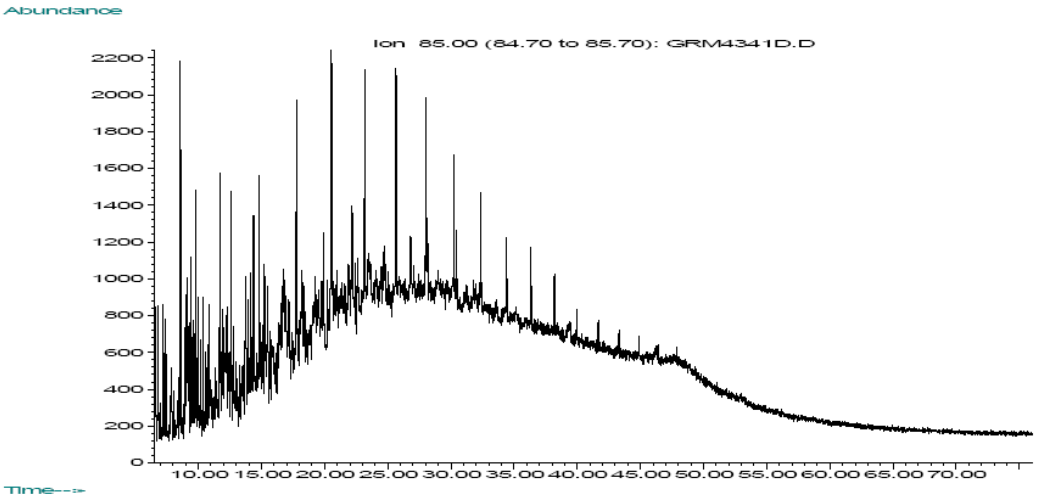
Results from the fingerprinting analysis indicate the samples originated from a heavy crude oil with normal alkanes ranging from C-10 to C-26. The samples contained low concentrations of aromatic compounds and were slightly weathered. The significant oil-fingerprinting biomarker compounds, hopanes and steranes, were detected at very low concentrations. The samples did contain a high concentration of asphaltenes and other unresolved high molecular weight compounds. The normal alkane profile for the two oil samples and North Slope Crude reference oil are displayed below.

Table 2. Results from Physical Testing

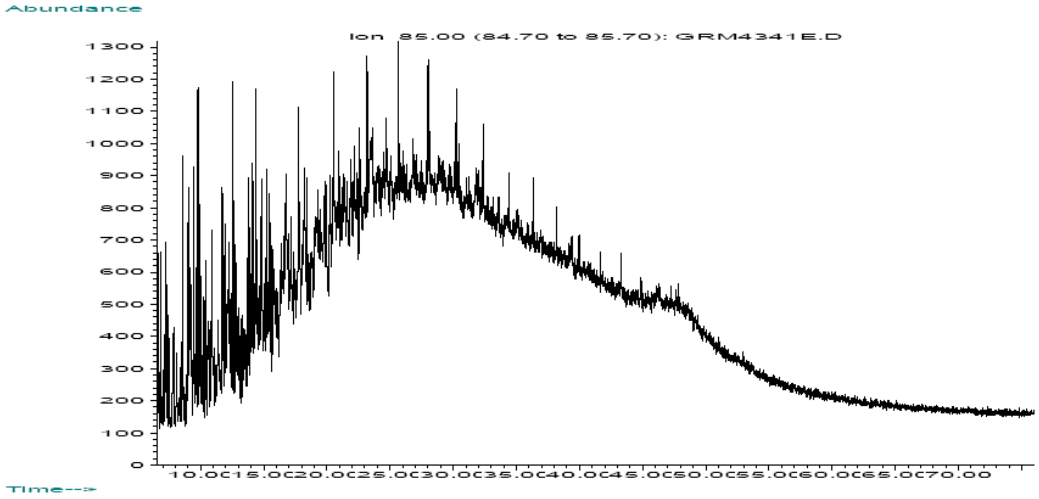
Test	Sample	Results	Comments
Density	Sample #1	0.978 g/ml	
	Sample #2	0.973 g/ml	
Viscosity	Sample #1	>5000cSt	Beyond testing range
	Sample #2	>5000cSt	Beyond testing range
Evaporative Weathering	Sample #1	< 3%	Oil floated and spread
	Sample #2	< 3%	Oil floated and spread



Normal Alkane Profile of Reference Oil: North Slope Crude



Normal Alkane Profile of Oil Sample #1 from Athos I Spill



Normal Alkane Profile of Oil Sample #2 from Athos I Spill

A.5. December 9, 2004 LSU source oil report.

Department of Environmental Studies, Louisiana State University

1285 Energy, Coast & Environment Building, Baton Rouge, LA 70803
(225) 578-4295

IES/RCAT04-28 09 December, 2004

To: Ed Levine
NOAA SSC

From: Scott Miles
Chemistry Support Team
Louisiana State University

Re: Delaware River Oil Spill

Executive Summary

One (1) oil sample (Table 1) collected from the Athos I spill by Steve Lehmann (NOAA SSC) was received at the Louisiana State University Response laboratory on 09 December 2004. The sample was diluted and fingerprinted upon arrival and logged-in at DES/RCAT. In addition to oil fingerprinting, density, viscosity, and oil cohesiveness test was performed on the sample. The sample displayed a fingerprinting pattern similar to a heavy crude oil with normal alkane ranges from nC-10 to nC-26. The sample displayed a fingerprinting pattern similar to previous samples retrieved from the M/V Athos spill, but with a higher degree of weathering. The samples contained high concentrations of asphaltenes and other unresolved high molecular weight compounds. The presence of aromatic and biomarker compounds was detected, but at very low levels. Initial density analyses suggest the oil samples will float if spilled in fresh water. **Results from the oil cohesiveness jar test demonstrate the oil may adhere to the river bottom sediments if the oil was released with sufficient mass and velocity to strike the river bottom. During the jar test, large quantities (>50%) of oil was retained on the silt/sand test bed and remained submerged during the entire testing period. We are speculating the outer boundary layer of the pooled oil mass may be adhering to the bottom sediments/detritus material. The remainder of the oil, not contacting the river bottom, is being held immobile by the high cohesive forces exerted by the highly viscous oil.**

Table 1. Sample Identifications and LSU Identifications

NOAA	Collection Site	Time	LSU ID#	Instrument ID
Pooled Oil	Delaware River/Philadelphia	12/08/2004	2N4344-01	GRM4344A

METHODOLOGY

Once the sample was received at the LSU laboratory, it was transferred with a metal spatula into 40-milliliter (ml) extraction vial. The sample was then mixed and covered with dichloromethane (DCM). Sodium sulfate Na_2SO_4 was added to each sample, which was then shaken. The sample was then transferred, using a disposable pipette, into a 2 mL autosampler vial and capped with a PTFE/Aluminum crimp cap. A reference oil standard (North Slope Crude) was analyzed prior to the sample oil analysis. The extracted oil sample and reference oils were analyzed on a Hewlett Packard 5890 Series II Gas Chromatograph coupled with a Hewlett Packard 5971 Series Mass Selective Detector operated in selected ion monitoring mode.

Oil density was determined by filling a pre-weighed calibrated Teflon tube with a known volume of sample oil. The Teflon tube and oil was weighed on an analytical balance and weight recorded. Density was expressed as g/ml.

Viscosity was determined using a calibrated EZ viscosity cup and stopwatch as specified in ASTM D 4212 standards. Viscosity was expressed in cSt.

The oil cohesiveness jar test was performed by placing approximately 10 ml of sample oil into a Teflon tube and forcefully injecting the oil into 125 ml Pyrex beaker. The beaker contained approximately 60 ml of Mississippi River water and a ¼" thick sand/silt bed material. The experiment was allowed to equilibrate for three (3) hours and visual observations were noted..

Results from the physical analyses are displayed in the results and discussion section, Table 2.

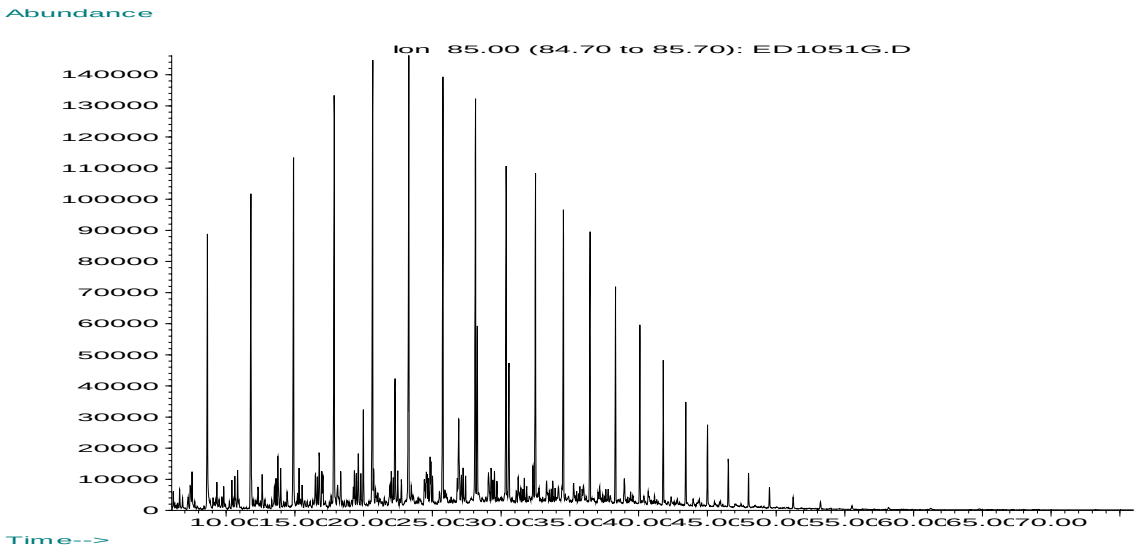
RESULTS AND DISCUSSION

Results from the fingerprinting analysis indicate the samples originated from a heavy crude oil with normal alkanes ranging from C-10 to C-26. The samples contained low concentrations of aromatic compounds and was moderately weathered. The significant oil-fingerprinting biomarker compounds, hopanes and steranes, were detected at very low concentrations. The samples did contain a high concentration of asphaltenes and other unresolved high molecular weight compounds**.** Results from the oil cohesiveness jar test demonstrate the oil may adhere to the river bottom sediments if the oil was released with sufficient mass and velocity to strike the river bottom. The normal alkane profiles for the pooled oil sample and North Slope Crude reference oil are displayed below.

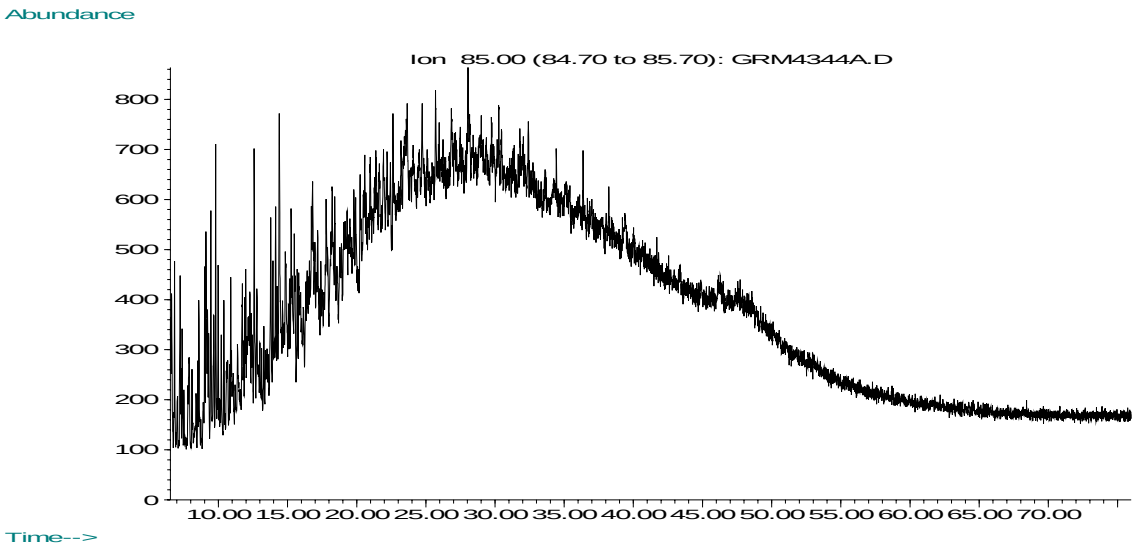
Table 2. Results from Physical Testing

Test	Sample	Results	Comments
Density	2N4344-01	0.943 g/ml	
Viscosity	2N4344-01	>5000cSt	Beyond testing range
Oil cohesiveness jar test	2N4344-01	Positive	Oil may adhere to bottom sediments

NA – Not Applicable



Normal Alkane Profile of Reference Oil: North Slope Crude



Normal Alkane Profile of Pooled Oil from *M/V Athos* I Spill

A.6. Narcotic potency of the PAH mixture in the source oil.

Sample ID	Average Athos I Oil	
Collection Date	11/28/04	
Location	Tank Center 7	
Acute PAH Narcosis	12.20	umol/g octanol
Acute:Chronic Ratio	5.09	
Chronic PAH Narcosis	2.40	umol/g octanol

	MW (g/mol)	log Kow	Subcooled Solub. (mol/L)	Athos Oil Ave. (ng/mg)	Moles PAH_i	Mole Fraction x_i	$LC50_i$ (mol/L)	$TU_{W,max}$ (S_L/LC50)	TUa ($TU_{W,max}$ * X_i)	% Contribution $TU_{W,max}$
Naphthalene	128.2	3.33	7.03E-04	61.0	2.65E-10	2.06E-02	8.70E-06	80.81	1.67	3.97
C1-Naphthalenes	142.2	3.80	2.14E-04	133.3	5.23E-10	4.06E-02	3.13E-06	68.33	2.78	6.62
C2-Naphthalenes	156.2	4.30	6.03E-05	266.3	9.51E-10	7.39E-02	1.05E-06	57.17	4.22	10.08
C3-Naphthalenes	170.3	4.80	1.70E-05	294.0	9.64E-10	7.48E-02	3.55E-07	47.82	3.58	8.54
C4-Naphthalenes	184.3	5.30	4.79E-06	204.9	6.20E-10	4.82E-02	1.20E-07	40.01	1.93	4.60
Biphenyl	154.2	3.80	2.14E-04	12.8	4.61E-11	3.58E-03	3.13E-06	68.33	0.24	0.58
Acenaphthylene	152.2	4.00	1.29E-04	8.4	3.06E-11	2.38E-03	2.02E-06	63.63	0.15	0.36
Acenaphthene	154.2	4.20	7.76E-05	19.0	6.89E-11	5.35E-03	1.31E-06	59.24	0.32	0.76
Fluorene	166.2	4.32	5.73E-05	47.9	1.61E-10	1.25E-02	1.01E-06	56.76	0.71	1.69
C1-Fluorenes	180.3	4.72	2.08E-05	123.0	3.81E-10	2.96E-02	4.23E-07	49.21	1.45	3.47
C2-Fluorenes	194.3	5.20	6.17E-06	224.4	6.45E-10	5.01E-02	1.49E-07	41.46	2.08	4.95
C3-Fluorenes	208.3	5.70	1.74E-06	294.3	7.88E-10	6.12E-02	5.01E-08	34.68	2.12	5.07
Phenanthrene	178.2	4.57	3.03E-05	88.7	2.78E-10	2.16E-02	5.84E-07	51.90	1.12	2.67
Anthracene	178.2	4.68	2.30E-05	7.8	2.44E-11	1.89E-03	4.61E-07	49.92	0.09	0.23
C1-Phenanthrenes	192.3	5.04	9.25E-06	236.6	6.87E-10	5.33E-02	2.11E-07	43.90	2.34	5.59
C2-Phenanthrenes	206.3	5.46	3.19E-06	334.7	9.05E-10	7.03E-02	8.45E-08	37.79	2.66	6.34
C3-Phenanthrenes	220.3	5.92	9.95E-07	290.4	7.35E-10	5.71E-02	3.10E-08	32.07	1.83	4.37
C4-Phenanthrenes	234.3	6.32	3.61E-07	238.6	5.68E-10	4.41E-02	1.30E-08	27.80	1.23	2.93
Dibenzothiophene	184.2	4.53	3.37E-05	40.1	1.21E-10	9.43E-03	6.39E-07	52.66	0.50	1.18
C1-Dibenzothiophene	198.3	4.96	1.13E-05	140.0	3.94E-10	3.06E-02	2.51E-07	45.17	1.38	3.30

C2-Dibenzothiophene	212.3	5.42	3.53E-06	372.0	9.78E-10	7.59E-02	9.21E-08	38.33	2.91	6.95
C3-Dibenzothiophene	226.3	5.89	1.07E-06	373.7	9.22E-10	7.16E-02	3.31E-08	32.41	2.32	5.53
Fluoranthene	202.3	5.23	5.71E-06	3.8	1.04E-11	8.08E-04	1.39E-07	41.02	0.03	0.08
Pyrene	202.3	5.13	7.36E-06	16.6	4.57E-11	3.55E-03	1.73E-07	42.51	0.15	0.36
C1-Fluoranthenes	216.3	5.48	3.00E-06	82.8	2.14E-10	1.66E-02	8.02E-08	37.46	0.62	1.48
C2-Fluoranthenes	230.3	5.88	1.10E-06	133.7	3.24E-10	2.51E-02	3.39E-08	32.53	0.82	1.95
C3-Fluoranthenes	244.3	6.28	4.00E-07	174.6	3.99E-10	3.10E-02	1.42E-08	28.20	0.87	2.08
Benzo(a)anthracene	195.0	5.91	1.02E-06	7.0	2.01E-11	1.56E-03	3.17E-08	32.18	0.05	0.12
Chyrsene	228.3	5.81	1.32E-06	37.6	9.20E-11	7.14E-03	3.94E-08	33.35	0.24	0.57
C1-Chyrsenes	242.3	6.14	5.70E-07	88.5	2.04E-10	1.58E-02	1.92E-08	29.64	0.47	1.12
C2-Chyrsenes	256.3	6.43	2.74E-07	127.1	2.77E-10	2.15E-02	1.03E-08	26.74	0.57	1.37
C3-Chyrsenes	270.4	6.94	7.52E-08	44.6	9.21E-11	7.15E-03	3.37E-09	22.28	0.16	0.38
C4-Chyrsenes	284.4	7.36	2.59E-08	10.4	2.04E-11	1.58E-03	1.35E-09	19.18	0.03	0.07
Benzo(b)fluoranthene	252.3	6.27	4.14E-07	8.2	1.81E-11	1.40E-03	1.46E-08	28.34	0.04	0.10
Benzo(k)fluoranthene	252.3	6.29	3.89E-07	1.1	2.47E-12	1.92E-04	1.38E-08	28.09	0.01	0.01
Benzo(e)pyrene	252.3	6.44	2.67E-07	14.2	3.14E-11	2.44E-03	1.00E-08	26.63	0.07	0.16
Benzo(a)pyrene	252.3	6.13	5.85E-07	5.0	1.10E-11	8.53E-04	1.97E-08	29.75	0.03	0.06
Perylene	252.3	6.25	4.32E-07	14.5	3.21E-11	2.49E-03	1.51E-08	28.50	0.07	0.17
Indeno(1,2,3-cd)pyrene	276.3	6.72	1.31E-07	3.6	7.30E-12	5.67E-04	5.42E-09	24.08	0.01	0.03
Dibenz(a,h)anthracene	278.4	6.71	1.34E-07	5.1	1.02E-11	7.95E-04	5.53E-09	24.16	0.02	0.05
Benzo(ghi)perylene	276.3	6.51	2.25E-07	5.9	1.20E-11	9.31E-04	8.65E-09	26.00	0.02	0.06

Total Moles of Specific PAHs =	1.29E-08	Acute Narcotic Potency of Ave Athos I Oil =	41.90
		Chronic Narcotic Potency of Ave Athos I Oil =	213.28

100.00

A.7.a PAH Analyte List by Laboratory
Compounds Included in Total PAH Measurement
Compounds in **Bold** are the National Status and Trends PAHs (NS&T Total PAHs)

B&B Laboratory	***GERG***	***Lancaster Laboratories***
Naphthalene	**Naphthalene**	**Naphthalene**
C1-Naphthalenes	C1-Naphthalenes	
C2-Naphthalenes	C2-Naphthalenes	
C3-Naphthalenes	C3-Naphthalenes	
C4-Naphthalenes	C4-Naphthalenes	
Benzothiophene		
C1-Benzothiophenes		
C2-Benzothiophenes		
C3-Benzothiophenes		
Biphenyl	**Biphenyl**	
Acenaphthylene	Acenaphthylene	Acenaphthylene
Acenaphthene	**Acenaphthene**	**Acenaphthene**
Dibenzofuran		
Fluorene	**Fluorene**	**Fluorene**
C1-Fluorenes	C1-Fluorenes	
C2-Fluorenes	C2-Fluorenes	
C3-Fluorenes	C3-Fluorenes	
Carbazole		
Anthracene	**Anthracene**	**Anthracene**
Phenanthrene	**Phenanthrene**	**Phenanthrene**
C1-Phenanthrene/Anthracenes	C1-Phenanthrenes/Anthracenes	
C2-Phenanthrene/Anthracenes	C2-Phenanthrenes/Anthracenes	
C3-Phenanthrene/Anthracenes	C3-Phenanthrenes/Anthracenes	
C4-Phenanthrene/Anthracenes	C4-Phenanthrenes/Anthracenes	
Dibenzothiophene	Dibenzothiophene	
C1-Dibenzothiophene	C1-Dibenzothiophenes	
C2-Dibenzothiophene	C2-Dibenzothiophenes	
C3-Dibenzothiophene	C3-Dibenzothiophenes	
Fluoranthene	**Fluoranthene**	**Fluoranthene**
Pyrene	**Pyrene**	**Pyrene**
C1-Fluoranthenes/Pyrenes	C1-Fluoranthenes/Pyrenes	
C2-Fluoranthenes/Pyrenes	C2-Fluoranthenes/Pyrenes	
C3-Fluoranthenes/Pyrenes	C3-Fluoranthenes/Pyrenes	
Naphthobenzothiophene		
C1-Naphthobenzothiophenes		

B&B Laboratory	***GERG***	***Lancaster Laboratories***
C2-Naphthobenzothiophenes		
C3-Naphthobenzothiophenes		
Benz(a)anthracene	**Benzo(a)anthracene**	**Benzo(a)anthracene**
Chrysene	**Chrysene**	**Chrysene**
C1-Chrysenes	C1-Chrysenes	
C2-Chrysenes	C2-Chrysenes	
C3-Chrysenes	C3-Chrysenes	
C4-Chrysenes	C4-Chrysenes	
Benzo(b)fluoranthene	Benzo(b)fluoranthene	Benzo(b)fluoranthene
Benzo(k)fluoranthene	Benzo(k)fluoranthene	Benzo(k)fluoranthene
Benzo(e)pyrene	**Benzo(e)pyrene**	
Benzo(a)pyrene	**Benzo(a)pyrene**	**Benzo(a)pyrene**
Perylene	**Perylene**	
Indeno(1,2,3-c,d)pyrene	Indeno(1,2,3-c,d)pyrene	Indeno(1,2,3-cd)pyrene
Dibenz(a,h)anthracene	**Dibenz(a,h)anthracene**	**Dibenz(a,h)anthracene**
Benzo(g,h,i)perylene	Benzo(g,h,i)perylene	Benzo(g,h,i)perylene

A.7.b PAH Analyte List by Laboratory
Additional Analytes Not Included as Total PAHs
Compounds in **Bold** are the National Status and Trends PAHs (NS&T Total PAHs)

B&B Laboratory	***GERG***	***Lancaster Laboratories***
2-Methylnaphthalene	**2-Methylnaphthalene**	Methyl t-Butyl Ether
1-Methylnaphthalene	**1-Methylnaphthalene**	Benzene
2,6-Dimethylnaphthalene	**2,6-Dimethylnaphthalene**	Toluene
1,6,7-Trimethylnaphthalene	1,6,7-Trimethylnaphthalene	Ethylbenzene
1-Methylphenanthrene	**1-Methylphenanthrene**	m,p-Xylene
C29-Hopane		o-Xylene
18a-Oleanane		Isopropylbenzene (Cumene)
C30-Hopane		n-Propylbenzene
		1,3,5-Trimethylbenzene
		tert-Butylbenzene
		1,2,4-Trimethylbenzene
		sec-Butylbenzene
		p-Isopropyltoluene
		n-Butylbenzene

APPENDIX B

Water Sample Analytical Results

B.1. Water sample log.

B.2. PAH analyses of water samples collected during preassessment efforts

B.3. Total suspended solids (TSS) analyses of water samples collected on December 7-8, 2004.

B.4. Volatile organic analyses of water samples collected on November 27, 2004, near the Commodore Barry Bridge.

B.1. Water sample log. All samples are surface samples unless noted otherwise in the comments column.

Sample ID	Latitude	Longitude	Date	Total PAHs (ng/L)	Comments
W-CBB-01	39.82586	-75.36619	27-Nov-04	391	Comm. Barry Br.
W-CBB-02	39.82.895	-75.37180	27-Nov-04	618	Comm. Barry Br.
W-CBB-03	39.83286	-75.37460	27-Nov-04	564	Comm. Barry Br.
W-WOOD-01	39.84204	-75.15443	28-Nov-04	962	Woodbury Creek
W-WOOD-02	39.86600	-75.19727	28-Nov-04	768	Woodbury Creek
W-DR-01	39.87383	-75.19268	28-Nov-04	3015	NJ side, just upstream of Woodbury Creek
W-DER-01			28-Nov-04	457	DE River on NJ side of where Athos moored
W-MAN-01			28-Nov-04	1122	Upstream of first bridge, Mantua Creek
W-MAN-02			28-Nov-04	585	Mouth of Mantua Creek
W-BTC-01-1	39.86117	-75.11560	28-Nov-04	876	Big Timber Creek
W-BTC-01-2	39.86117	-75.11560	28-Nov-04	787	Big Timber Creek (field duplicate)
W-BTC-02	39.88633	-75.13495	28-Nov-04	1124	Big Timber Creek
W-BTC-03	39.88685	-75.13690	28-Nov-04	1517	Big Timber Creek
WMH-01	39.79208	-75.44603	28-Nov-04	727	Marcus Hook
WMH-02	39.78860	-75.44796	28-Nov-04	595	Marcus Hook
WMH-03	39.78389	-75.44540	28-Nov-04	474	Marcus Hook
W-BTC-04	39.88840	-75.13528	30-Nov-04	203	Big Timber Creek
W-BTC-05	39.88582	-75.13320	30-Nov-04	310	Big Timber Creek
W-BTC-06	39.85307	-75.09625	30-Nov-04	304	Big Timber Creek
W-WOOD-03-1	39.86990	-75.19633	30-Nov-04	205	Woodbury Creek
W-WOOD-03-2	39.86990	-75.19633	30-Nov-04	195	Woodbury Creek
W-WOOD-04	39.86517	-75.19558	30-Nov-04	283	Woodbury Creek
W-WOOD-05	39.88840	-75.13528	30-Nov-04	481	Woodbury Creek
WMH-04	39.78833	-75.44200	30-Nov-04	439	Marcus Hook
WMH-05	39.78600	-75.44233	30-Nov-04	289	Marcus Hook
WMH-06	39.78350	-75.44033	30-Nov-04	273	Marcus Hook
W-CBB-04	39.82300	-75.36667	30-Nov-04	407	Comm. Barry Br.
W-CBB-05	39.82500	-75.36700	30-Nov-04	225	Comm. Barry Br.
W-CBB-06	39.83333	-75.36867	30-Nov-04	249	Comm. Barry Br.
W-DER-02			30-Nov-04	646	160 m East of Athos I bow
W-MAN-03			30-Nov-04	729	Mouth of Mantua Creek
W-MAN-04			30-Nov-04	403	1/4 mi up Mantua Creek
WPA4-J	39.86318	-75.2407	30-Nov-05	2531	PA, Across from Mantua Creek
WMIF-1	39.87612	-75.20883	30-Nov-05	4927	Mouth of Schuylkill River
WMIF-2	39.87522	-75.21192	30-Nov-05	586	Mouth of Schuylkill River
W-UL-01	40.01288	-75.02488	7-Dec-04	177	Upstream of Tacony Palmyra Bridge, East Bank
W-UL-02	40.01740	-75.02817	7-Dec-04	105	Upstream of Tacony Palmyra Bridge, Center Channel
WSUB-01-1	40.01740	-75.02817	7-Dec-04	478	Upstream of Tacony Palmyra Bridge, Center Channel (Bottom sample)

Sample ID	Latitude	Longitude	Date	Total PAHs (ng/L)	Comments
WSUB-01-2	40.01740	-75.02817	7-Dec-04	32	Upstream of Tacony Palmyra Bridge, Center Channel (Bottom sample)
W-UL-03	40.01770	-75.03710	7-Dec-04	179	Upstream of Tacony Palmyra Bridge, West Bank
W-TPB-01	40.00922	-75.04285	7-Dec-04	141	East Bank
W-TPB-02	40.01132	-75.04483	7-Dec-04	213	Center Channel
W-TPB-03	40.01370	-75.04610	7-Dec-04	320	West Bank
W-BTC-07	39.88330	-75.13205	7-Dec-04	409	Big Timber Creek
W-Dup-01	39.88330	-75.13205	7-Dec-04	378	Big Timber Creek, duplicate
W-BTC-08	39.87150	-75.12043	7-Dec-04	287	Big Timber Creek
W-BTC-09	39.88698	-75.13533	7-Dec-04	190	Big Timber Creek, river side of boom at mouth
WLP-#1-5	39.43060	-75.47412	7-Dec-04	130	Liston Pt. Left Descending Bank
WLP-#2-5	39.40397	-75.49662	7-Dec-04	132	Liston Pt. Center Channel
WLP-#3-5	39.40127	-75.52187	7-Dec-04	2154	Liston Pt. Right Descending Bank
W-WOOD-07	39.86608	-75.19635	8-Dec-04	250	Woodbury Creek, inside boom creekside, eastside
W-WOOD-08	39.84190	-75.15450	8-Dec-04	533	Woodbury Creek, otherside of bridge, by baseball field
W-WOOD-06	39.86717	-75.19670	8-Dec-04	235	Woodbury Creek, riverside of boom
W-MAN-07	39.83477	-75.23668	8-Dec-04	255	Mantua Creek, downriver
W-MAN-06	39.85383	-75.23105	8-Dec-04	214	Mantua Creek, inside boom, creekside at mouth
W-MAN-05	39.85445	-75.23135	8-Dec-04	188	Mantua Creek, outside boom, riverside at mouth
W-TN-01	39.85915	-75.30923	8-Dec-04	437	Tinicum Island, west coast outside boom, riverside
W-TN-02	39.85327	-75.31020	8-Dec-04	383	Tinicum Island, in front of island to the NJ side
W-SUBTN-01-1	39.85327	-75.31020	8-Dec-04	2083	Tinicum Island, in front of island to the NJ side (Bottom sample)
W-SUBTN-01-2	39.85327	-75.31020	8-Dec-04	197	Tinicum Island, in front of island to the NJ side (Bottom sample)
W-TN-03	39.84487	-75.30710	8-Dec-04	244	NJ side of river shoreline area
W-TN-04	39.84393	-75.28160	8-Dec-04	299	Off cove on island NJ side at Greenwich
W-SUBTN-02-1	39.84393	-75.28160	8-Dec-04	317	Off cove on island NJ side at Greenwich (Bottom sample)
W-SUBTN-02-2	39.84393	-75.28160	8-Dec-04	38	Off cove on island NJ side at Greenwich (Bottom sample)
WCD-#1S	39.57283	-75.53270	8-Dec-04	220	C & D Canal, Left Descending Bank
WCD-#2S	39.57093	-75.56238	8-Dec-04	154	C & D Canal, Center Channel
WCD-#2D-1	39.57093	-75.56238	8-Dec-04	297	C & D Canal, Center Channel (Bottom sample)
WCD-#2D-2	39.57093	-75.56238	8-Dec-04	38	C & D Canal, Center Channel (Bottom sample)
WCD-#3S (ETX3924D)	39.57097	-75.56923	8-Dec-04	210	C & D Canal, Right Descending Bank
WCR-#1S	39.71685	-75.51042	8-Dec-04	180	Christina River, Right Descending Bank
WCR-#1D-1	39.71685	-75.51042	8-Dec-04	776	Christina River, Right Descending Bank (Bottom sample)
WCR-#1D-2	39.71685	-75.51042	8-Dec-04	100	Christina River, Right Descending Bank (Bottom sample)

Sample ID	Latitude	Longitude	Date	Total PAHs (ng/L)	Comments
WCR-#2S	39.71297	-75.50800	8-Dec-04	187	Christina River, Center Channel
WCR-#2D-1	39.71297	-75.50800	8-Dec-04	809	Christina River, Center Channel (Bottom sample)
WCR-#2D-2	39.71297	-75.50800	8-Dec-04	25	Christina River, Center Channel (Bottom sample)
WCR-#3S (ETX3918.D)	39.71183	-75.49560	8-Dec-04	160	Christina River, Left Descending Bank
WCR-#3S (ETX3924.D)			8-Dec-04	210	Christina River
WMH-#1-5	39.80968	-75.41132	8-Dec-04	26634	Marcus Hook, Right Descending Bank
WMH-#1S			8-Dec-04	293	Marcus Hook
WMH-#2D	39.80370	-75.41062	8-Dec-04	570	Marcus Hook, Center Channel (Bottom sample)
WMH-#3S	39.79850	-75.40993	8-Dec-04	172	Marcus Hook, Left Descending Bank

B.2. PAH analyses of water samples collected during preassessment efforts.

Sample Name	ETX3798.D	ETX3800.D	ETX3802.D	ETX3804.D	ETX3806.D	ETX3808.D
Client Name	W-BTC-01 (1 of 2)	W-BTC-02 (1 of 2)	W-BTC-03 (1 of 2)	W-WOOD-01 (1 of 2)	W-WOOD-02 (1 of 2)	W-DER-01 (1 of 2)
Matrix	Water	Water	Water	Water	Water	Water
Collection Date	11/28/04	11/28/04	11/28/04	11/28/04	11/28/04	11/28/04
Received Date	11/30/04	11/30/04	11/30/04	11/30/04	11/30/04	11/30/04
Extraction Date	12/01/04	12/01/04	12/01/04	12/01/04	12/01/04	12/01/04
Extraction Batch	ENV 1054	ENV 1054	ENV 1054	ENV 1054	ENV 1054	ENV 1054
Date Acquired	12/07/04	12/07/04	12/08/04	12/08/04	12/08/04	12/08/04
Method	PAH-2002	PAH-2002	PAH-2002	PAH-2002	PAH-2002	PAH-2002
Sample Volume (L)	1.0	1.0	1.0	1.0	1.0	1.0
Dilution	NA	NA	NA	NA	NA	NA
Target Compounds	Su Corrected Conc. (ng/L) Q	Su Corrected Conc. (ng/L) Q	Su Corrected Conc. (ng/L) Q	Su Corrected Conc. (ng/L) Q	Su Corrected Conc. (ng/L) Q	Su Corrected Conc. (ng/L) Q
Naphthalene	93.3	130	78.2	62.8	39.9	48.6
C1-Naphthalenes	93.4	129	59.2	39.9	32.4	31.2
C2-Naphthalenes	68.6	90.2	64.0	38.1	32.0	25.7
C3-Naphthalenes	49.0	69.2	71.8	28.4	26.2	17.2
C4-Naphthalenes	41.1	45.4	77.3	27.3	30.8	18.9
Benzothiophene	<1.7 U	1.9	1.5 J	<1.7 U	<1.7 U	<1.6 U
C1-Benzothiophenes	<3.3 U	7.8	<3.3 U	<3.3 U	<3.3 U	<3.3 U
C2-Benzothiophenes	<3.3 U	9.2	<3.3 U	<3.3 U	<3.3 U	<3.3 U
C3-Benzothiophenes	<3.3 U	12.6	<3.3 U	<3.3 U	<3.3 U	<3.3 U
Biphenyl	3.7	4.7	5.3	3.4	2.6	3.0
Acenaphthylene	3.2	1.7	1.6	4.0	2.4	1.5
Acenaphthene	6.1	6.1	5.5	20.6	4.4	<1.3 U
Dibenzofuran	4.7	4.8	3.6	11.6	4.0	3.3
Fluorene	6.2	7.1	6.5	13.9	5.1	2.8
C1-Fluorenes	10.3	17.5	20.5	10.1	11.0	5.8
C2-Fluorenes	23.0	28.0	51.5	<1.2 U	26.9	13.1
C3-Fluorenes	32.8	36.3	66.2	<1.2 U	30.0	18.7
Carbazole	<1.9 U	1.2 J	6.6	14.8	<1.9 U	<1.8 U
Anthracene	2.8	1.7	1.8	4.4	3.3	1.5
Phenanthrene	13.7	14.9	15.7	47.1	15.0	7.5
C1-Phenanthrene/Anthracenes	24.3	35.8	48.5	25.6	26.5	12.4
C2-Phenanthrene/Anthracenes	38.2	53.8	103.0	25.2	46.3	25.6
C3-Phenanthrene/Anthracenes	35.8	48.0	95.8	20.7	42.7	23.1
C4-Phenanthrene/Anthracenes	19.1	28.6	68.3	8	27.7	13.7
Dibenzothiophene	1.7	2.4	3.5	3.2	3.3	1.0
C1-Dibenzothiophenes	13.1	20.2	35.3	5.0	15.8	8.0
C2-Dibenzothiophenes	25.1	33.9	82.6	4.6	28.8	13.4
C3-Dibenzothiophenes	29.1	43.9	110	7.5	40.8	20.6
Fluoranthene	17.1	10.6	8.3	112	16.4	8.1
Pyrene	22.2	16.7	15.7	71.7	24.1	14.4
C1-Fluoranthenes/Pyrenes	15.2	16.8	23.6	21.5	15.7	9.5
C2-Fluoranthenes/Pyrenes	10.7	14.5	27.1	13.5	14.0	6.7
C3-Fluoranthenes/Pyrenes	7.5	13.3	36.9	4.2	11.8	4.0
Naphthobenzothiophene	6.5	6.8	14.8	13.8	8.2	3.9
C1-Naphthobenzothiophenes	12.8	21.4	56.0	8.0	21.2	10.3
C2-Naphthobenzothiophenes	21.2	35.0	84.8	9.8	32.4	15.5
C3-Naphthobenzothiophenes	15.1	23.5	47.7	<2.3 U	24.2	12.5
Benz(a)anthracene	8.8	5.6	5.8	19.4	9.4	4.9
Chrysene	13.2	7.9	11.1	43.9	11.5	5.5
C1-Chrysenes	10.6	10.2	21.0	9.5	10.8	7.0
C2-Chrysenes	7.4	12.9	29.3	<1.6 U	9.7	5.7
C3-Chrysenes	<1.6 U	5.9	15.7	<1.6 U	<1.6 U	<1.6 U
C4-Chrysenes	<1.6 U	<1.6 U	<1.6 U	<1.6 U	<1.6 U	<1.6 U
Benzo(b)fluoranthene	18.2	9.8	8.3	60.2	15.2	8.3
Benzo(k)fluoranthene	6.2	3.2	2.2 J	19.4	5.3	2.9
Benzo(e)pyrene	11.5	6.9	8.1	33.3	9.3	5.4
Benzo(a)pyrene	11.9	5.6	4.9	25.6	9.7	4.9
Perylene	4.5	3.0	4.5	6.1	5.4	3.2
Indeno(1,2,3-c,d)pyrene	8.2	3.6	3.5	30.1	7.0	3.9
Dibenzo(a,h)anthracene	<1.5 U	<1.5 U	<1.5 U	4.3	1.3 J	<1.5 U
Benzo(g,h,i)perylene	9.3	4.4	3.7	29.1	7.3	4.1
Total PAHs	876	1124	1517	962	768	457
Individual Alkyl Isomers and Hopanes						
2-Methylnaphthalene	96.2	126	63.3	37.0	33.2	33.4
1-Methylnaphthalene	53.4	80.5	31.5	26.9	18.6	16.6
2,6-Dimethylnaphthalene	26.8	34.3	26.3	13.5	12.1	10.0
1,6,7-Trimethylnaphthalene	5.9	7.0	8.9	3.5	3.5	2.5
1-Methylphenanthrene	4.3	6.4	9.9	4.4	5.1	2.7
C29-Hopane	24.7	15.7	32.5	44.1	26.4	12.7
18a-Oleanane	<10 U	<9.7 U	<9.9 U	<9.9 U	<10 U	<9.8 U
C30-Hopane	27.1	24.2	41.4	44.1	31.5	17.1
Surrogate (Su)	Su Recovery (%)	Su Recovery (%)	Su Recovery (%)	Su Recovery (%)	Su Recovery (%)	Su Recovery (%)
Naphthalene-d8	74	78	78	57	76	80
Acenaphthene-d10	79	82	81	56	80	80
Phenanthrene-d10	75	77	78	57	77	75
Chrysene-d12	68	75	78	56	80	73
Perylene-d12	80	82	84	62	81	80

Qualifiers (Q): J=Below the MDL, U=Not detected, B=In procedural blank > 3x MDL, I=Interference, D=Diluted value, NA=Not Applicable, *=Outside QA limits, refer to narrative

Sample Name	ETX3810.D	ETX3812.D	ETX3814.D	ETX3820.D	ETX3822.D	ETX3824.D
Client Name	W-MAN-01 (1 of 2)	W-MAN-02 (1 of 2)	W-CBB-01 (1 of 6)	W-CBB-02 (1 of 2)	W-CBB-03 (1 of 2)	WMH-1 (1 of 2)
Matrix	Water	Water	Water	Water	Water	Water
Collection Date	11/28/04	11/28/04	11/27/04	11/27/04	11/27/04	11/28/04
Received Date	11/30/04	11/30/04	11/30/04	11/30/04	11/30/04	11/30/04
Extraction Date	12/01/04	12/01/04	12/01/04	12/01/04	12/01/04	12/01/04
Extraction Batch	ENV 1054	ENV 1054	ENV 1054	ENV 1054	ENV 1054	ENV 1054
Date Acquired	12/08/04	12/08/04	12/08/04	12/08/04	12/08/04	12/08/04
Method	PAH-2002	PAH-2002	PAH-2002	PAH-2002	PAH-2002	PAH-2002
Sample Volume (L)	1.0	1.0	1.0	1.0	1.0	1.0
Dilution	NA	NA	NA	NA	NA	NA

Target Compounds	Su Corrected Conc. (ng/L)	Q	Su Corrected Conc. (ng/L)	Q	Su Corrected Conc. (ng/L)	Q	Su Corrected Conc. (ng/L)	Q	Su Corrected Conc. (ng/L)	Q	Su Corrected Conc. (ng/L)	Q
Naphthalene	90.1		91.8		45.4		84.9		61.2		63.3	
C1-Naphthalenes	66.0		51.3		33.4		57.4		37.5		67.6	
C2-Naphthalenes	69.0		34.6		28.9		31.8		22.4		76.3	
C3-Naphthalenes	55.1		24.1		16.2		18.9		13.1		42.7	
C4-Naphthalenes	52.5		23.8		<6.1	U	14.3		10.9		21.1	
Benzothiophene	<1.6	U	<1.6	U	<1.6	U	<1.6	U	<1.6	U	<1.7	U
C1-Benzothiophenes	<3.3	U	<3.3	U	<3.2	U	<3.2	U	<3.2	U	<3.4	U
C2-Benzothiophenes	<3.3	U	<3.3	U	<3.2	U	<3.2	U	<3.2	U	<3.4	U
C3-Benzothiophenes	<3.3	U	<3.3	U	<3.2	U	<3.2	U	<3.2	U	<3.4	U
Biphenyl	6.5		3.1		2.9		4.3		3.1		5.1	
Acenaphthylene	4.0		<1.1	U	2.9		4.2		3.4		4.5	
Acenaphthene	12.1		4.4		4.7		4.7		4.2		5.8	
Dibenzofuran	9.1		4.4		3.5		5.4		4.4		5.4	
Fluorene	8.8		4.3		3.6		4.2		3.5		5.6	
C1-Fluorenes	23.3		8.5		4.7		7.2		<1.2	U	7.0	
C2-Fluorenes	39.6		15.9		<1.2	U	<1.2	U	<1.2	U	9.8	
C3-Fluorenes	55.4		<1.2	U	<1.2	U	<1.2	U	<1.2	U	<1.3	U
Carbazole	16.9		8.3		5.9		8.2		8.5		2.1	
Anthracene	4.3		1.3		3.1		5.6		5.7		7.7	
Phenanthrene	22.4		8.4		8.7		17.7		20.5		25.1	
C1-Phenanthrene/Anthracenes	33.9		15.9		8.3		12.8		13.9		20.5	
C2-Phenanthrene/Anthracenes	58.5		25.4		9.6		18.3		20.1		27.3	
C3-Phenanthrene/Anthracenes	46.6		26.2		8.6		13.6		19.5		21.3	
C4-Phenanthrene/Anthracenes	32.3		15.5		3.7		8.9		13.1		11.0	
Dibenzothiophene	4.4		1.1		0.8	J	1.0		1.2		1.8	
C1-Dibenzothiophenes	18.7		11.7		5.7		4.3		4.7		4.3	
C2-Dibenzothiophenes	35.2		16.2		<1.7	U	<1.7	U	7.1		4.5	
C3-Dibenzothiophenes	48.3		23.4		<1.7	U	<1.7	U	13.4		<1.8	U
Fluoranthene	28.2		10.8		19.0		32.7		32.0		34.9	
Pyrene	37.3		15.5		25.4		39.3		36.9		38.2	
C1-Fluoranthenes/Pyrenes	19.6		10.2		12.1		20.6		19.3		22.9	
C2-Fluoranthenes/Pyrenes	16.7		8.8		5.7		10.6		9.9		10.6	
C3-Fluoranthenes/Pyrenes	9.6		7.2		3.7		4.8		8.4		6.7	
Naphthobenzothiophene	9.3		5.0		4.0		6.9		7.4		7.6	
C1-Naphthobenzothiophenes	21.9		9.6		<2.2	U	4.9		8.1		6.5	
C2-Naphthobenzothiophenes	34.0		18.0		<2.2	U	<2.2	U	11.4		<2.4	U
C3-Naphthobenzothiophenes	27.7		13.8		<2.2	U	<2.2	U	<2.2	U	<2.4	U
Benz(a)anthracene	8.9		6.2		11.2		15.6		12.9		15.3	
Chrysene	12.3		7.5		12.4		19.6		16.4		18.3	
C1-Chrysenes	11.1		6.4		7.5		11.4		9.4		10.0	
C2-Chrysenes	8.2		5.8		4.1		5.5		5.1		5.3	
C3-Chrysenes	<1.6	U	<1.6	U	<1.6	U	<1.6	U	<1.6	U	<1.7	U
C4-Chrysenes	<1.6	U	<1.6	U	<1.6	U	<1.6	U	<1.6	U	<1.7	U
Benzo(b)fluoranthene	16.3		10.3		22.1		28.4		24.5		26.3	
Benzo(k)fluoranthene	5.7		3.7		8.5		10.5		8.4		8.4	
Benzo(e)pyrene	10.7		7.4		11.8		17.9		14.2		14.6	
Benzo(a)pyrene	10.5		6.2		13.4		17.4		14.4		17.2	
Perylene	5.1		3.3		6.8		13.6		10.0		16.0	
Indeno(1,2,3-c,d)pyrene	7.0		4.8		10.0		13.8		11.6		13.5	
Dibenzo(a,h)anthracene	1.6		<1.5	U	2.4		3.1		2.1		2.2	
Benzo(g,h,i)perylene	7.1		4.6		10.6		13.4		10.4		12.5	
Total PAHs	1122		585		391		618		564		727	
Individual Alkyl Isomers and Hopanes												
2-Methylnaphthalene	67.7		57.0		34.5		64.4		39.7		67.5	
1-Methylnaphthalene	37.9		25.1		19.0		27.4		20.2		40.8	
2,6-Dimethylnaphthalene	24.3		14.2		8.7		14.6		10.1		31.9	
1,6,7-Trimethylnaphthalene	6.5		1.5		0.9	J	1.6		1.4		4.9	
1-Methylphenanthrene	5.9		2.9		1.3		2.6		2.8		4.5	
C29-Hopane	35.4		13.6		21.8		31.6		24.4		27.7	
18a-Oleanane	<9.8	U	<9.8	U	<9.6	U	<9.6	U	<9.6	U	<10.1	U
C30-Hopane	37.2		18.1		24.0		45.8		34.1		29.3	

Surrogate (Su)	Su Recovery (%)	Su Recovery (%)	Su Recovery (%)	Su Recovery (%)	Su Recovery (%)	Su Recovery (%)
Naphthalene-d8	43	86	70	68	82	87
Acenaphthene-d10	40	84	77	69	80	87
Phenanthrene-d10	40	77	76	69	71	72
Chrysene-d12	52	70	66	69	81	82
Perylene-d12	52	80	77	72	77	66

Qualifiers (Q): J=Below the MDL, U=Not detected, B=In procedural blank > 3x MDL, I=Interference, D=Diluted value, NA=Not Applicable, *=Outside QA limits, refer to narrative

Sample Name	ETX3826.D		ETX3828.D		ETX3830.D	
Client Name	WMH-2 (1 of 2)		WMH-3 (1 of 2)		W-DR-01 (1 of	
1) **Matrix**	Water		Water		Water	
Collection Date	11/28/04		11/28/04		11/28/04	
Received Date	11/30/04		11/30/04		11/30/04	
Extraction Date	12/01/04		12/01/04		12/01/04	
Extraction Batch	ENV 1054		ENV 1054		ENV 1054	
Date Acquired	12/08/04		12/08/04		12/08/04	
Method	PAH-2002		PAH-2002		PAH-2002	
Sample Volume (L)	1.0		1.0		1.0	
Dilution	NA		NA		NA	
Target Compounds	Su Corrected Q Conc. (ng/L)	Q	Su Corrected Conc. (ng/L)	Q	Su Corrected Conc. (ng/L)	
Naphthalene	65.0		79.3		97.4	
C1-Naphthalenes	64.5		40.4		65.1	
C2-Naphthalenes	67.8		24.5		122	
C3-Naphthalenes	34.4		16.8		138	
C4-Naphthalenes	19.9		<6.4	U	124	
Benzothiophene	<1.7	U	<1.7	U	1.3	J
C1-Benzothiophenes	<3.4	U	<3.4	U	<3.3	U
C2-Benzothiophenes	<3.4	U	<3.4	U	<3.3	U
C3-Benzothiophenes	<3.4	U	<3.4	U	<3.3	U
Biphenyl	2.6		2.3		5.9	
Acenaphthylene	2.8		3.0		5.2	
Acenaphthene	5.7		4.2		7.2	
Dibenzofuran	5.1		4.1		7.7	
Fluorene	4.8		3.0		13.8	
C1-Fluorenes	7.4		<1.3	U	46.3	
C2-Fluorenes	<1.3	U	<1.3	U	110.0	
C3-Fluorenes	<1.3	U	<1.3	U	132	
Carbazole	1.8	J	7.0		<1.9	U
Anthracene	4.5		4.4		4.2	
Phenanthrene	19.4		18.9		41.6	
C1-Phenanthrene/Anthracenes	16.0		10.5		117	
C2-Phenanthrene/Anthracenes	22.6		13.9		214	
C3-Phenanthrene/Anthracenes	17.3		11.6		204	
C4-Phenanthrene/Anthracenes	9.9		8.1		136	
Dibenzothiophene	1.4		1.4		11.7	
C1-Dibenzothiophenes	5.6		<1.8	U	71.2	
C2-Dibenzothiophenes	4.0		<1.8	U	164	
C3-Dibenzothiophenes	<1.8	U	<1.8	U	229	
Fluoranthene	24.4		25.1		23.0	
Pyrene	28.1		27.2		33.1	
C1-Fluoranthenes/Pyrenes	15.6		13.0		49.5	
C2-Fluoranthenes/Pyrenes	7.0		7.6		60.1	
C3-Fluoranthenes/Pyrenes	<1.4	U	<1.4	U	36.9	
Naphthobenzothiophene	6.7		3.7		28.0	
C1-Naphthobenzothiophenes	6.7		4.3		112	
C2-Naphthobenzothiophenes	<2.4	U	<2.4	U	190	
C3-Naphthobenzothiophenes	<2.4	U	<2.4	U	156	
Benz(a)anthracene	11.3		12.2		17.0	
Chrysene	13.4		13.6		24.2	
C1-Chrysenes	7.4		8.0		45.3	
C2-Chrysenes	<1.7	U	4.7		57.9	
C3-Chrysenes	<1.7	U	<1.7	U	21.8	
C4-Chrysenes	<1.7	U	<1.7	U	<1.6	U
Benzo(b)fluoranthene	26.9		30.8		20.6	
Benzo(k)fluoranthene	3.8		4.4		6.3	
Benzo(e)pyrene	13.1		13.9		18.2	
Benzo(a)pyrene	14.2		14.8		13.2	
Perylene	11.6		11.6		10.0	
Indeno(1,2,3-c,d)pyrene	9.7		11.9		9.3	
Dibenzo(a,h)anthracene	1.9		2.2		2.5	
Benzo(g,h,i)perylene	10.6		11.8		11.1	
Total PAHs	595		474		3015	
Individual Isomers						
2-Methylnaphthalene	64.5		46.1		66.4	
1-Methylnaphthalene	38.8		18.4		37.9	
2,6-Dimethylnaphthalene	26.3		10.7		49.2	
1,6,7-Trimethylnaphthalene	4.2		1.4		18.3	
1-Methylphenanthrene	3.6		2.3		22.5	
C29-Hopane	20.9		23.3		54.3	
18a-Oleanane	<10.1	U	<10.1	U	<10	U
C30-Hopane	30.7		28.6		68.0	

Surrogate (Su)	Su Recovery (%)	Su Recovery (%)	Su Recovery (%)
Naphthalene-d8	89	82	80
Acenaphthene-d10	93	85	83
Phenanthrene-d10	68	69	76
Chrysene-d12	78	67	77
Perylene-d12	75	75	77

Qualifiers (Q): J=Below the MDL, U=Not detected, B=In procedural blank > 3x MDL, I=Interference, D=Diluted value, NA=Not Applicable, *=Outside QA limits, refer to narrative

Sample Name	ETX3837.D	ETX3838.D	ETX3839.D	ETX3841.D	ETX3843.D	ETX3845.D
Client Name	W-WOOD-03 (1 of 2)	W-WOOD-03 (2 of 2)	W-WOOD-04 (1 of 2)	W-BTC-04 (1 of 2)	W-BTC-05 (1 of 2)	W-BTC-06 (1 of 1)
Matrix	Water	Water	Water	Water	Water	Water
Collection Date	11/30/04	11/30/04	11/30/04	11/30/04	11/30/04	11/30/04
Received Date	12/04/04	12/04/04	12/04/04	12/04/04	12/04/04	12/04/04
Extraction Date	12/06/04	12/06/04	12/06/04	12/06/04	12/06/04	12/06/04
Extraction Batch	ENV 1058	ENV 1058	ENV 1058	ENV 1058	ENV 1058	ENV 1058
Date Acquired	12/14/04	12/14/04	12/14/04	12/14/04	12/14/04	12/14/04
Method	PAH-2002	PAH-2002	PAH-2002	PAH-2002	PAH-2002	PAH-2002
Sample Volume (L)	0.9	0.9	1.0	0.9	0.9	0.9
Dilution	NA	NA	NA	NA	NA	NA

Target Compounds	Su Corrected Conc. (ng/L)	Q	Su Corrected Conc. (ng/L)	Q	Su Corrected Conc. (ng/L)	Q	Su Corrected Conc. (ng/L)	Q	Su Corrected Conc. (ng/L)	Q	Su Corrected Conc. (ng/L)	Q
Naphthalene	42.1		36.9		51.3		45.6		49.5		45.1	
C1-Naphthalenes	28.9		23.3		40.0		33.6		39.0		32.1	
C2-Naphthalenes	17.1		16.3		20.4		14.2		23.1		14.9	
C3-Naphthalenes	8.9		9.2		12.6		8.8		16.6		11.0	
C4-Naphthalenes	<6.5	U	<6.5	U	8.9		<6.6	U	9.9		5.8	J
Benzothiophene	<1.7	U	<1.7	U	<1.6	U	<1.7	U	3.7		<1.7	U
C1-Benzothiophenes	<3.5	U	<3.5	U	<3.2	U	<3.5	U	<3.4	U	<3.4	U
C2-Benzothiophenes	<3.5	U	<3.5	U	<3.2	U	<3.5	U	<3.4	U	<3.4	U
C3-Benzothiophenes	<3.5	U	<3.5	U	<3.2	U	<3.5	U	<3.4	U	<3.4	U
Biphenyl	2.1	J	2.5		2.1	J	2.0	J	2.3		2.5	
Acenaphthylene	1.1	J	0.8	J	1.2		0.9	J	<1.1	U	1.3	
Acenaphthene	3.3		<1.4	U	4.7		2.7		4.8		3.3	
Dibenzofuran	2.8		<1.2	U	3.5		2.8		4.3		3.0	
Fluorene	2.1		2.3		3.6		1.7		2.6		2.5	
C1-Fluorenes	<1.3	U	<1.3	U	3.8		<1.3	U	3.6		<1.3	U
C2-Fluorenes	<1.3	U	<1.3	U	5.8		<1.3	U	<1.3	U	<1.3	U
C3-Fluorenes	<1.3	U	<1.3	U	<1.2	U	<1.3	U	<1.3	U	<1.3	U
Carbazole	0.6	J	<1.9	U	0.9	J	<2	U	1.3	J	0.9	J
Anthracene	1.0		1.0		1.0		0.7	J	1.1		1.1	
Phenanthrene	6.7		6.6		7.3		5.7		8.6		10.4	
C1-Phenanthrene/Anthracenes	12.6		12.0		13.6		10.8		14.9		15.2	
C2-Phenanthrene/Anthracenes	<2.9	U	<2.9	U	<2.7	U	<2.9	U	8.1		7.8	
C3-Phenanthrene/Anthracenes	<2.9	U	<2.9	U	<2.7	U	<2.9	U	7.2		6.5	
C4-Phenanthrene/Anthracenes	<2.9	U	<2.9	U	<2.7	U	<2.9	U	<2.9	U	<2.9	U
Dibenzothiophene	<0.9	U	<0.9	U	1.3		0.4	J	1.0		0.8	J
C1-Dibenzothiophenes	<1.8	U	<1.8	U	1.9		<1.8	U	4.5		2.6	
C2-Dibenzothiophenes	<1.8	U	<1.8	U	6.3		<1.8	U	<1.8	U	5.7	
C3-Dibenzothiophenes	<1.8	U	<1.8	U	5.3		<1.8	U	<1.8	U	4.7	
Fluoranthene	10.3		11.7		10.9		9.7		12.4		15.9	
Pyrene	14.0		15.4		15.6		12.6		20.5		23.3	
C1-Fluoranthenes/Pyrenes	3.7		4.2		6.1		4.4		7.2		7.9	
C2-Fluoranthenes/Pyrenes	2.0		2.3		2.7		<1.5	U	4.2		3.4	
C3-Fluoranthenes/Pyrenes	<1.5	U	<1.5	U	1.1	J	<1.5	U	<1.4	U	<1.4	U
Naphthobenzothiophene	1.8		2.0		1.9		<1.2	U	2.1		2.4	
C1-Naphthobenzothiophenes	<2.4	U	<2.4	U	2.3		<2.4	U	<2.4	U	2.7	
C2-Naphthobenzothiophenes	<2.4	U	<2.4	U	<2.2	U	<2.4	U	<2.4	U	<2.4	U
C3-Naphthobenzothiophenes	<2.4	U	<2.4	U	<2.2	U	<2.4	U	<2.4	U	<2.4	U
Benz(a)anthracene	4.4		5.4		5.5		5.0		5.0		7.4	
Chrysene	7.2		7.8		8.8		6.6		9.2		12.5	
C1-Chrysenes	4.3		4.1		<1.6	U	3.4		4.6		4.8	
C2-Chrysenes	<1.7	U	<1.7	U	<1.6	U	<1.7	U	<1.7	U	<1.7	U
C3-Chrysenes	<1.7	U	<1.7	U	<1.6	U	<1.7	U	<1.7	U	<1.7	U
C4-Chrysenes	<1.7	U	<1.7	U	<1.6	U	<1.7	U	<1.7	U	<1.7	U
Benzo(b)fluoranthene	7.5		8.9		7.8		8.3		9.8		12.3	
Benzo(k)fluoranthene	3.4		4.3		3.6		3.9		4.9		5.4	
Benzo(e)pyrene	4.7		5.4		4.9		4.9		6.4		7.0	
Benzo(a)pyrene	4.6		4.5		5.1		5.0		6.5		7.9	
Perylene	1.3		1.0		2.2		1.8		1.8		2.8	
Indeno(1,2,3-c,d)pyrene	3.4		3.4		3.7		3.4		3.9		5.2	
Dibenzo(a,h)anthracene	<1.6	U	0.6	J	0.7	J	<1.6	U	<1.6	U	<1.6	U
Benzo(g,h,i)perylene	2.8		3.5		4.1		3.9		4.9		5.7	
Total PAHs	205		195		283		203		310		304	
Individual Alkyl Isomers and Hopanes												
2-Methylnaphthalene	30.3		23.9		43.2		34.7		40.9		33.5	
1-Methylnaphthalene	16.3		13.8		21.2		19.7		22.1		18.3	
2,6-Dimethylnaphthalene	6.5		5.2		10.3		6.8		9.4		6.8	
1,6,7-Trimethylnaphthalene	0.5	J	0.3	J	1.0		0.9	J	1.4		1.3	
1-Methylphenanthrene	10.6		8.3		9.8		9.0		11.9		12.4	
C29-Hopane	<10.3	U	<10.3	U	<9.6	U	<10.4	U	<10.2	U	<10.2	U
18a-Oleanane	<10.3	U	<10.3	U	<9.6	U	<10.4	U	<10.2	U	<10.2	U
C30-Hopane	<10.3	U	<10.3	U	<9.6	U	<10.4	U	<10.2	U	<10.2	U

Surrogate (Su)	Su Recovery (%)	Su Recovery (%)	Su Recovery (%)	Su Recovery (%)	Su Recovery (%)	Su Recovery (%)
Naphthalene-d8	74	68	73	69	44	66
Acenaphthene-d10	81	78	81	81	49	74
Phenanthrene-d10	87	93	91	89	59	79
Chrysene-d12	79	85	85	77	50	75
Perylene-d12	80	81	87	80	50	79

Qualifiers (Q): J=Below the MDL, U=Not detected, B=In procedural blank > 3x MDL, I=Interference, D=Diluted value, NA=Not Applicable, *=Outside QA limits, refer to narrative

Sample Name	ETX3846.D	ETX3848.D	ETX3850.D	ETX3852.D	ETX3854.D	ETX3856.D
Client Name	W-WOOD-05 (1 of 2)	WPA4-J (1 of 2)	WMIF-1 (1 of 2)	WMIF-2 (1 of 2)	W-CBB-04 (1 of 2)	W-CBB-05 (1 of 2)
Matrix	Water	Water	Water	Water	Water	Water
Collection Date	11/30/04	11/30/04	11/30/04	11/30/04	11/30/04	11/30/04
Received Date	12/04/04	12/04/04	12/04/04	12/04/04	12/04/04	12/04/04
Extraction Date	12/06/04	12/06/04	12/06/04	12/06/04	12/06/04	12/06/04
Extraction Batch	ENV 1058	ENV 1058	ENV 1058	ENV 1058	ENV 1058	ENV 1058
Date Acquired	12/14/04	12/14/04	12/14/04	12/14/04	12/14/04	12/14/04
Method	PAH-2002	PAH-2002	PAH-2002	PAH-2002	PAH-2002	PAH-2002
Sample Volume (L)	0.9	0.9	1.0	1.0	1.0	1.0
Dilution	NA	NA	NA	NA	NA	NA

Target Compounds	Su Corrected Conc. (ng/L)	Q	Su Corrected Conc. (ng/L)	Q	Su Corrected Conc. (ng/L)	Q	Su Corrected Conc. (ng/L)	Q	Su Corrected Conc. (ng/L)	Q	Su Corrected Conc. (ng/L)	Q
Naphthalene	37.2		120		195		77.4		32.1		51.8	
C1-Naphthalenes	23.6		85.6		149		52.9		20.0		28.5	
C2-Naphthalenes	19.4		134		192		29.6		15.8		14.3	
C3-Naphthalenes	15.9		129		257		16.8		11.0		7.6	
C4-Naphthalenes	12.8		90.3		228		5.9	J	7.8		8.6	
Benzothiophene	<1.7	U	2.1		2.5		<1.7	U	<1.6	U	<1.6	U
C1-Benzothiophenes	<3.5	U	13.9		11.3		<3.3	U	<3.2	U	<3.2	U
C2-Benzothiophenes	<3.5	U	29.1		33.8		<3.3	U	<3.2	U	<3.2	U
C3-Benzothiophenes	<3.5	U	22.3		41.7		<3.3	U	<3.2	U	<3.2	U
Biphenyl	4.1		12.6		9.9		3.3		1.8	J	2.0	J
Acenaphthylene	1.8		7.2		8.9		4.7		1.2		0.8	J
Acenaphthene	4.2		45.5		27.7		4.9		4.3		2.3	
Dibenzofuran	4.7		18.9		18.2		5.1		4.2		2.5	
Fluorene	4.6		39.7		37.0		5.3		3.0		1.4	
C1-Fluorenes	4.8		55.1		88.3		4.0		<1.2	U	<1.2	U
C2-Fluorenes	13.6		74.8		188		<1.2	U	<1.2	U	<1.2	U
C3-Fluorenes	<1.3	U	80.3		223		<1.2	U	<1.2	U	<1.2	U
Carbazole	<1.9	U	9.1		<1.9	U	1.5	J	<1.8	U	<1.8	U
Anthracene	2.3		9.3		6.4		4.3		1.4		1.0	
Phenanthrene	16.7		89.6		92.1		17.7		10.1		5.1	
C1-Phenanthrene/Anthracenes	23.0		107		208		22.9		20.8		9.7	
C2-Phenanthrene/Anthracenes	17.0		145		347		11.0		21.4		4.4	
C3-Phenanthrene/Anthracenes	19.2		95.9		325		9.2		29.9		4.9	
C4-Phenanthrene/Anthracenes	<2.9	U	46.9		186		<2.8	U	11.7		<2.7	U
Dibenzothiophene	1.9		20.2		23.8		1.4		<0.8	U	0.3	J
C1-Dibenzothiophenes	6.4		49.0		115		3.5		<1.7	U	<1.7	U
C2-Dibenzothiophenes	13.6		90.1		281		4.7		<1.7	U	<1.7	U
C3-Dibenzothiophenes	9.8		97.1		365		6.7		<1.7	U	<1.7	U
Fluoranthene	24.8		69.0		48.7		29.9		16.8		10.0	
Pyrene	36.9		97.3		66.6		33.0		28.3		16.6	
C1-Fluoranthenes/Pyrenes	14.5		54.3		73.7		14.6		12.0		5.2	
C2-Fluoranthenes/Pyrenes	10.1		35.0		100		7.1		8.3		3.1	
C3-Fluoranthenes/Pyrenes	3.5		15.1		61.3		<1.4	U	5.1		<1.4	U
Naphthobenzothiophene	3.8		19.6		44.7		5.8		4.9		0.8	J
C1-Naphthobenzothiophenes	6.3		34.7		118		5.4		12.8		1.4	J
C2-Naphthobenzothiophenes	<2.4	U	48.9		183		<2.3	U	15.0		<2.2	U
C3-Naphthobenzothiophenes	<2.4	U	33.6		159		<2.3	U	12.2		<2.2	U
Benz(a)anthracene	11.7		37.4		28.2		20.3		9.2		4.7	
Chrysene	20.5		59.0		66.8		28.9		14.7		7.6	
C1-Chrysenes	11.4		44.7		89.3		15.3		12.3		3.8	
C2-Chrysenes	7.2		32.4		56.9		<1.6	U	7.6		<1.6	U
C3-Chrysenes	<1.7	U	14.1		42.9		<1.6	U	<1.6	U	<1.6	U
C4-Chrysenes	<1.7	U	<1.7	U	7.0		<1.6	U	<1.6	U	<1.6	U
Benzo(b)fluoranthene	20.5		55.0		27.3		34.9		12.7		6.9	
Benzo(k)fluoranthene	7.1		20.0		9.4		14.9		5.4		3.2	
Benzo(e)pyrene	11.1		30.1		21.2		19.9		8.8		4.7	
Benzo(a)pyrene	13.6		41.3		18.6		24.4		9.2		4.6	
Perylene	4.5		13.8		12.4		5.5		4.5		1.7	
Indeno(1,2,3-c,d)pyrene	8.6		25.9		15.4		16.7		5.7		2.7	
Dibenzo(a,h)anthracene	1	J	4.0		3.1		2.7		0.8	J	<1.5	U
Benzo(g,h,i)perylene	7.7		26.5		12.7		14.1		4.3		2.9	
Total PAHs	481		2531		4927		586		407		225	
Individual Alkyl Isomers and Hopanes												
2-Methylnaphthalene	24.1		76.2		145		54.8		20.9		30.8	
1-Methylnaphthalene	14.1		63.3		96.3		30.8		11.4		15.2	
2,6-Dimethylnaphthalene	8.0		58.2		90		12.9		5.4		5.1	
1,6,7-Trimethylnaphthalene	2.6		21.8		39.1		1.2		1.1		0.6	J
1-Methylphenanthrene	15.1		37.8		61		12.6		12.4		8.6	
C29-Hopane	19.8		60.5		75.4		16.1		16.6		<9.6	U
18a-Oleanane	<10.3	U	<10.4	U	12.3		<10	U	<9.6	U	<9.6	U
C30-Hopane	25.5		66.4		68.7		9.7	J	18.2		<9.6	U

Surrogate (Su)	Su Recovery (%)	Su Recovery (%)	Su Recovery (%)	Su Recovery (%)	Su Recovery (%)	Su Recovery (%)
Naphthalene-d8	66	68	65	70	64	66
Acenaphthene-d10	73	79	80	84	76	80
Phenanthrene-d10	73	75	90	88	87	92
Chrysene-d12	80	80	94	80	90	83
Perylene-d12	76	77	73	74	66	69

Qualifiers (Q): J=Below the MDL, U=Not detected, B=In procedural blank > 3x MDL, I=Interference, D=Diluted value, NA=Not Applicable, *=Outside QA limits, refer to narrative

Sample Name	ETX3858.D	ETX3860.D	ETX3862.D	ETX3864.D	ETX3866.D	ETX3868.D
Client Name	W-CBB-06 (1 of 2)	W-DER-2 (1 of 2)	M-MAN-04 (1 of 2)	M-MAN-03 (1 of 2)	WMH-04 (1 of 2)	WMH-05 (1 of 2)
Matrix	Water	Water	Water	Water	Water	Water
Collection Date	11/30/04	11/30/04	11/30/04	11/30/04	11/30/04	11/30/04
Received Date	12/04/04	12/04/04	12/04/04	12/04/04	12/04/04	12/04/04
Extraction Date	12/06/04	12/06/04	12/06/04	12/06/04	12/06/04	12/06/04
Extraction Batch	ENV 1058	ENV 1058	ENV 1058	ENV 1058	ENV 1058	ENV 1058
Date Acquired	12/14/04	12/14/04	12/14/04	12/14/04	12/14/04	12/14/04
Method	PAH-2002	PAH-2002	PAH-2002	PAH-2002	PAH-2002	PAH-2002
Sample Volume (L)	1.0	0.9	0.9	0.9	1.0	1.0
Dilution	NA	NA	NA	NA	NA	NA

Target Compounds	Su Corrected Conc. (ng/L)	Q	Su Corrected Conc. (ng/L)	Q	Su Corrected Conc. (ng/L)	Q	Su Corrected Conc. (ng/L)	Q	Su Corrected Conc. (ng/L)	Q	Su Corrected Conc. (ng/L)	Q
Naphthalene	46.1		222		51.0		56.6		42.4		56.5	
C1-Naphthalenes	24.8		131		36.6		39.1		29.5		35.8	
C2-Naphthalenes	13.9		42.3		22.2		31.2		17.6		16.9	
C3-Naphthalenes	9.5		18.1		17.4		27.5		11.6		10.8	
C4-Naphthalenes	7.0		7.7		13.7		21.6		10.2		7.1	
Benzothiophene	<1.6	U	<1.7	U	<1.7	U	<1.7	U	<1.6	U	<1.6	U
C1-Benzothiophenes	<3.2	U	<3.5	U	<3.5	U	<3.5	U	<3.2	U	<3.2	U
C2-Benzothiophenes	<3.2	U	<3.5	U	<3.5	U	<3.5	U	<3.2	U	<3.2	U
C3-Benzothiophenes	<3.2	U	<3.5	U	<3.5	U	<3.5	U	<3.2	U	<3.2	U
Biphenyl	2.4		4.0		3.3		3.2		2.1	J	2.9	
Acenaphthylene	1.1		4.8		3.3		3.6		1.4		<1	U
Acenaphthene	4.5		7.2		5.0		4.2		5.0		4.5	
Dibenzofuran	4.5		6.8		5.0		5.0		5.0		4.2	
Fluorene	2.7		6.6		3.5		5.0		3.2		2.8	
C1-Fluorenes	<1.2	U	4.9		4.6		7.6		<1.2	U	<1.2	U
C2-Fluorenes	<1.2	U	<1.3	U	<1.3	U	19.4		<1.2	U	<1.2	U
C3-Fluorenes	<1.2	U	<1.3	U	<1.3	U	39.4		<1.2	U	<1.2	U
Carbazole	<1.8	U	1.6	J	<2	U	<1.9	U	<1.8	U	<1.8	U
Anthracene	1.3		2.4		2.0		1.8		1.9		1.4	
Phenanthrene	8.0		13.6		11.4		16.1		11.8		7.2	
C1-Phenanthrene/Anthracenes	12.1		18		19.3		32.8		17.4		12.7	
C2-Phenanthrene/Anthracenes	<2.7	U	6.9		12.1		31.9		12.0		8.4	
C3-Phenanthrene/Anthracenes	<2.7	U	5.4		11.3		36.8		17.0		8.3	
C4-Phenanthrene/Anthracenes	<2.7	U	3.9		2.7	J	22.2		7.1		4.3	
Dibenzothiophene	0.6	J	1.0		1.1		2.4		0.7	J	0.7	J
C1-Dibenzothiophenes	<1.7	U	1.8	J	5.0		11.1		3.5		2.0	
C2-Dibenzothiophenes	<1.7	U	<1.8	U	7.3		29.3		9.1		<1.7	U
C3-Dibenzothiophenes	<1.7	U	<1.8	U	11.2		39.2		15.6		<1.7	U
Fluoranthene	14.1		21.4		15.6		20.5		20.6		12.9	
Pyrene	23.2		24.5		22.4		25.2		31.8		22.7	
C1-Fluoranthenes/Pyrenes	7.6		7.6		7.6		15.6		12.1		6.4	
C2-Fluoranthenes/Pyrenes	3.4		2.7		6.5		13.1		7.9		3.2	
C3-Fluoranthenes/Pyrenes	<1.4	U	<1.5	U	<1.5	U	6.3		3.7		<1.4	U
Naphthobenzothiophene	1.8		2.1		3.2		7.6		4.9		1.8	
C1-Naphthobenzothiophenes	1.8	J	2.4	J	5.1		14.1		9.2		<2.2	U
C2-Naphthobenzothiophenes	<2.2	U	<2.4	U	5.9		20.0		10.8		<2.2	U
C3-Naphthobenzothiophenes	<2.2	U	<2.4	U	4.5		14.5		7.9		<2.2	U
Benz(a)anthracene	6.7		8.7		7.9		10.4		10.5		6.0	
Chrysene	10.1		11.9		12.9		17.2		16.0		9.9	
C1-Chrysenes	3.8		4.8		6.9		12.6		9.6		4.3	
C2-Chrysenes	<1.6	U	<1.7	U	<1.7	U	9.0		6.1		<1.6	U
C3-Chrysenes	<1.6	U	<1.7	U	<1.7	U	<1.7	U	<1.6	U	<1.6	U
C4-Chrysenes	<1.6	U	<1.7	U	<1.7	U	<1.7	U	<1.6	U	<1.6	U
Benzo(b)fluoranthene	10.2		13.4		14.0		13.9		15.7		9.9	
Benzo(k)fluoranthene	4.2		5.8		5.6		6.0		6.7		4.4	
Benzo(e)pyrene	6.2		8.3		8.4		9.3		10.6		5.6	
Benzo(a)pyrene	6.9		8.7		9.3		10.4		11.2		5.8	
Perylene	2.4		2.8		3.7		3.8		4.1		1.9	
Indeno(1,2,3-c,d)pyrene	3.7		5.0		5.8		5.2		8.1		3.3	
Dibenzo(a,h)anthracene	<1.5	U	<1.6	U	1.5	J	1.1	J	1.1	J	<1.5	U
Benzo(g,h,i)perylene	4.0		5.3		6.8		6.6		6.6		4.4	
Total PAHs	249		646		403		729		439		289	
Individual Isomers												
2-Methylnaphthalene	26.6		134		38.5		39.5		31.4		38.1	
1-Methylnaphthalene	13.3		78.4		20.6		23.8		16.2		19.7	
2,6-Dimethylnaphthalene	5.1		19.6		9.6		12.2		6.4		7.7	
1,6,7-Trimethylnaphthalene	0.7	J	1.6		2.1		2.9		0.8	J	1.0	
1-Methylphenanthrene	10.0		12.2		11.8		16.3		11.1		10.2	
C29-Hopane	<9.6	U	12.1		15.2		21.9		14.3		<9.6	U
18a-Oleanane	<9.6	U	<10.4	U	<10.4	U	<10.3	U	<9.6	U	<9.6	U
C30-Hopane	<9.6	U	14.4		16.6		19.1		22.0		<9.6	U

Surrogate (Su)	Su Recovery (%)	Su Recovery (%)	Su Recovery (%)	Su Recovery (%)	Su Recovery (%)	Su Recovery (%)
Naphthalene-d8	65	66	68	66	61	64
Acenaphthene-d10	77	80	77	81	76	73
Phenanthrene-d10	86	86	88	87	77	83
Chrysene-d12	82	81	82	86	76	77
Perylene-d12	71	72	77	72	67	72

Qualifiers (Q): J=Below the MDL, U=Not detected, B=In procedural blank > 3x MDL, I=Interference, D=Diluted value, NA=Not Applicable, *=Outside QA limits, refer to narrative

Sample Name	ETX3870.D
Client Name	WMH-06 (1 of
2) **Matrix**	Water
Collection Date	11/30/04
Received Date	12/04/04
Extraction Date	12/06/04
Extraction Batch	ENV 1058
Date Acquired	12/15/04
Method	PAH-2002
Sample Volume (L)	1.0
Dilution	NA

Target Compounds	Su Corrected Q Conc. (ng/L)
Naphthalene	31.0
C1-Naphthalenes	20.1
C2-Naphthalenes	16.3
C3-Naphthalenes	12.5
C4-Naphthalenes	11.5
Benzothiophene	<1.6 U
C1-Benzothiophenes	<3.2 U
C2-Benzothiophenes	<3.2 U
C3-Benzothiophenes	<3.2 U
Biphenyl	2.5
Acenaphthylene	1.7
Acenaphthene	5.2
Dibenzofuran	4.2
Fluorene	3.5
C1-Fluorenes	<1.2 U
C2-Fluorenes	<1.2 U
C3-Fluorenes	<1.2 U
Carbazole	<1.8 U
Anthracene	1.5
Phenanthrene	7.9
C1-Phenanthrene/Anthracenes	12.9
C2-Phenanthrene/Anthracenes	8.8
C3-Phenanthrene/Anthracenes	7.4
C4-Phenanthrene/Anthracenes	3.2
Dibenzothiophene	0.6 J
C1-Dibenzothiophenes	2.5
C2-Dibenzothiophenes	4.3
C3-Dibenzothiophenes	6.4
Fluoranthene	12.9
Pyrene	22.6
C1-Fluoranthenes/Pyrenes	6.6
C2-Fluoranthenes/Pyrenes	3.5
C3-Fluoranthenes/Pyrenes	<1.4 U
Naphthobenzothiophene	2.3
C1-Naphthobenzothiophenes	2.2 J
C2-Naphthobenzothiophenes	<2.2 U
C3-Naphthobenzothiophenes	<2.2 U
Benz(a)anthracene	6.3
Chrysene	10.4
C1-Chrysenes	4.7
C2-Chrysenes	<1.6 U
C3-Chrysenes	<1.6 U
C4-Chrysenes	<1.6 U
Benzo(b)fluoranthene	10.8
Benzo(k)fluoranthene	4.1
Benzo(e)pyrene	6.4
Benzo(a)pyrene	6.3
Perylene	2.3
Indeno(1,2,3-c,d)pyrene	3.7
Dibenzo(a,h)anthracene	<1.5 U
Benzo(g,h,i)perylene	4.1
Total PAHs	273
Individual Isomers	
2-Methylnaphthalene	20.6
1-Methylnaphthalene	11.9
2,6-Dimethylnaphthalene	6.2
1,6,7-Trimethylnaphthalene	1.1
1-Methylphenanthrene	9.8
C29-Hopane	<9.6 U
18a-Oleanane	<9.6 U
C30-Hopane	<9.6 U

Surrogate (Su)	Su Recovery (%)
Naphthalene-d8	69
Acenaphthene-d10	65
Phenanthrene-d10	90
Chrysene-d12	79
Perylene-d12	70

Qualifiers (Q): J=Below the MDL, U=Not detected, B=In procedural blank > 3x MDL, I=Interference, D=Diluted value, NA=Not Applicable, *=Outside QA limits, refer to narrative

Sample Name	ETX3885.D	ETX3886.D	ETX3887.D	ETX3895.D	ETX3896.D	ETX3897.D
Client Name	W-WOOD-06	W-WOOD-07	W-WOOD-08	W-UL-01	W-UL-02	W-UL-03
Matrix	Water	Water	Water	Water	Water	Water
Collection Date	12/08/04	12/08/04	12/08/04	12/07/04	12/07/04	12/07/04
Received Date	12/10/04	12/10/04	12/10/04	12/10/04	12/10/04	12/10/04
Extraction Date	12/13/04	12/13/04	12/13/04	12/13/04	12/13/04	12/13/04
Extraction Batch	ENV 1063	ENV 1063	ENV 1063	ENV 1063	ENV 1063	ENV 1063
Date Acquired	12/15/04	12/15/04	12/16/04	12/16/04	12/16/04	12/16/04
Method	PAH-2002	PAH-2002	PAH-2002	PAH-2002	PAH-2002	PAH-2002
Sample Volume (L)	0.9	0.9	0.9	0.9	0.9	0.9
Dilution	NA	NA	NA	NA	NA	NA

Target Compounds	Su Corrected Conc. (ng/L)	Q	Su Corrected Conc. (ng/L)	Q	Su Corrected Conc. (ng/L)	Q	Su Corrected Conc. (ng/L)	Q	Su Corrected Conc. (ng/L)	Q	Su Corrected Conc. (ng/L)	Q
Naphthalene	15.0		16.1		18.3		15.6		13.3		13.6	
C1-Naphthalenes	9.5		10.7		11.4		10.3		6.9		6.0	
C2-Naphthalenes	10.3		11.8		12.5		8.5		5.4	J	6.4	J
C3-Naphthalenes	16.1		15.8		15.4		<6.9	U	<6.9	U	<6.6	U
C4-Naphthalenes	12		14.5		<6.7	U	<6.9	U	<6.9	U	<6.6	U
Benzothiophene	1.9		1.5	J	1.8		<1.8	U	<1.8	U	1.7	J
C1-Benzothiophenes	<3.6	U	<3.6	U	<3.6	U	<3.6	U	<3.6	U	<3.5	U
C2-Benzothiophenes	<3.6	U	<3.6	U	<3.6	U	<3.6	U	<3.6	U	<3.5	U
C3-Benzothiophenes	<3.6	U	<3.6	U	<3.6	U	<3.6	U	<3.6	U	<3.5	U
Biphenyl	1.6	J	2.7		2.6		2.0	J	1.7	J	1.2	J
Acenaphthylene	2.6		2.8		3.7		2.5		1.8		2.4	
Acenaphthene	2.4		2.6		9.4		1.7		1.1	J	1.8	
Dibenzofuran	2.1		2.9		3.6		2.2		2.3		2.0	
Fluorene	2.5		2.5		7.6		2.1		2.1		1.9	
C1-Fluorenes	<1.3	U	<1.3	U	<1.3	U	<1.4	U	<1.4	U	<1.3	U
C2-Fluorenes	<1.3	U	<1.3	U	<1.3	U	<1.4	U	<1.4	U	<1.3	U
C3-Fluorenes	<1.3	U	<1.3	U	<1.3	U	<1.4	U	<1.4	U	<1.3	U
Carbazole	<2	U	1.4	J	10.6		<2.1	U	<2.1	U	<2	U
Anthracene	3.3		3.2		6.6		2.6		1.7		2.4	
Phenanthrene	8.7		8.4		29.3		8.2		5.4		8.1	
C1-Phenanthrene/Anthracenes	7.1		6.4		14.3		4.6		4.1		4.6	
C2-Phenanthrene/Anthracenes	10.2		10.3		15.8		<3.1	U	<3.1	U	4.3	
C3-Phenanthrene/Anthracenes	10.0		11.2		<3	U	<3.1	U	<3.1	U	<2.9	U
C4-Phenanthrene/Anthracenes	<3	U	<3	U	<3	U	<3.1	U	<3.1	U	<2.9	U
Dibenzothiophene	2.0		2.3		6.2		1.0		<1	U	0.9	J
C1-Dibenzothiophenes	3.5		3.6		7.2		<1.9	U	<1.9	U	<1.8	U
C2-Dibenzothiophenes	4.8		6.0		9.2		<1.9	U	<1.9	U	<1.8	U
C3-Dibenzothiophenes	<1.9	U	<1.9	U	<1.9	U	<1.9	U	<1.9	U	<1.8	U
Fluoranthene	18.0		13.3		56.2		16.4		7.7		16.3	
Pyrene	17.1		14.0		44.9		15.7		7.7		13.5	
C1-Fluoranthenes/Pyrenes	9.4		9.9		17.2		7.7		5.1		6.8	
C2-Fluoranthenes/Pyrenes	6.3		6.2		15.0		<1.5	U	<1.5	U	2.7	
C3-Fluoranthenes/Pyrenes	<1.5	U	<1.5	U	<1.5	U	<1.5	U	<1.5	U	<1.5	U
Naphthobenzothiophene	3.1		<1.3	U	12.0		3.1		<1.3	U	2.9	
C1-Naphthobenzothiophenes	<2.5	U	<2.5	U	8.6		<2.5	U	<2.5	U	<2.4	U
C2-Naphthobenzothiophenes	<2.5	U	<2.5	U	8.9		<2.5	U	<2.5	U	<2.4	U
C3-Naphthobenzothiophenes	<2.5	U	<2.5	U	<2.5	U	<2.5	U	<2.5	U	<2.4	U
Benz(a)anthracene	4.9		4.9		10.5		5.3		2.8		6.1	
Chrysene	10.6		9.1		31.2		10.1		5.6		11.8	
C1-Chrysenes	<1.7	U	8.0		14.1		<1.8	U	<1.8	U	<1.7	U
C2-Chrysenes	<1.7	U	<1.8	U	<1.7	U	<1.8	U	<1.8	U	<1.7	U
C3-Chrysenes	<1.7	U	<1.8	U	<1.7	U	<1.8	U	<1.8	U	<1.7	U
C4-Chrysenes	<1.7	U	<1.8	U	<1.7	U	<1.8	U	<1.8	U	<1.7	U
Benzo(b)fluoranthene	12.2		12.0		38.7		14.5		8.7		17.4	
Benzo(k)fluoranthene	3.6		3.8		9.8		5.0		3.4		6.5	
Benzo(e)pyrene	6.5		7.8		20.4		8.9		4.3		9.3	
Benzo(a)pyrene	7.2		8.9		16.3		10.3		5.3		9.1	
Perylene	2.5		2.5		5.2		4.1		2.1		2.8	
Indeno(1,2,3-c,d)pyrene	3.7		6.2		17.4		6.5		3.5		9.0	
Dibenzo(a,h)anthracene	2	J	2		3.0		<1.7	U	<1.7	U	<1.6	U
Benzo(g,h,i)perylene	2.6		4.8		17.7		7.8		2.9		7.0	
Total PAHs	235		250		533		177		105		179	
Individual Alkyl Isomers and Hopanes												
2-Methylnaphthalene	9.3		9.8		8.3		10.3		6.4		5.1	
1-Methylnaphthalene	6.4		7.9		10.7		6.8		5.1		4.8	
2,6-Dimethylnaphthalene	2.8		4.9		3.8		3.0		1.9		2.3	
1,6,7-Trimethylnaphthalene	1.4		1.0	J	1.2		<1.1	U	<1.1	U	<1.1	U
1-Methylphenanthrene	2.0		2.1		3.8		1.4		1.1	J	1.1	J
C29-Hopane	<10.6	U	<10.8	U	44.8		<10.9	U	<10.9	U	<10.4	U
18a-Oleanane	<10.6	U	<10.8	U	<10.6	U	<10.9	U	<10.9	U	<10.4	U
C30-Hopane	<10.6	U	<10.8	U	40.7		<10.9	U	<10.9	U	<10.4	U

Surrogate (Su)	Su Recovery (%)	Su Recovery (%)	Su Recovery (%)	Su Recovery (%)	Su Recovery (%)	Su Recovery (%)
Naphthalene-d8	88	86	82	82	90	92
Acenaphthene-d10	88	87	86	85	91	96
Phenanthrene-d10	88	86	85	88	94	97
Chrysene-d12	75	76	88	78	72	69
Perylene-d12	86	98	88	85	98	95

Qualifiers (Q): J=Below the MDL, U=Not detected, B=In procedural blank > 3x MDL, I=Interference, D=Diluted value, NA=Not Applicable, *=Outside QA limits, refer to narrative

Sample Name	ETX3898.D	ETX3899.D	ETX3900.D	ETX3901.D	ETX3902.D	ETX3903.D
Client Name	W-TPB-01	W-TPB-02	W-TPB-03	W-BTC-07	W-BTC-08	W-BTC-09
Matrix	Water	Water	Water	Water	Water	Water
Collection Date	12/07/04	12/07/04	12/07/04	12/07/04	12/07/04	12/07/04
Received Date	12/10/04	12/10/04	12/10/04	12/10/04	12/10/04	12/10/04
Extraction Date	12/13/04	12/13/04	12/13/04	12/13/04	12/13/04	12/13/04
Extraction Batch	ENV 1063	ENV 1063	ENV 1063	ENV 1063	ENV 1063	ENV 1063
Date Acquired	12/16/04	12/16/04	12/16/04	12/16/04	12/16/04	12/16/04
Method	PAH-2002	PAH-2002	PAH-2002	PAH-2002	PAH-2002	PAH-2002
Sample Volume (L)	0.9	0.9	0.9	0.9	0.9	0.9
Dilution	NA	NA	NA	NA	NA	NA

Target Compounds	Su Corrected Conc. (ng/L)	Q	Su Corrected Conc. (ng/L)	Q	Su Corrected Conc. (ng/L)	Q	Su Corrected Conc. (ng/L)	Q	Su Corrected Conc. (ng/L)	Q	Su Corrected Conc. (ng/L)	Q
Naphthalene	11.4		19.5		20.2		12.4		13.2		12.1	
C1-Naphthalenes	5.9		8.3		11.1		9.2		8.4		7.3	
C2-Naphthalenes	8.4		7.2		9.8		9.7		7.7		8.7	
C3-Naphthalenes	<6.8	U	<7	U	<6.8	U	11.9		<6.7	U	11.7	
C4-Naphthalenes	<6.8	U	<7	U	<6.8	U	10.0		<6.7	U	<6.9	U
Benzothiophene	<1.8	U	<1.8	U	2.3		1.7	J	2.1		1.3	J
C1-Benzothiophenes	<3.6	U	<3.7	U	<3.6	U	<3.5	U	<3.5	U	<3.6	U
C2-Benzothiophenes	<3.6	U	<3.7	U	<3.6	U	<3.5	U	<3.5	U	<3.6	U
C3-Benzothiophenes	<3.6	U	<3.7	U	<3.6	U	<3.5	U	<3.5	U	<3.6	U
Biphenyl	1.8	J	1.6	J	1.4	J	1.5	J	1.2	J	1.9	J
Acenaphthylene	1.9		3.7		2.8		4.3		3.9		2.2	
Acenaphthene	1.7		2.0		2.4		4.9		4.5		1.9	
Dibenzofuran	2.0		2.3		2.4		2.8		2.1		1.8	
Fluorene	1.6		2.3		3.0		4.7		3.6		2.7	
C1-Fluorenes	<1.3	U	<1.4	U	<1.3	U	<1.3	U	<1.3	U	<1.4	U
C2-Fluorenes	<1.3	U	<1.4	U	<1.3	U	<1.3	U	<1.3	U	<1.4	U
C3-Fluorenes	<1.3	U	<1.4	U	<1.3	U	<1.3	U	<1.3	U	<1.4	U
Carbazole	<2	U	<2.1	U	2.3		3.0		3.8		1.0	J
Anthracene	2.0		4.1		3.2		5.7		5.3		2.9	
Phenanthrene	7.6		10.5		14.3		16.4		14.7		9.1	
C1-Phenanthrene/Anthracenes	3.8		6.7		6.8		10.4		8.5		6.5	
C2-Phenanthrene/Anthracenes	<3	U	<3.1	U	7.9		12.4		10.4		10.7	
C3-Phenanthrene/Anthracenes	<3	U	<3.1	U	5.9		13.6		<3	U	8.9	
C4-Phenanthrene/Anthracenes	<3	U	<3.1	U	<3	U	<3	U	<3	U	<3.1	U
Dibenzothiophene	<0.9	U	1.1		2.1		3.3		3.2		1.6	
C1-Dibenzothiophenes	<1.9	U	<1.9	U	2.1		4.5		3.1		2.2	
C2-Dibenzothiophenes	<1.9	U	<1.9	U	<1.9	U	7.4		4.9		5.4	
C3-Dibenzothiophenes	<1.9	U	<1.9	U	<1.9	U	8.8		<1.9	U	<1.9	U
Fluoranthene	14.2		20.0		27.3		32.1		27.1		12.9	
Pyrene	12.6		17.0		24.7		32.9		26.4		13.1	
C1-Fluoranthenes/Pyrenes	5.7		7.4		10.2		15.1		10.2		7.7	
C2-Fluoranthenes/Pyrenes	<1.5	U	<1.6	U	6.8		9.2		6.8		<1.5	U
C3-Fluoranthenes/Pyrenes	<1.5	U	<1.6	U	<1.5	U	<1.5	U	<1.5	U	<1.5	U
Naphthobenzothiophene	2.8		<1.3	U	6.2		7.1		4.1		2.2	
C1-Naphthobenzothiophenes	<2.5	U	<2.6	U	4.1		4.5		<2.5	U	<2.5	U
C2-Naphthobenzothiophenes	<2.5	U	<2.6	U	<2.5	U	6.3		<2.5	U	<2.5	U
C3-Naphthobenzothiophenes	<2.5	U	<2.6	U	<2.5	U	<2.5	U	<2.5	U	<2.5	U
Benz(a)anthracene	3.8		8.3		10.4		10.6		8.3		5.6	
Chrysene	7.1		14.2		18.0		21.8		18.4		9.5	
C1-Chrysenes	<1.8	U	<1.8	U	10.9		14.8		7.5		<1.8	U
C2-Chrysenes	<1.8	U	<1.8	U	<1.8	U	<1.7	U	<1.7	U	<1.8	U
C3-Chrysenes	<1.8	U	<1.8	U	<1.8	U	<1.7	U	<1.7	U	<1.8	U
C4-Chrysenes	<1.8	U	<1.8	U	<1.8	U	<1.7	U	<1.7	U	<1.8	U
Benzo(b)fluoranthene	13.0		22.3		26.9		27.6		23.6		11.7	
Benzo(k)fluoranthene	4.6		7.6		8.3		6.7		5.3		2.7	J
Benzo(e)pyrene	7.2		13.3		14.3		14.9		11.1		5.5	
Benzo(a)pyrene	6.7		13.0		15.8		14.0		11.5		5.8	
Perylene	2.8		4.0		5.0		5.4		5.0		2.1	
Indeno(1,2,3-c,d)pyrene	6.0		6.9		14.3		12.4		11.2		4.9	
Dibenzo(a,h)anthracene	<1.7	U	<1.7	U	1.9		1.9		<1.6	U	<1.7	U
Benzo(g,h,i)perylene	6.4		9.3		14.5		12.6		9.5		6.0	
Total PAHs	141		213		320		409		287		190	
Individual Alkyl Isomers and Hopanes												
2-Methylnaphthalene	5.2		7.5		9.0		7.6		6.2		6.6	
1-Methylnaphthalene	4.6		6.4		9.4		7.7		7.9		5.5	
2,6-Dimethylnaphthalene	1.7	J	2.5		3.9		4.0		1.9		3.7	
1,6,7-Trimethylnaphthalene	<1.1	U	<1.1	U	<1.1	U	0.9	J	<1.1	U	0.7	J
1-Methylphenanthrene	0.9	J	1.8		1.5		2.6		2.6		1.9	
C29-Hopane	<10.8	U	<11	U	<10.8	U	26.6		22.8		<10.9	U
18a-Oleanane	<10.8	U	<11	U	<10.8	U	<10.5	U	<10.5	U	<10.9	U
C30-Hopane	<10.8	U	<11	U	<10.8	U	27.9		23.2		<10.9	U

Surrogate (Su)	Su Recovery (%)	Su Recovery (%)	Su Recovery (%)	Su Recovery (%)	Su Recovery (%)	Su Recovery (%)
Naphthalene-d8	91	66	96	90	92	98
Acenaphthene-d10	90	70	97	94	96	94
Phenanthrene-d10	94	71	94	95	95	99
Chrysene-d12	82	52	86	96	91	87
Perylene-d12	98	63	94	94	90	90

Qualifiers (Q): J=Below the MDL, U=Not detected, B=In procedural blank > 3x MDL, I=Interference, D=Diluted value, NA=Not Applicable, *=Outside QA limits, refer to narrative

Sample Name	ETX3904.D	ETX3905.D	ETX3906.D	ETX3907.D	ETX3910.D	ETX3911.D
Client Name	W-DUP-01	WLP #1-5	WLP #2-5	WLP #3-5	WSUB-01 (1 of 2)	WSUB-01 (2 of 2)
Matrix	Water	Water	Water	Water	Water	Water
Collection Date	12/07/04	12/07/04	12/07/04	12/07/04	12/07/04	12/07/04
Received Date	12/10/04	12/10/04	12/10/04	12/10/04	12/10/04	12/10/04
Extraction Date	12/13/04	12/13/04	12/13/04	12/13/04	12/13/04	12/13/04
Extraction Batch	ENV 1063	ENV 1063	ENV 1063	ENV 1063	ENV 1063	ENV 1063
Date Acquired	12/16/04	12/16/04	12/16/04	12/16/04	12/16/04	12/16/04
Method	PAH-2002	PAH-2002	PAH-2002	PAH-2002	PAH-2002	PAH-2002
Sample Volume (L)	0.9	0.9	1.0	0.9	0.9	0.9
Dilution	NA	NA	NA	NA	NA	NA

Target Compounds	Su Corrected Conc. (ng/L)	Q	Su Corrected Conc. (ng/L)	Q	Su Corrected Conc. (ng/L)	Q	Su Corrected Conc. (ng/L)	Q	Su Corrected Conc. (ng/L)	Q	Su Corrected Conc. (ng/L)	Q
Naphthalene	12.8		15.7		11.4		20.0		15.1		12.3	
C1-Naphthalenes	9.4		8.7		6.9		12.7		9.5		6.5	
C2-Naphthalenes	10.4		7.7		7.0		49.9		7.8		<6.9	U
C3-Naphthalenes	11.6		<6.5	U	<6.3	U	97.0		<6.9	U	<6.9	U
C4-Naphthalenes	9.9		<6.5	U	<6.3	U	76.3		<6.9	U	<6.9	U
Benzothiophene	2.0		<1.7	U	<1.7	U	<1.8	U	<1.8	U	<1.8	U
C1-Benzothiophenes	<3.6	U	<3.5	U	<3.3	U	<3.6	U	<3.6	U	<3.6	U
C2-Benzothiophenes	<3.6	U	<3.5	U	<3.3	U	<3.6	U	<3.6	U	<3.6	U
C3-Benzothiophenes	<3.6	U	<3.5	U	<3.3	U	<3.6	U	<3.6	U	<3.6	U
Biphenyl	2.0	J	1.5	J	1.8	J	2.8		2.2	J	1.6	J
Acenaphthylene	4.1		1.9		2.0		8.4		6.5		<1.2	U
Acenaphthene	5.0		<1.4	U	<1.4	U	4.1		<1.5	U	<1.5	U
Dibenzofuran	2.6		1.5		1.1	J	5.8		2.8		1.4	
Fluorene	4.8		1.8		1.4		11.1		2.9		1.2	
C1-Fluorenes	<1.3	U	<1.3	U	<1.2	U	28.5		<1.4	U	<1.4	U
C2-Fluorenes	<1.3	U	<1.3	U	<1.2	U	110		<1.4	U	<1.4	U
C3-Fluorenes	<1.3	U	<1.3	U	<1.2	U	80.1		<1.4	U	<1.4	U
Carbazole	2.6		<1.9	U	<1.9	U	<2	U	2.3		<2.1	U
Anthracene	5.3		2.8		3.4		11.9		8.7		0.9	
Phenanthrene	15.1		6.5		7.6		51.0		25.7		2.6	
C1-Phenanthrene/Anthracenes	9.7		4.6		5.2		79.7		13.7		<3.1	U
C2-Phenanthrene/Anthracenes	14.2		<2.9	U	<2.8	U	127		11.0		<3.1	U
C3-Phenanthrene/Anthracenes	12.4		<2.9	U	<2.8	U	104		<3.1	U	<3.1	U
C4-Phenanthrene/Anthracenes	<3	U	<2.9	U	<2.8	U	56.1		<3.1	U	<3.1	U
Dibenzothiophene	3.2		1.4		1.9		10.7		1.7		<1	U
C1-Dibenzothiophenes	4.2		<1.8	U	2.2		53.8		3.1		<1.9	U
C2-Dibenzothiophenes	6.8		<1.8	U	<1.8	U	114		<1.9	U	<1.9	U
C3-Dibenzothiophenes	10.2		<1.8	U	<1.8	U	131		<1.9	U	<1.9	U
Fluoranthene	28.5		9.1		9.8		43.1		49.4		2.3	
Pyrene	30.1		10.3		12.6		48.8		47.5		2.8	
C1-Fluoranthenes/Pyrenes	13.6		7.1		6.3		54.1		20.9		<1.5	U
C2-Fluoranthenes/Pyrenes	7.7		<1.5	U	<1.4	U	60.4		13.1		<1.5	U
C3-Fluoranthenes/Pyrenes	<1.5	U	<1.5	U	<1.4	U	41.1		<1.5	U	<1.5	U
Naphthobenzothiophene	6.6		<1.2	U	<1.2	U	25.9		8.0		<1.3	U
C1-Naphthobenzothiophenes	<2.5	U	<2.4	U	<2.3	U	54.5		<2.5	U	<2.5	U
C2-Naphthobenzothiophenes	<2.5	U	<2.4	U	<2.3	U	92.2		<2.5	U	<2.5	U
C3-Naphthobenzothiophenes	<2.5	U	<2.4	U	<2.3	U	70.1		<2.5	U	<2.5	U
Benz(a)anthracene	10.3		3.3		3.7		21.1		21.9		<1	U
Chrysene	22.1		6.2		7.1		50.9		31.3		<0.9	U
C1-Chrysenes	13.7		<1.7	U	<1.6	U	68.8		16.6		<1.8	U
C2-Chrysenes	<1.7	U	<1.7	U	<1.6	U	58.6		<1.8	U	<1.8	U
C3-Chrysenes	<1.7	U	<1.7	U	<1.6	U	34.9		<1.8	U	<1.8	U
C4-Chrysenes	<1.7	U	<1.7	U	<1.6	U	<1.7	U	<1.8	U	<1.8	U
Benzo(b)fluoranthene	26.4		9.5		10.0		43.2		45.7		<3	U
Benzo(k)fluoranthene	6.4		3.1		3.4		10.1		10.1		<3.1	U
Benzo(e)pyrene	14.7		5.3		6.5		30.3		24.1		<3.2	U
Benzo(a)pyrene	14.3		6.4		6.5		25.0		25.6		<1.9	U
Perylene	5.0		5.9		6.2		33.6		7.9		<0.8	U
Indeno(1,2,3-c,d)pyrene	9.3		4.7		3.6		18.9		19.7		<2.2	U
Dibenzo(a,h)anthracene	<1.7	U	<1.6	U	<1.5	U	3.0		4.4		<1.7	U
Benzo(g,h,i)perylene	11.0		5.0		4.6		19.3		18.7		<2.5	U
Total PAHs	378		130		132		2154		478		31.6	
Individual Isomers												
2-Methylnaphthalene	8.6		8.8		6.4		11.8		9.0		6.2	
1-Methylnaphthalene	7.1		5.7		5.1		9.4		6.8		4.6	
2,6-Dimethylnaphthalene	3.3		2.6		2.8		28.6		3.8		<1.8	U
1,6,7-Trimethylnaphthalene	0.9	J	<1	U	<1	U	9.9		<1.1	U	<1.1	U
1-Methylphenanthrene	2.8		1.1	J	1.7		23.7		3.6		<1.2	U
C29-Hopane	28.4		<10.3	U	<10	U	55.9		22.2		<10.9	U
18a-Oleanane	<10.6	U	<10.3	U	<10	U	<10.6	U	<10.9	U	<10.9	U
C30-Hopane	30.7		<10.3	U	<10	U	69.1		37.9		<10.9	U

Surrogate (Su)	Su Recovery (%)	Su Recovery (%)	Su Recovery (%)	Su Recovery (%)	Su Recovery (%)	Su Recovery (%)
Naphthalene-d8	96	92	95	93	93	93
Acenaphthene-d10	96	92	96	94	94	89
Phenanthrene-d10	99	99	99	93	97	98
Chrysene-d12	92	85	90	91	94	82
Perylene-d12	97	98	94	93	97	91

Qualifiers (Q): J=Below the MDL, U=Not detected, B=In procedural blank > 3x MDL, I=Interference, D=Diluted value, NA=Not Applicable, *=Outside QA limits, refer to narrative

Sample Name	ETX3888.D	ETX3889.D	ETX3890.D	ETX3891.D	ETX3892.D	ETX3893.D
Client Name	W-MAN-05	W-MAN-06	W-MAN-07	W-TN-01	W-TN-02	W-TN-03
Matrix	Water	Water	Water	Water	Water	Water
Collection Date	12/08/04	12/08/04	12/08/04	12/08/04	12/08/04	12/08/04
Received Date	12/10/04	12/10/04	12/10/04	12/10/04	12/10/04	12/10/04
Extraction Date	12/14/04	12/14/04	12/14/04	12/14/04	12/14/04	12/14/04
Extraction Batch	ENV 1064	ENV 1064	ENV 1064	ENV 1064	ENV 1064	ENV 1064
Date Acquired	12/18/04	12/18/04	12/18/04	12/19/04	12/19/04	12/19/04
Method	PAH-2002	PAH-2002	PAH-2002	PAH-2002	PAH-2002	PAH-2002
Sample Volume (L)	0.9	0.9	0.9	0.9	0.9	0.9
Dilution	NA	NA	NA	NA	NA	NA

Target Compounds	Su Corrected Conc. (ng/L)	Q	Su Corrected Conc. (ng/L)	Q	Su Corrected Conc. (ng/L)	Q	Su Corrected Conc. (ng/L)	Q	Su Corrected Conc. (ng/L)	Q	Su Corrected Conc. (ng/L)	Q
Naphthalene	8.8		7.0		7.3		11.5		12.2		9.2	
C1-Naphthalenes	9.6		8.4		6.2		13.2		13.2		7.1	
C2-Naphthalenes	9.2		9.4		7.3		20.1		14.1		10.1	
C3-Naphthalenes	10.7		10.9		<6.7	U	29.8		19.7		<6.7	U
C4-Naphthalenes	14.8		<6.7	U	<6.7	U	21.1		13.6		<6.7	U
Benzothiophene	2.6		2.6		2.5		4.0		3.1		3.9	
C1-Benzothiophenes	<3.5	U	<3.6	U	<3.5	U	<3.5	U	<3.5	U	<3.5	U
C2-Benzothiophenes	<3.5	U	<3.6	U	<3.5	U	<3.5	U	<3.5	U	<3.5	U
C3-Benzothiophenes	<3.5	U	<3.6	U	<3.5	U	<3.5	U	<3.5	U	<3.5	U
Biphenyl	1.7	J	1.9	J	2.2	J	2.9		2.6		2.9	
Acenaphthylene	3.0		2.5		2.3		3.9		3.4		2.9	
Acenaphthene	1.6		1.7		<1.4	U	3.8		2.7		2.4	
Dibenzofuran	2.0		1.7		1.9		3.4		2.8		2.3	
Fluorene	3.0		2.5		<0.7	U	5.2		4.6		2.6	
C1-Fluorenes	<1.3	U	<1.3	U	<1.3	U	9.9		<1.3	U	<1.3	U
C2-Fluorenes	<1.3	U	<1.3	U	<1.3	U	<1.3	U	<1.3	U	<1.3	U
C3-Fluorenes	<1.3	U	<1.3	U	<1.3	U	<1.3	U	<1.3	U	<1.3	U
Carbazole	<2	U	<2	U	2.1		3.0		1.4	J	<2	U
Anthracene	2.4		2.7		4.3		5.5		6.2		3.9	
Phenanthrene	6.3		6.2		11.7		10.2		12.1		7.6	
C1-Phenanthrene/Anthracenes	5.5		7.4		7.4		12.3		11.6		9.2	
C2-Phenanthrene/Anthracenes	9.4		10.1		10.1		17.0		14.8		12.7	
C3-Phenanthrene/Anthracenes	9.0		10.9		8.5		13		12.0		<3	U
C4-Phenanthrene/Anthracenes	<3	U	<3	U	<3	U	12.1		<3	U	<3	U
Dibenzothiophene	1.3		1.4		1.9		3.1		2.3		2.4	
C1-Dibenzothiophenes	<1.9	U	4.1		<1.9	U	6.2		5.2		2.5	
C2-Dibenzothiophenes	<1.9	U	7.4		<1.9	U	8.3		7.1		<1.9	U
C3-Dibenzothiophenes	<1.9	U	9.8		<1.9	U	11.9		<1.9	U	<1.9	U
Fluoranthene	11.8		12.6		22.3		23.5		25.3		14.2	
Pyrene	13.5		14.4		22.1		28.5		30.4		19.7	
C1-Fluoranthenes/Pyrenes	9.4		8.3		12.8		17.3		14.4		12.8	
C2-Fluoranthenes/Pyrenes	<1.5	U	6.0		8.8		8.3		8.5		10.4	
C3-Fluoranthenes/Pyrenes	<1.5	U	<1.5	U	<1.5	U	<1.5	U	<1.5	U	<1.5	U
Naphthobenzothiophene	<1.2	U	<1.2	U	6.7		8.3		10.2		4.1	
C1-Naphthobenzothiophenes	<2.5	U	<2.5	U	4.5		9.3		5.9		8.4	
C2-Naphthobenzothiophenes	<2.5	U	<2.5	U	<2.5	U	<2.5	U	8.0		<2.5	U
C3-Naphthobenzothiophenes	<2.5	U	<2.5	U	<2.5	U	<2.5	U	<2.5	U	<2.5	U
Benz(a)anthracene	6.5		8.4		16.1		12.7		13.7		9.2	
Chrysene	7.3		7.9		8.6		15.9		14.6		10.8	
C1-Chrysenes	<1.7	U	7.7		8.1		10.7		9.4		10.0	
C2-Chrysenes	<1.7	U	<1.7	U	6.8		<1.7	U	<1.7	U	6.5	
C3-Chrysenes	<1.7	U	<1.7	U	<1.7	U	<1.7	U	<1.7	U	<1.7	U
C4-Chrysenes	<1.7	U	<1.7	U	<1.7	U	<1.7	U	<1.7	U	<1.7	U
Benzo(b)fluoranthene	9.9		9.9		16.4		22.3		23.6		15.3	
Benzo(k)fluoranthene	3.5		3.5		5.3		5.0		5.8		4.2	
Benzo(e)pyrene	6.6		7.1		10.7		10.5		11.5		10.2	
Benzo(a)pyrene	6.8		6.8		11.0		10.8		12.4		8.9	
Perylene	2.2		2.3		3.4		5.0		4.9		3.0	
Indeno(1,2,3-c,d)pyrene	4.5		5.1		6.9		8.6		9.5		7.6	
Dibenzo(a,h)anthracene	<1.6	U	<1.7	U	1.8		<1.6	U	2.1		<1.6	U
Benzo(g,h,i)perylene	5.3		4.9		6.5		8.4		8.3		6.8	
Total PAHs	188		214		255		437		383		244	
Individual Alkyl Isomers and Hopanes												
2-Methylnaphthalene	8.8		6.9		5.2		10.6		12.2		6.7	
1-Methylnaphthalene	6.0		6.2		4.4		9.9		8.2		4.3	
2,6-Dimethylnaphthalene	3.5		3.6		2.4		5.6		5.2		3.1	
1,6,7-Trimethylnaphthalene	0.7	J	0.7	J	<1.1	U	3.8		1.4		<1.1	U
1-Methylphenanthrene	2.0		2.7		2.0		3.7		3.4		3.3	
C29-Hopane	<10.5	U	<10.6	U	21.9		<10.5	U	<10.5	U	32.2	
18a-Oleanane	<10.5	U	<10.6	U	<10.5	U	<10.5	U	<10.5	U	<10.5	U
C30-Hopane	<10.5	U	<10.6	U	20.9		<10.5	U	<10.5	U	19.8	

Surrogate (Su)	Su Recovery (%)	Su Recovery (%)	Su Recovery (%)	Su Recovery (%)	Su Recovery (%)	Su Recovery (%)
Naphthalene-d8	81	85	88	77	88	86
Acenaphthene-d10	83	91	97	85	98	90
Phenanthrene-d10	90	89	91	82	85	86
Chrysene-d12	89	89	94	100	105	92
Perylene-d12	86	89	94	78	90	87

Qualifiers (Q): J=Below the MDL, U=Not detected, B=In procedural blank > 3x MDL, I=Interference, D=Diluted value, NA=Not Applicable, *=Outside QA limits, refer to narrative

Sample Name	ETX3894.D	ETX3908.D	ETX3909.D	ETX3913.D	ETX3914.D	ETX3916.D
Client Name	W-TN-04	WMH #1-5	AG SAMPLE BL	WCR #2S	WCR #20 (1 of 2)	WCR #1D (1 of 2)
Matrix	Water	Water	Water	Water	Water	Water
Collection Date	12/08/04	12/08/04	12/08/04	12/08/04	12/08/04	12/08/04
Received Date	12/10/04	12/10/04	12/10/04	12/10/04	12/10/04	12/10/04
Extraction Date	12/14/04	12/14/04	12/14/04	12/14/04	12/14/04	12/14/04
Extraction Batch	ENV 1064	ENV 1064	ENV 1064	ENV 1064	ENV 1064	ENV 1064
Date Acquired	12/19/04	12/19/04	12/19/04	12/19/04	12/19/04	12/19/04
Method	PAH-2002	PAH-2002	PAH-2002	PAH-2002	PAH-2002	PAH-2002
Sample Volume (L)	0.9	0.9	1.0	0.9	0.9	0.9
Dilution	NA	NA	NA	NA	NA	NA

Target Compounds	Su Corrected Conc. (ng/L)	Q	Su Corrected Conc. (ng/L)	Q	Su Corrected Conc. (ng/L)	Q	Su Corrected Conc. (ng/L)	Q	Su Corrected Conc. (ng/L)	Q	Su Corrected Conc. (ng/L)	Q
Naphthalene	8.7		32.6		20.5		6.7		9.5		5.3	
C1-Naphthalenes	7.2		140		4.8		5.0		7.2		5.7	
C2-Naphthalenes	8.9		792		<6.3	U	<6.7	U	10.7		13.2	
C3-Naphthalenes	11.4		1340		<6.3	U	<6.7	U	<6.7	U	29.8	
C4-Naphthalenes	14.9		1170		<6.3	U	<6.7	U	<6.7	U	18.9	
Benzothiophene	2.2		11.2		<1.7	U	2.2		2.5		1.7	J
C1-Benzothiophenes	<3.6	U	44.9		<3.3	U	<3.6	U	<3.5	U	<3.6	U
C2-Benzothiophenes	<3.6	U	185		<3.3	U	<3.6	U	<3.5	U	<3.6	U
C3-Benzothiophenes	<3.6	U	325		<3.3	U	<3.6	U	<3.5	U	<3.6	U
Biphenyl	1.9	J	20.3		1.3	J	2.1	J	2.4		2.2	J
Acenaphthylene	2.2		<1.2	U	<1.1	U	3.2		10.6		5.9	
Acenaphthene	1.7		44.1		<1.4	U	<1.4	U	<1.4	U	2.5	
Dibenzofuran	2.0		34.1		<1.2	U	1.2	J	4.5		2.8	
Fluorene	3.0		112		<0.6	U	2.0		6.2		4.6	
C1-Fluorenes	<1.3	U	354		<1.2	U	<1.3	U	<1.3	U	9.6	
C2-Fluorenes	<1.3	U	888		<1.2	U	<1.3	U	<1.3	U	<1.3	U
C3-Fluorenes	<1.3	U	939		<1.2	U	<1.3	U	<1.3	U	<1.3	U
Carbazole	<2	U	43.0		<1.9	U	1.2	J	1.8	J	1.9	J
Anthracene	4.4		<0.9	U	<0.8	U	5.4		12.4		9.3	
Phenanthrene	8.9		378		<1.4	U	10.8		30.8		22.1	
C1-Phenanthrene/Anthracenes	9.6		1010		<2.8	U	6.5		16.6		20.7	
C2-Phenanthrene/Anthracenes	14.2		1740		<2.8	U	<3	U	27.4		34.1	
C3-Phenanthrene/Anthracenes	12.5		1600		<2.8	U	<3	U	26.9		29.2	
C4-Phenanthrene/Anthracenes	<3	U	1160		<2.8	U	<3	U	18.1		16.5	
Dibenzothiophene	1.6		146		<0.9	U	1.9		4.2		3.9	
C1-Dibenzothiophenes	3.9		743		<1.8	U	<1.9	U	6.3		10.5	
C2-Dibenzothiophenes	9.7		1790		<1.8	U	<1.9	U	16.4		26.6	
C3-Dibenzothiophenes	<1.9	U	1950		<1.8	U	<1.9	U	25.3		31.2	
Fluoranthene	17.6		79.9		<0.7	U	18.7		55.6		38.1	
Pyrene	20.4		135		<1	U	21.4		58.1		44.1	
C1-Fluoranthenes/Pyrenes	12.5		452		<1.4	U	14.2		36.7		27.0	
C2-Fluoranthenes/Pyrenes	9.2		661		<1.4	U	7.2		21.3		23.2	
C3-Fluoranthenes/Pyrenes	<1.5	U	620		<1.4	U	<1.5	U	14.7		12.7	
Naphthobenzothiophene	5.1		343		<1.2	U	4.0		21.3		16.2	
C1-Naphthobenzothiophenes	9.7		1130		<2.3	U	<2.5	U	17.0		25.2	
C2-Naphthobenzothiophenes	11.0		2090		<2.3	U	<2.5	U	28.6		31.5	
C3-Naphthobenzothiophenes	<2.5	U	1340		<2.3	U	<2.5	U	24.2		27.9	
Benz(a)anthracene	10.1		90.3		<0.9	U	13.9		28.1		21.9	
Chrysene	10.3		267		<0.8	U	5.7		33.5		26.1	
C1-Chrysenes	9.8		734		<1.6	U	<1.7	U	24.3		21.9	
C2-Chrysenes	<1.7	U	921		<1.6	U	<1.7	U	19.4		16.7	
C3-Chrysenes	<1.7	U	314		<1.6	U	<1.7	U	<1.7	U	<1.7	U
C4-Chrysenes	<1.7	U	113.0		<1.6	U	<1.7	U	<1.7	U	<1.7	U
Benzo(b)fluoranthene	15.9		73.4		<2.8	U	13.0		48.6		37.0	
Benzo(k)fluoranthene	5.2		15.4		<2.9	U	4.2		15.4		11.3	
Benzo(e)pyrene	7.7		91.1		<3	U	7.7		26.6		18.9	
Benzo(a)pyrene	9.6		46.6		<1.8	U	8.9		29.0		19.2	
Perylene	3.5		56.6		<0.8	U	6.2		20.0		14.1	
Indeno(1,2,3-c,d)pyrene	5.8		23.2		<2.1	U	6.2		20.8		17.0	
Dibenzo(a,h)anthracene	<1.7	U	11.2		<1.5	U	<1.7	U	4.7		3.3	
Benzo(g,h,i)perylene	6.6		34.5		<2.3	U	7.0		20.8		14.3	
Total PAHs	299		26634		26.6		187		809		776	
Individual Alkyl Isomers and Hopanes												
2-Methylnaphthalene	6.0		96.7		5.0		3.6		6.2		5.4	
1-Methylnaphthalene	5.2		123		2.3		4.2		5.0		3.4	
2,6-Dimethylnaphthalene	2.8		388		<1.7	U	<1.8	U	4.0		4.2	
1,6,7-Trimethylnaphthalene	0.7	J	205		<1	U	<1.1	U	<1.1	U	1.3	
1-Methylphenanthrene	3.1		323		<1.1	U	2.1		6.8		6.5	
C29-Hopane	26.1		369		<10	U	<10.6	U	64.9		93.2	
18a-Oleanane	<10.6	U	66.2		<10	U	<10.6	U	<10.5	U	22.1	
C30-Hopane	26.1		412		<10	U	<10.6	U	93.4		126	

Surrogate (Su)	Su Recovery (%)	Su Recovery (%)	Su Recovery (%)	Su Recovery (%)	Su Recovery (%)	Su Recovery (%)
Naphthalene-d8	87	71	85	87	93	90
Acenaphthene-d10	90	87	90	90	89	88
Phenanthrene-d10	86	85	86	89	81	83
Chrysene-d12	98	82	95	93	94	98
Perylene-d12	86	81	99	83	83	84

Qualifiers (Q): J=Below the MDL, U=Not detected, B=In procedural blank > 3x MDL, I=Interference, D=Diluted value, NA=Not Applicable, *=Outside QA limits, refer to narrative

Sample Name	ETX3918.D	ETX3919.D	ETX3920.D	ETX3922.D	ETX3923.D	ETX3924.D
Client Name	WCR #3S	WCR #1S	WCD #2D (1 of 2)	WCD #1S	WCD #2S	WCR #3S
Matrix	Water	Water	Water	Water	Water	Water
Collection Date	12/08/04	12/08/04	12/08/04	12/08/04	12/08/04	12/08/04
Received Date	12/10/04	12/10/04	12/10/04	12/10/04	12/10/04	12/10/04
Extraction Date	12/14/04	12/14/04	12/14/04	12/14/04	12/14/04	12/14/04
Extraction Batch	ENV 1064	ENV 1064	ENV 1064	ENV 1064	ENV 1064	ENV 1064
Date Acquired	12/19/04	12/19/04	12/19/04	12/20/04	12/20/04	12/20/04
Method	PAH-2002	PAH-2002	PAH-2002	PAH-2002	PAH-2002	PAH-2002
Sample Volume (L)	0.9	0.9	0.9	0.9	0.9	0.9
Dilution	NA	NA	NA	NA	NA	NA

Target Compounds	Su Corrected Conc. (ng/L)	Q	Su Corrected Conc. (ng/L)	Q	Su Corrected Conc. (ng/L)	Q	Su Corrected Conc. (ng/L)	Q	Su Corrected Conc. (ng/L)	Q	Su Corrected Conc. (ng/L)	Q
Naphthalene	5.6		7.2		8.1		6.6		6.5		9.6	
C1-Naphthalenes	5.2		5.0		4.6		4.7		5.1		5.8	
C2-Naphthalenes	<6.7	U	<6.7	U	<6.8	U	6.6	J	<6.7	U	<6.7	U
C3-Naphthalenes	<6.7	U	<6.7	U	<6.8	U	<6.7	U	<6.7	U	<6.7	U
C4-Naphthalenes	<6.7	U	<6.7	U	<6.8	U	<6.7	U	<6.7	U	<6.7	U
Benzothiophene	1.1	J	2.3		2.1		1.9		<1.8	U	2.5	
C1-Benzothiophenes	<3.6	U	<3.6	U	<3.6	U	<3.6	U	<3.6	U	<3.5	U
C2-Benzothiophenes	<3.6	U	<3.6	U	<3.6	U	<3.6	U	<3.6	U	<3.5	U
C3-Benzothiophenes	<3.6	U	<3.6	U	<3.6	U	<3.6	U	<3.6	U	<3.5	U
Biphenyl	2.2	J	1.7	J	2.5		1.9	J	1.8	J	<2.3	U
Acenaphthylene	2.4		2.4		2.9		2.6		2.5		<1.1	U
Acenaphthene	<1.4	U	<1.4	U	<1.5	U	<1.4	U	<1.4	U	<1.4	U
Dibenzofuran	1.5		1.8		1.8		1.6		1.5		1.7	
Fluorene	2.6		1.2		3.0		1.9		2.4		2.2	
C1-Fluorenes	<1.3	U	<1.3	U	<1.3	U	<1.3	U	<1.3	U	<1.3	U
C2-Fluorenes	<1.3	U	<1.3	U	<1.3	U	<1.3	U	<1.3	U	<1.3	U
C3-Fluorenes	<1.3	U	<1.3	U	<1.3	U	<1.3	U	<1.3	U	<1.3	U
Carbazole	1.1	J	<2	U	1.2	J	<2	U	<2	U	1.2	J
Anthracene	4.4		4.1		5.6		3.9		3.4		4.0	
Phenanthrene	7.3		7.1		10.4		9.4		6.8		8.0	
C1-Phenanthrene/Anthracenes	6.0		3.9		8.0		6.5		4.8		5.9	
C2-Phenanthrene/Anthracenes	8.2		9.2		14.3		<3	U	<3	U	10.1	
C3-Phenanthrene/Anthracenes	<3	U	8.1		14.5		<3	U	<3	U	9.1	
C4-Phenanthrene/Anthracenes	<3	U	<3	U	7.4		<3	U	<3	U	<3	U
Dibenzothiophene	2.6		2.2		2.8		2.0		1.8		3.1	
C1-Dibenzothiophenes	2.8		3.2		4.7		1.9		<1.9	U	3.4	
C2-Dibenzothiophenes	<1.9	U	<1.9	U	<1.9	U	<1.9	U	<1.9	U	<1.9	U
C3-Dibenzothiophenes	<1.9	U	<1.9	U	<1.9	U	<1.9	U	<1.9	U	<1.9	U
Fluoranthene	12.4		11.8		18.8		16.7		12.4		17.6	
Pyrene	15.5		16.1		22.8		20.2		14.8		21.0	
C1-Fluoranthenes/Pyrenes	10.0		11.7		14.7		12.8		9.6		12.2	
C2-Fluoranthenes/Pyrenes	5.9		7.4		11.5		7.0		7.1		4.9	
C3-Fluoranthenes/Pyrenes	<1.5	U	<1.5	U	<1.5	U	<1.5	U	<1.5	U	<1.5	U
Naphthobenzothiophene	4.9		3.7		6.6		4.1		2.8		4.3	
C1-Naphthobenzothiophenes	<2.5	U	<2.5	U	11.3		<2.5	U	<2.5	U	<2.5	U
C2-Naphthobenzothiophenes	<2.5	U	<2.5	U	11.7		<2.5	U	<2.5	U	<2.5	U
C3-Naphthobenzothiophenes	<2.5	U	<2.5	U	<2.5	U	<2.5	U	<2.5	U	<2.5	U
Benz(a)anthracene	6.4		6.3		10.2		11.0		7.9		9.1	
Chrysene	8.0		8.2		12.6		10.2		8.0		11.9	
C1-Chrysenes	<1.7	U	8.4		12.2		7.0		<1.7	U	<1.7	U
C2-Chrysenes	<1.7	U	<1.7	U	<1.8	U	5.0		<1.7	U	<1.7	U
C3-Chrysenes	<1.7	U	<1.7	U	<1.8	U	<1.7	U	<1.7	U	<1.7	U
C4-Chrysenes	<1.7	U	<1.7	U	<1.8	U	<1.7	U	<1.7	U	<1.7	U
Benzo(b)fluoranthene	11.7		13.8		18.2		19.2		13.6		17.6	
Benzo(k)fluoranthene	3.5		4.1		6.3		7.3		5.0		5.2	
Benzo(e)pyrene	6.5		6.8		10.5		11.0		8.6		10.8	
Benzo(a)pyrene	6.4		7.6		10.7		11.0		8.3		9.7	
Perylene	6.8		5.3		9.2		7.7		6.9		4.6	
Indeno(1,2,3-c,d)pyrene	4.3		4.5		7.2		8.7		6.3		6.7	
Dibenzo(a,h)anthracene	<1.7	U	<1.7	U	<1.7	U	<1.7	U	<1.7	U	<1.6	U
Benzo(g,h,i)perylene	5.0		4.8		8.3		9.3		5.8		8.2	
Total PAHs	160		180		297		220		154		210	
Individual Isomers												
2-Methylnaphthalene	3.7		4.0		3.3		4.1		4.0		4.4	
1-Methylnaphthalene	4.4		3.7		4.0		3.3		3.9		4.6	
2,6-Dimethylnaphthalene	<1.8	U	<1.8	U	<1.8	U	2.6		<1.8	U	<1.8	U
1,6,7-Trimethylnaphthalene	<1.1	U	<1.1	U	<1.1	U	<1.1	U	<1.1	U	<1.1	U
1-Methylphenanthrene	1.7		1.5		3.3		2.1		1.6		1.7	
C29-Hopane	<10.6	U	<10.6	U	46.4		12.5		<10.6	U	<10.5	U
18a-Oleanane	<10.6	U	<10.6	U	<10.8	U	<10.6	U	<10.6	U	<10.5	U
C30-Hopane	<10.6	U	<10.6	U	54.3		17.3		<10.6	U	<10.5	U

Surrogate (Su)	Su Recovery (%)	Su Recovery (%)	Su Recovery (%)	Su Recovery (%)	Su Recovery (%)	Su Recovery (%)
Naphthalene-d8	91	83	94	92	92	81
Acenaphthene-d10	93	90	96	94	96	90
Phenanthrene-d10	85	85	84	85	94	97
Chrysene-d12	100	96	93	83	84	85
Perylene-d12	89	93	83	88	91	97

Qualifiers (Q): J=Below the MDL, U=Not detected, B=In procedural blank > 3x MDL, I=Interference, D=Diluted value, NA=Not Applicable, *=Outside QA limits, refer to narrative

Sample Name	ETX3927.D	ETX3928.D	ETX3929.D	ETX3930.D	ETX3931.D	ETX3932.D
Client Name	WMH #2D	WMH #3S	WSUB-TN-01 (1 of 2)	WSUB-TN-01 (2 of 2)	WSUB-TN-02 (1 of 2)	WSUB-TN-02 (2 of 2)
Matrix	Water	Water	Water	Water	Water	Water
Collection Date	12/08/04	12/08/04	12/08/04	12/08/04	12/08/04	12/08/04
Received Date	12/10/04	12/10/04	12/10/04	12/10/04	12/10/04	12/10/04
Extraction Date	12/14/04	12/14/04	12/14/04	12/14/04	12/14/04	12/14/04
Extraction Batch	ENV 1065	ENV 1065	ENV 1065	ENV 1065	ENV 1065	ENV 1065
Date Acquired	12/24/04	12/24/04	12/24/04	12/24/04	12/24/04	12/24/04
Method	PAH-2002	PAH-2002	PAH-2002	PAH-2002	PAH-2002	PAH-2002
Sample Volume (L)	0.9	0.9	0.9	1.0	0.9	1.0
Dilution	NA	NA	NA	NA	NA	NA

Target Compounds	Su Corrected Conc. (ng/L)	Q	Su Corrected Conc. (ng/L)	Q	Su Corrected Conc. (ng/L)	Q	Su Corrected Conc. (ng/L)	Q	Su Corrected Conc. (ng/L)	Q	Su Corrected Conc. (ng/L)	Q
Naphthalene	5.1		4.8		12.0		13.2		8.2		3.1	J
C1-Naphthalenes	5.8		4.3		13.1		15.5		6.7		3.1	J
C2-Naphthalenes	7.3		7.7		34.2		17.4		8.7		<8.2	U
C3-Naphthalenes	<6.9	U	<7	U	94.7		19.9		<6.8	U	<8.2	U
C4-Naphthalenes	<6.9	U	<7	U	89.4		22.1		<6.8	U	<8.2	U
Benzothiophene	1.3	J	1.2	J	1.9		2.5		2.7		1.4	J
C1-Benzothiophenes	<3.6	U	<3.7	U	4.5		<3.2	U	<3.6	U	<3.3	U
C2-Benzothiophenes	<3.6	U	<3.7	U	<3.6	U	<3.2	U	<3.6	U	<3.3	U
C3-Benzothiophenes	<3.6	U	<3.7	U	<3.6	U	<3.2	U	<3.6	U	<3.3	U
Biphenyl	1.7	J	1.4	J	1.6	J	2.2		1.2	J	0.7	J
Acenaphthylene	3.8		0.8	J	2.8		0.8	J	1.6		<1.1	U
Acenaphthene	1.0	J	0.5	J	3.1		2.6		1.6		0.7	J
Dibenzofuran	1.7		1.1	J	3.5		2.3		1.5		0.6	J
Fluorene	2.3		1.7		5.1		2.9		2.3		1.2	
C1-Fluorenes	<1.4	U	<1.4	U	20.5		5.5		4.6		<1.2	U
C2-Fluorenes	<1.4	U	<1.4	U	134		<1.2	U	<1.3	U	<1.2	U
C3-Fluorenes	<1.4	U	<1.4	U	89.4		<1.2	U	<1.3	U	<1.2	U
Carbazole	1.0	J	1.5	J	<2.1	U	<1.8	U	<2	U	<1.9	U
Anthracene	3.7		2.2		5.0		0.9		3.0		0.9	
Phenanthrene	15.6		7.9		36.2		4.9		9.7		1.8	
C1-Phenanthrene/Anthracenes	14.6		4.0		65.0		5.0		7.6		1.5	J
C2-Phenanthrene/Anthracenes	26.5		9.3		131		7.4		14.9		<2.8	U
C3-Phenanthrene/Anthracenes	29.1		7.6		140		<2.7	U	14.7		<2.8	U
C4-Phenanthrene/Anthracenes	15.9		<3.1	U	97.2		<2.7	U	9.5		<2.8	U
Dibenzothiophene	2.1		1.4		6.5		1.4		1.5		0.8	J
C1-Dibenzothiophenes	5.3		2.3		41.7		3.1		3.4		2.0	
C2-Dibenzothiophenes	18.9		<1.9	U	122		5.4		9.5		<1.7	U
C3-Dibenzothiophenes	25.3		<1.9	U	163		5.0		15.5		<1.7	U
Fluoranthene	40.3		13.7		54.3		7.8		20.1		2.3	
Pyrene	42.4		16.7		53.3		11.3		23.0		5.2	
C1-Fluoranthenes/Pyrenes	27.8		10.2		57.9		5.6		14.7		4.2	
C2-Fluoranthenes/Pyrenes	16.5		6.7		56.2		<1.4	U	10.2		<1.4	U
C3-Fluoranthenes/Pyrenes	6.7		2.8		35.0		<1.4	U	8.5		<1.4	U
Naphthobenzothiophene	11.6		2.9		23.5		2.0		4.2		<1.2	U
C1-Naphthobenzothiophenes	14.4		4.2		61.7		<2.2	U	6.1		<2.3	U
C2-Naphthobenzothiophenes	21.8		<2.6	U	82.3		<2.2	U	7.3		<2.3	U
C3-Naphthobenzothiophenes	16.3		<2.6	U	80.8		<2.2	U	7.3		<2.3	U
Benz(a)anthracene	17.8		5.5		21.7		2.8		8.1		0.8	J
Chrysene	25.0		7.9		32.2		4.2		10.4		1.6	
C1-Chrysenes	12.8		3.7		32.8		<1.6	U	7.3		<1.6	U
C2-Chrysenes	8.9		<1.8	U	34.3		<1.6	U	5.2		<1.6	U
C3-Chrysenes	<1.8	U	<1.8	U	18.8		<1.6	U	<1.8	U	<1.6	U
C4-Chrysenes	<1.8	U	<1.8	U	<1.8	U	<1.6	U	<1.8	U	<1.6	U
Benzo(b)fluoranthene	32.9		10.8		32.2		6.4		15.8		1.4	J
Benzo(k)fluoranthene	9.5		2.9	J	10.7		2.3	J	4.9		0.4	J
Benzo(e)pyrene	18.2		6.5		19.7		4.0		9.1		1.6	J
Benzo(a)pyrene	21.0		5.8		20.9		3.7		9.5		1.2	J
Perylene	6.7		2.5		7.6		1.0		2.7		<0.8	U
Indeno(1,2,3-c,d)pyrene	16.4		4.1		15.2		2.6		6.8		0.6	J
Dibenzo(a,h)anthracene	1.7		0.8	J	2.9		0.8	J	0.9	J	<1.5	U
Benzo(g,h,i)perylene	13.7		4.3		12.0		2.6		6.2		0.7	J
Total PAHs	570		172		2083		197		317		37.8	
Individual Alkyl Isomers and Hopanes												
2-Methylnaphthalene	4.9		2.9		8.6		11.3		4.8		2.2	J
1-Methylnaphthalene	3.1		3.2		9.7		10.3		4.5		2.1	
2,6-Dimethylnaphthalene	1.9		1.3	J	10.9		3.5		2.1		<1.7	U
1,6,7-Trimethylnaphthalene	<1.1	U	<1.1	U	8.4		1.2		<1.1	U	<1	U
1-Methylphenanthrene	3.6		1.2	J	15.6		1.3		2.4		0.5	J
C29-Hopane	51.2		14.0		73.0		<9.6	U	42.0		<9.9	U
18a-Oleanane	<10.9	U	<11	U	<10.9	U	<9.6	U	<10.6	U	<9.9	U
C30-Hopane	64.3		15.0		80.6		<9.6	U	38.7		<9.9	U

Surrogate (Su)	Su Recovery (%)	Su Recovery (%)	Su Recovery (%)	Su Recovery (%)	Su Recovery (%)	Su Recovery (%)
Naphthalene-d8	79	74	78	58	69	81
Acenaphthene-d10	82	85	89	56	76	84
Phenanthrene-d10	69	75	72	63	66	76
Chrysene-d12	86	80	92	61	76	68
Perylene-d12	84	87	90	81	87	90

Qualifiers (Q): J=Below the MDL, U=Not detected, B=In procedural blank > 3x MDL, I=Interference, D=Diluted value, NA=Not Applicable, *=Outside QA limits, refer to narrative

Polaris Applied Sciences, Inc.
TV Athos I Oil Spill Project
Polycyclic Aromatic Hydrocarbon Data
Client Submitted Samples

Sample Name	ETX3921.D		ETX3926.D	
Client Name	WCD #2D (2 of 2)		WMH #1S	
Matrix	Water		Water	
Collection Date	12/08/04		12/08/04	
Received Date	12/10/04		12/10/04	
Extraction Date	12/14/04		12/14/04	
Extraction Batch	ENV 1065		ENV 1064	
Date Acquired	12/23/04		12/20/04	
Method	PAH-2002		PAH-2002	
Sample Volume (L)	1.0		0.9	
Dilution	NA		NA	
Target Compounds	Su Corrected Conc. (ng/L)	Q	Su Corrected Conc. (ng/L)	Q
Naphthalene	3.5		8.7	
C1-Naphthalenes	3.6	J	7.3	
C2-Naphthalenes	<6.1	U	<7	U
C3-Naphthalenes	<6.1	U	<7	U
C4-Naphthalenes	<6.1	U	<7	U
Benzothiophene	0.8	J	3.8	
C1-Benzothiophenes	<3.2	U	<3.7	U
C2-Benzothiophenes	<3.2	U	<3.7	U
C3-Benzothiophenes	<3.2	U	<3.7	U
Biphenyl	1.8	J	3.2	
Acenaphthylene	<1	U	3.1	
Acenaphthene	<1.3	U	<1.5	U
Dibenzofuran	0.8	J	2.8	
Fluorene	0.7		3.8	
C1-Fluorenes	<1.2	U	<1.4	U
C2-Fluorenes	<1.2	U	<1.4	U
C3-Fluorenes	<1.2	U	<1.4	U
Carbazole	<1.8	U	10.9	
Anthracene	<0.8	U	3.4	
Phenanthrene	2.4		9.2	
C1-Phenanthrene/Anthracenes	1.3	J	12.5	
C2-Phenanthrene/Anthracenes	<2.7	U	17.9	
C3-Phenanthrene/Anthracenes	<2.7	U	15.3	
C4-Phenanthrene/Anthracenes	<2.7	U	<3.1	U
Dibenzothiophene	0.9		3.0	
C1-Dibenzothiophenes	2.1		6.2	
C2-Dibenzothiophenes	<1.7	U	17.7	
C3-Dibenzothiophenes	<1.7	U	17.2	
Fluoranthene	2.3		16.6	
Pyrene	5.4		22.5	
C1-Fluoranthenes/Pyrenes	3.3		12.7	
C2-Fluoranthenes/Pyrenes	<1.4	U	8.0	
C3-Fluoranthenes/Pyrenes	<1.4	U	<1.6	U
Naphthobenzothiophene	<1.1	U	<1.3	U
C1-Naphthobenzothiophenes	<2.3	U	<2.6	U
C2-Naphthobenzothiophenes	<2.3	U	<2.6	U
C3-Naphthobenzothiophenes	<2.3	U	<2.6	U
Benz(a)anthracene	1.2		9.1	
Chrysene	1.4		10.9	
C1-Chrysenes	<1.6	U	10.6	
C2-Chrysenes	<1.6	U	8.2	
C3-Chrysenes	<1.6	U	<1.8	U
C4-Chrysenes	<1.6	U	<1.8	U
Benzo(b)fluoranthene	2.1	J	13.5	
Benzo(k)fluoranthene	0.9	J	4.3	
Benzo(e)pyrene	1.2	J	8.0	
Benzo(a)pyrene	0.9	J	6.9	
Perylene	0.5	J	3.6	
Indeno(1,2,3-c,d)pyrene	0.7	J	6.6	
Dibenzo(a,h)anthracene	<1.5	U	<1.7	U
Benzo(g,h,i)perylene	0.6	J	5.1	
Total PAHs	38.4		293	
Individual Alkyl Isomers and Hopanes				
2-Methylnaphthalene	2.5		6.3	
1-Methylnaphthalene	2.5		5.1	
2,6-Dimethylnaphthalene	<1.6	U	<1.9	U
1,6,7-Trimethylnaphthalene	<1	U	<1.1	U
1-Methylphenanthrene	0.4	J	2.9	
C29-Hopane	<9.7	U	<11	U
18a-Oleanane	<9.7	U	<11	U
C30-Hopane	<9.7	U	<11	U
Surrogate (Su)	Su Recovery (%)		Su Recovery (%)	
Naphthalene-d8	76		57	
Acenaphthene-d10	85		64	
Phenanthrene-d10	82		64	
Chrysene-d12	75		64	
Perylene-d12	87		60	

Qualifiers (Q): J=Below the MDL, U=Not detected, B=In procedural blank > 3x MDL, I=Interference, D=Diluted value, NA=Not Applicable, *=Outside QA limits, refer to narrative

Sample Name	ETX3915.D		ETX3917.D	
Client Name	WCR #2D (2 of 2)		CR #1D (2 of 2)	
Matrix	Water		Water	
Collection Date	12/08/04		12/08/04	
Received Date	12/10/04		12/10/04	
Extraction Date	12/14/04		12/14/04	
Extraction Batch	ENV 1065		ENV 1065	
Date Acquired	12/23/04		12/23/04	
Method	PAH-2002		PAH-2002	
Sample Volume (L)	1.0		1.0	
Dilution	NA		NA	
Target Compounds	Su Corrected Conc. (ng/L)	Q	Su Corrected Conc. (ng/L)	Q
Naphthalene	3.3		4.0	
C1-Naphthalenes	2.9	J	5.1	
C2-Naphthalenes	<6.1	U	6.9	
C3-Naphthalenes	<6.1	U	<6.1	U
C4-Naphthalenes	<6.1	U	<6.1	U
Benzothiophene	1.1	J	1.2	J
C1-Benzothiophenes	<3.2	U	<3.2	U
C2-Benzothiophenes	<3.2	U	<3.2	U
C3-Benzothiophenes	<3.2	U	<3.2	U
Biphenyl	1.3	J	1.6	J
Acenaphthylene	<1	U	0.9	J
Acenaphthene	<1.3	U	<1.3	U
Dibenzofuran	0.6	J	1.1	J
Fluorene	0.9		1.0	
C1-Fluorenes	<1.2	U	<1.2	U
C2-Fluorenes	<1.2	U	<1.2	U
C3-Fluorenes	<1.2	U	<1.2	U
Carbazole	<1.8	U	0.8	J
Anthracene	<0.8	U	1.4	
Phenanthrene	1.5		4.1	
C1-Phenanthrene/Anthracenes	<2.7	U	2.8	
C2-Phenanthrene/Anthracenes	<2.7	U	5.5	
C3-Phenanthrene/Anthracenes	<2.7	U	6.3	
C4-Phenanthrene/Anthracenes	<2.7	U	<2.7	U
Dibenzothiophene	<0.8	U	<0.9	U
C1-Dibenzothiophenes	<1.7	U	<1.7	U
C2-Dibenzothiophenes	<1.7	U	<1.7	U
C3-Dibenzothiophenes	<1.7	U	<1.7	U
Fluoranthene	1.8		8.4	
Pyrene	5.5		11.6	
C1-Fluoranthenes/Pyrenes	<1.4	U	6.0	
C2-Fluoranthenes/Pyrenes	<1.4	U	<1.4	U
C3-Fluoranthenes/Pyrenes	<1.4	U	<1.4	U
Naphthobenzothiophene	<1.1	U	2.0	
C1-Naphthobenzothiophenes	<2.2	U	<2.3	U
C2-Naphthobenzothiophenes	<2.2	U	<2.3	U
C3-Naphthobenzothiophenes	<2.2	U	<2.3	U
Benz(a)anthracene	<0.9	U	2.9	
Chrysene	<0.8	U	4.0	
C1-Chrysenes	<1.6	U	2.3	
C2-Chrysenes	<1.6	U	<1.6	U
C3-Chrysenes	<1.6	U	<1.6	U
C4-Chrysenes	<1.6	U	<1.6	U
Benzo(b)fluoranthene	1.3	J	5.2	
Benzo(k)fluoranthene	0.6	J	2.2	J
Benzo(e)pyrene	0.9	J	3.8	
Benzo(a)pyrene	1.1	J	3.6	
Perylene	0.7	J	1.6	
Indeno(1,2,3-c,d)pyrene	0.8	J	2.1	
Dibenzo(a,h)anthracene	<1.5	U	<1.5	U
Benzo(g,h,i)perylene	0.8	J	1.9	J
Total PAHs	25.1		100.3	
Individual Alkyl Isomers and Hopanes				
2-Methylnaphthalene	2.3		3.2	
1-Methylnaphthalene	1.7		3.8	
2,6-Dimethylnaphthalene	<1.6	U	1.2	J
1,6,7-Trimethylnaphthalene	<1	U	<1	U
1-Methylphenanthrene	<1.1	U	0.6	J
C29-Hopane	<9.6	U	<9.7	U
18a-Oleanane	<9.6	U	<9.7	U
C30-Hopane	<9.6	U	<9.7	U
Surrogate (Su)	Su Recovery (%)		Su Recovery (%)	
Naphthalene-d8	72		66	
Acenaphthene-d10	84		80	
Phenanthrene-d10	85		83	
Chrysene-d12	88		86	
Perylene-d12	95		93	

B.3. Total suspended solids (TSS) of water samples collected on December 7-8, 2004.

Sample Name	ETX3885	ETX3886	ETX3887	ETX3888	ETX3889
Client Name	W-Wood-06	W-Wood-07	W-Wood-08	W-Man-05	W-Man-06
Matrix	Filter	Filter	Filter	Filter	Filter
Received Date	12/10/04	12/10/04	12/10/04	12/10/04	12/10/04
Batch	TS-050	TS-050	TS-050	TS-050	TS-050
Method	EMAP-TSS	EMAP-TSS	EMAP-TSS	EMAP-TSS	EMAP-TSS
Analysis	mg/L	mg/L	mg/L	mg/L	mg/L
TSS	8.5	7.0	12.0	10.0	28.0

Qualifiers (Q): NA=Not applicable, *=Outside QA limits, refer to narrative

Sample Name	ETX3890	ETX3891	ETX3892	ETX3893	ETX3894
Client Name	W-Man-07	W-TN-01	W-TN-02	W-TN-03	W-TN-04
Matrix	Filter	Filter	Filter	Filter	Filter
Received Date	12/10/04	12/10/04	12/10/04	12/10/04	12/10/04
Batch	TS-050	TS-050	TS-050	TS-050	TS-050
Method	EMAP-TSS	EMAP-TSS	EMAP-TSS	EMAP-TSS	EMAP-TSS
Analysis	mg/L	mg/L	mg/L	mg/L	mg/L
TSS	27.0	39.5	37.5	35.0	28.5

Qualifiers (Q): NA=Not applicable, *=Outside QA limits, refer to narrative

Sample Name	ETX3895	ETX3896	ETX3897	ETX3898	ETX3899
Client Name	W-UR-01	W-UR-02	W-UR-03	W-TPB-01	W-TPB-02
Matrix	Filter	Filter	Filter	Filter	Filter
Received Date	12/10/04	12/10/04	12/10/04	12/10/04	12/10/04
Batch	TS-050	TS-050	TS-050	TS-050	TS-050
Method	EMAP-TSS	EMAP-TSS	EMAP-TSS	EMAP-TSS	EMAP-TSS
Analysis	mg/L	mg/L	mg/L	mg/L	mg/L
TSS	14.5	9.0	38.0	8.5	32.0

Qualifiers (Q): NA=Not applicable, *=Outside QA limits, refer to narrative

Sample Name	ETX3900F	ETX3901	ETX3902	ETX3903	ETX3904
Client Name	W-TPB-03	W-BTC-07	W-BTC-08	W-BTC-09	W-Dup-01
Matrix	Filter	Filter	Filter	Filter	Filter
Received Date	12/10/04	12/10/04	12/10/04	12/10/04	12/10/04
Batch	TS-050	TS-050	TS-050	TS-050	TS-050
Method	EMAP-TSS	EMAP-TSS	EMAP-TSS	EMAP-TSS	EMAP-TSS
Analysis	mg/L	mg/L	mg/L	mg/L	mg/L
TSS	20.5	34.5	7.5	21.0	30.0

Qualifiers (Q): NA=Not applicable, *=Outside QA limits, refer to narrative

Sample Name	ETX3905	ETX3906	ETX3907	ETX3908
Client Name	WLP#1-5	WLP#2-5	WLP#3-5	WMP#1-5
Matrix	Filter	Filter	Filter	Filter
Received Date	12/10/04	12/10/04	12/10/04	12/10/04
Batch	TS-050	TS-050	TS-051	TS-051
Method	EMAP-TSS	EMAP-TSS	EMAP-TSS	EMAP-TSS
Analysis	mg/L	mg/L	mg/L	mg/L
TSS	4.5	20.0	183.0	57.0

Qualifiers (Q): NA=Not applicable, *=Outside QA limits, refer to narrative

Sample Name	ETX3910	ETX3913	ETX3914	ETX3916
Client Name	WSUB-01(1 of 2)	WCR#25	WCR#2D (1 of 2)	WCR#1D (1 of 2)
Matrix	Filter	Filter	Filter	Filter
Received Date	12/10/04	08/21/03	08/21/03	08/21/03
Batch	TS-051	TS-051	TS-051	TS-051
Method	EMAP-TSS	EMAP-TSS	EMAP-TSS	EMAP-TSS
Analysis	mg/L	mg/L	mg/L	mg/L
TSS	35.0	46.5	118.5	102.0

Qualifiers (Q): NA=Not applicable, *=Outside QA limits, refer to narrative

Sample Name	ETX3918	ETX3919	ETX3920	ETX3922	ETX3923
Client Name	WCR#3S	WCR#1S	WCD#2D (1 of 2)	WCD#1S	WCD#2S
Matrix	Filter	Filter	Filter	Filter	Filter
Received Date	08/21/03	08/21/03	08/21/03	08/21/03	08/21/03
Batch	TS-051	TS-051	TS-051	TS-051	TS-051
Method	EMAP-TSS	EMAP-TSS	EMAP-TSS	EMAP-TSS	EMAP-TSS
Analysis	mg/L	mg/L	mg/L	mg/L	mg/L
TSS	18.0	27.5	46.0	39.0	63.0

Qualifiers (Q): NA=Not applicable, *=Outside QA limits, refer to narrative

Sample Name	ETX3924	ETX3925	ETX3926	ETX3927	ETX3928
Client Name	WCR#3S	Methhod Blank	WMH#1S	WMH#2D	WMH#3S
Matrix	Filter	Filter	Filter	Filter	Filter
Received Date	08/21/03	08/21/03	08/21/03	08/21/03	08/21/03
Batch	TS-051	TS-051	TS-051	TS-051	TS-051
Method	EMAP-TSS	EMAP-TSS	EMAP-TSS	EMAP-TSS	EMAP-TSS
Analysis	mg/L	mg/L	mg/L	mg/L	mg/L
TSS	43.0	2.5	14.5	42.0	32.0

Qualifiers (Q): NA=Not applicable, *=Outside QA limits, refer to narrative

Sample Name	ETX3929	ETX3931
Client Name	WSUB-TN-01 (1 of 2)	WSUB-TN-0 (1 of 2)
Matrix	Filter	Filter
Received Date	08/21/03	08/21/03
Batch	TS-051	TS-051
Method	EMAP-TSS	EMAP-TSS
Analysis	mg/L	mg/L
TSS	66.5	32.5

Qualifiers (Q): NA=Not applicable, *=Outside QA limits, refer to narrative

B.4. Volatile organic analyses. Water sample collected on November 27, 2004 near the Commodore Barry Bridge.

SEVERN TRENT STL

LABORATORY TEST RESULTS

Job Number: 228205 Date: 12/29/2004

CUSTOMER: B&B Laboratories PROJECT: TV ATHOS ATTN: Tommy McDonald

Customer Sample ID: VOA-1
Date Sampled.....: 11/27/2004
Time Sampled.....: 15:55
Sample Matrix.....: Water

Laboratory Sample ID: 228205-1
Date Received.....: 12/16/2004
Time Received.....: 09:20

TEST METHOD	PARAMETER/TEST DESCRIPTION	SAMPLE RESULT	REPORTING LIMIT	UNITS	DATE	TECH
SW-846 8260B	Volatile Organics					
	Acetone	ND	100	ug/L	12/20/04	rjt
	Acetonitrile	ND	50	ug/L	12/20/04	rjt
	Acrolein	ND	50	ug/L	12/20/04	rjt
	Acrylonitrile	ND	50	ug/L	12/20/04	rjt
	Benzene	ND	5	ug/L	12/20/04	rjt
	Bromodichloromethane	ND	5	ug/L	12/20/04	rjt
	Bromoform (Tribromomethane)	ND	5	ug/L	12/20/04	rjt
	Bromomethane (methyl bromide)	ND	5	ug/L	12/20/04	rjt
	Carbon Disulfide	ND	5	ug/L	12/20/04	rjt
	Carbon Tetrachloride	ND	5	ug/L	12/20/04	rjt
	Chlorobenzene	ND	5	ug/L	12/20/04	rjt
	Chloroethane (Ethyl chloride)	ND	5	ug/L	12/20/04	rjt
	Chloroform	ND	5	ug/L	12/20/04	rjt
	Chloromethane (methyl chloride)	ND	5	ug/L	12/20/04	rjt
	Dibromochloromethane	ND	5	ug/L	12/20/04	rjt
	Dibromomethane	ND	5	ug/L	12/20/04	rjt
	1,2-Dibromoethane (EDB)	ND	5	ug/L	12/20/04	rjt
	Dichlorodifluoromethane	ND	5	ug/L	12/20/04	rjt
	1,1-Dichloroethane	ND	5	ug/L	12/20/04	rjt
	1,2-Dichloroethane (EDC)	ND	5	ug/L	12/20/04	rjt
	1,1-Dichloroethene (Vinylidene chloride)	ND	5	ug/L	12/20/04	rjt
	cis-1,2-Dichloroethene	ND	5	ug/L	12/20/04	rjt
	trans-1,2-Dichloroethene	ND	5	ug/L	12/20/04	rjt
	1,2-Dichloropropane	ND	5	ug/L	12/20/04	rjt
	1,3-Dichloropropane	ND	5	ug/L	12/20/04	rjt
	2,2-Dichloropropane	ND	5	ug/L	12/20/04	rjt
	1,1-Dichloropropene	ND	5	ug/L	12/20/04	rjt
	cis-1,3-Dichloropropene	ND	5	ug/L	12/20/04	rjt
	trans-1,3-Dichloropropene	ND	5	ug/L	12/20/04	rjt
	1,4-Dioxane	ND	100	ug/L	12/20/04	rjt
	Ethyl Acetate	ND	5	ug/L	12/20/04	rjt
	Ethylbenzene	ND	5	ug/L	12/20/04	rjt
	Ethyl Ether (Diethyl Ether)	ND	5	ug/L	12/20/04	rjt
	Ethyl Methacrylate	ND	5	ug/L	12/20/04	rjt
	2-Hexanone	ND	5	ug/L	12/20/04	rjt
	Iodomethane (Methyl Iodide)	ND	5	ug/L	12/20/04	rjt
	Methylene Chloride (Dichloromethane)	ND	50	ug/L	12/20/04	rjt
	Methyl Ethyl Ketone (2-Butanone)	ND	10	ug/L	12/20/04	rjt
	4-Methyl-2-Pentanone (MIBK)	ND	5	ug/L	12/20/04	rjt
	Methyl Methacrylate	ND	5	ug/L	12/20/04	rjt
	tert-Butyl Methyl Ether (MTBE)	ND	5	ug/L	12/20/04	rjt
	2-Nitropropane	ND	5	ug/L	12/20/04	rjt
	Styrene	ND	5	ug/L	12/20/04	rjt
	1,1,2,2-Tetrachloroethane	ND	5	ug/L	12/20/04	rjt
	Tetrachloroethene	ND	5	ug/L	12/20/04	rjt
	Toluene	ND	5	ug/L	12/20/04	rjt
	1,2,3-Trichlorobenzene	ND	5	ug/L	12/20/04	rjt
	1,1,1-Trichloroethane	ND	5	ug/L	12/20/04	rjt

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SEVERN TRENT STL

LABORATORY TEST RESULTS

Job Number: 228205 Date: 12/29/2004

CUSTOMER: B&B Laboratories PROJECT: TV ATHOS ATTN: Tommy McDonald

Customer Sample ID: VOA-1
Date Sampled.....: 11/27/2004
Time Sampled.....: 15:55
Sample Matrix.....: Water

Laboratory Sample ID: 228205-1
Date Received.....: 12/16/2004
Time Received.....: 09:20

TEST METHOD	PARAMETER/TEST DESCRIPTION	SAMPLE RESULT	REPORTING LIMIT	UNITS	DATE	TECH
	1,1,2-Trichloroethane	ND	5	ug/L	12/20/04	rjt
	Trichloroethene	ND	5	ug/L	12/20/04	rjt
	Trichlorofluoromethane	ND	5	ug/L	12/20/04	rjt
	1,1,2-Trichloro-1,2,2-Trifluoroethane	ND	50	ug/L	12/20/04	rjt
	1,2,4-Trimethylbenzene	ND	5	ug/L	12/20/04	rjt
	1,3,5-Trimethylbenzene	ND	5	ug/L	12/20/04	rjt
	1,2,3-Trichloropropane	ND	5	ug/L	12/20/04	rjt
	Vinyl Acetate	ND	5	ug/L	12/20/04	rjt
	Vinyl Chloride (Chloroethene)	ND	5	ug/L	12/20/04	rjt
	Xylenes (total)	ND	15	ug/L	12/20/04	rjt

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APPENDIX C

Submerged Oil Report

SUBMERGED OIL ASSESSMENT – *ATHOS 1* OIL SPILL

Submerged Oil Assessment Unit
Planning Section
***Athos 1* Oil Spill Unified Command**

11 December 2004

TABLE OF CONTENTS

SUBMERGED OIL ASSESSMENT – ATHOS 1 OIL SPILL

I. INTRODUCTION

At 9:30 pm on 26 November, the *T/V Athos* 1 struck a submerged object while preparing to dock at the Citgo facilities, resulting in two holes in the No. 7 port and center tanks. It was carrying a heavy Venezuelan crude oil. The initial report was that 30,000 gallons were released; on 30 November, the volume was increased to a maximum potential of 473,500 gallons. The final estimate will be available once the oil from the holed tanks has been offloaded from the tanker.

There was concern that some of the heavy oil would mix with sediment and not float. Pooled oil was reported on the bottom at the collision site, and shoreline assessment teams reported that oil stranded on the intertidal zone had started to become submerged during the rising tide. Therefore, a special team was assigned to assess the extent and degree of submerged oil and develop recovery options. The Salem Nuclear Power Plant started shut-down procedures for the No. 2 unit on 3 December and No. 1 unit on 4 December because of the threat of oil contamination of the circulation and service water intake systems. The Logan Power Plant in New Jersey stopped using water from the river for a day. Other utility and industrial water intakes along the river have been concerned about the impacts on the oil on their water intakes and water use within the facility, though none have reported shut-downs. The submerged oil also posed risks to shellfish resources in Delaware Bay.

II. CHARACTERISTICS OF THE SPILLED OIL

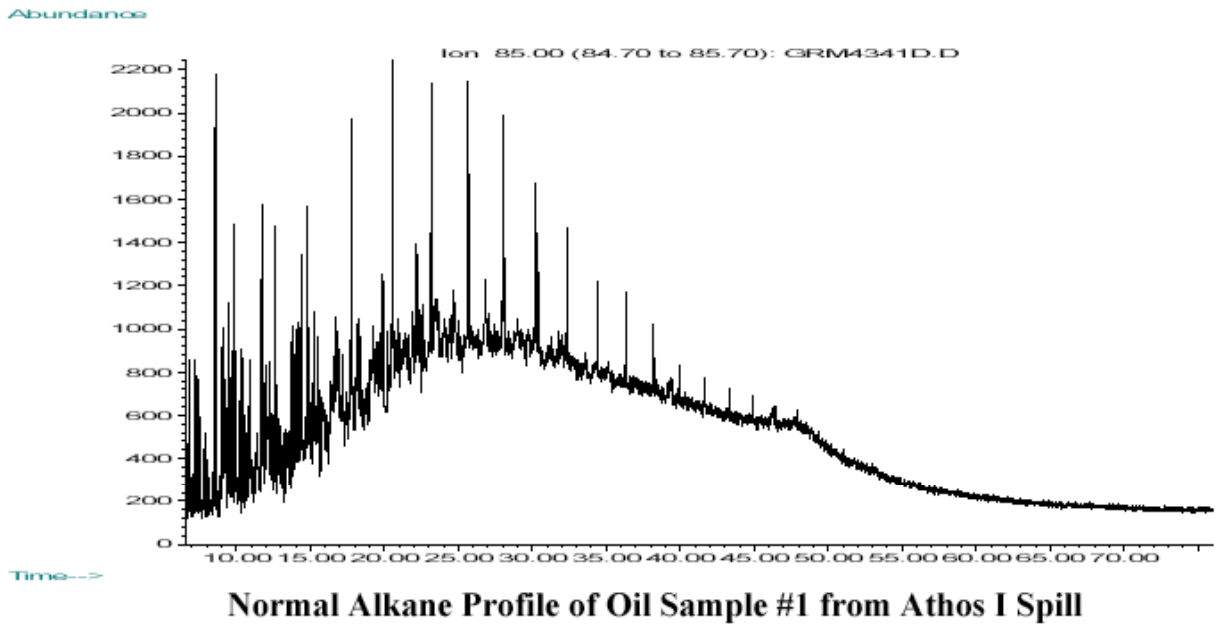
Physical Properties of Source Oil

Two samples of the oil from hold No. 7 center (the source oil) were analyzed for physical properties and chemical characteristics, with the following results:

Density: 0.973 and 0.978 grams per milliliter; fresh water is 1.00 and oceanic sea water is 1.025 g/ml. Therefore, the oil is lighter than both fresh water and sea water.

Viscosity: greater than 5,000 centiStokes (cSt) at 100°F and at ambient water temperature greater than 50,000 cSt, meaning that the oil's viscosity is similar to cold honey;

Composition: the oil is composed of a large amount of asphaltenes and other high molecular weight compounds. The aromatic hydrocarbon content is very low (0.06%), and the oil has a very low dissolved fraction. Figure 1 is the normal alkane distribution in the fresh oil. Note that there are few individual peaks and a large "hump" of unresolved hydrocarbons. This oil can be characterized as a heavy, degraded crude oil.



Normal Alkane Profile of Oil Sample #1 from Athos I Spill

Figure 1. Normal alkane profiles of the source oil from hold No. 7 center. Note there are few identifiable peaks and a large "hump" of unresolved compounds.

Behavior of the Spilled Oil

One of the key concerns was whether the oil would not float after release to the environment and loss of the light fractions due to evaporation. The fresh source oil was "evaporatively weathered" by heating it to 90°C under vacuum and less than 3 % was lost by evaporation after 4 hours. Therefore, the weathered oil (after evaporation) is still expected to float. Using the National Oceanic and Atmospheric Administration (NOAA) oil weathering model ADIOS, up to 13% of the oil could have evaporated within 5 days of the release. Based on the chemical analysis and model results, the amount of oil lost via evaporation is likely 3-13%.

With only 0.06% aromatic hydrocarbons (which are the primary compounds in the oil that dissolve), lost via dissolution was estimated as less than 1%. The oil is very viscous and did not form a stable emulsion even when exposed to high wave energy. The model ADIOS estimated less than 1% of the fresh oil dispersed into the water column. The Delaware River contains a high suspended load, but due to the viscous nature of the oil, very little of the oil (less than 1%) adhered to particles in the water column (as opposed to sandy sediments on the shoreline).

While the exact amount released is unknown, the amount lost to oil weathering processes (evaporation, dissolution, emulsification, dispersion, and adsorption to suspended particulate matter) is likely tens of thousands of gallons (Table 1).

The shoreline cleanup assessment teams provide some indication of the length of shoreline oiled. However, the technology does not exist to accurately measure shoreline thickness. This information is needed to calculate oil volume. The amount of oil recovered from the shoreline is mixed with debris and sediments, and the oil content of the oily waste is unknown.

As discussed later, some of the oil that stranded on the shoreline picked up sediment. Samples collected from the oil stranded on the shoreline and recovered from the water column had a few % sand. Even 2-3 % of sand is enough to make the oil slightly heavier than fresh water.

A preliminary mass balance of the spilled oil is shown in Table 1.

Table 1. Preliminary mass balance of the spilled oil.

Physical Process	Estimates
Evaporation	3 – 13% of total volume spilled minus volume of oil in trench #1 and #2
Dissolution	< 1% of total volume spilled
Emulsification	0%
Dispersion	1% total volume spilled
Sedimentation (due to river load)	Unknown but likely < 1%
Oil on shoreline	~ 100 miles
Oil recovered from shoreline	Unknown
Oil floated off shoreline	Unknown
Oil with sediment mobilized off shoreline	Unknown
Tarballs in water column	Unknown
Tarballs on bottom	Unknown
Pooled oil (located in Trench #1 and #2)	~ 4000 gallons

PHYSICAL PROCESSES AND TRANSPORT

A. Oil Trajectory and Physical Processes during the Spill

The primary forcing function for currents in both the Delaware River and Bay are the semidiurnal tides. Near the spill site, maximum currents are about 2 knots with a tidal excursion of about 8 miles. In the middle of Delaware Bay, maximum currents are about1 knot with a tidal excursion about 4 miles. The river inflow into the system results in a net displacement down river over each 12 hour cycle. The currents from the river outflow are small compared to the tidal currents but it is the major factor in any net down river displacement of subsurface oil.

Water levels in the River and Bay rise and fall as function of onshore/offshore winds. This can raise the water levels in the river 1 – 2 feet above or below predicted tide levels. Severe storm events, much stronger than reported during the spill event and more intense than the usual storm, could have a significant effect on the currents and oil transport.

In the Chesapeake – Delaware Canal, the tide wave moves from the Chesapeake into the canal towards Reedy Island in the Delaware River. Water level differences between Chesapeake Bay and Delaware River due to meteorological events and river discharge can result in water flowing from the Delaware into the Chesapeake.

For the most part, the River and Bay are well mixed vertically. The U.S. Environmental Protection Agency collected salinity measurements from the spill site to Raccoon River entrance and reported values of 1 to 2 ppt. In addition, NOAA measured salinity and conductivity near the Commodore Barry Bridge, which indicated the river, was well mixed. There is a broad salinity gradient or mixing zone in the lower river and in the bay. The gradient of mixing in winter and spring is largest near Ship John Lighthouse (39° 19'N, 75° 23'W). The gradient moves seaward with increases freshwater. The interface between the freshwater and saline water may be a collection area for floating oil. Since the mobile subsurface oil contains sediment, the density differences along the saltwater – freshwater mixing zone are less likely to cause submerged oil to refloat.

Outside the Bay, the circulation on the inner continental shelf is primarily controlled by winds and water density differences. Off the northeast coast, freshwater input from rivers such as the Hudson and Delaware result in a near shore density flow from the north to south. Currents due to density differences in the water will be within 10 miles of the shoreline, follow the shoreline and typically move to the south at speeds between 0.1 and 1 knot. Superimposed are the regional winds, which will generate a coastal current to the north with southerly winds and southward with northerly winds. At the Bay entrance, there is a net flow of fresh water along the south side and net inflow along the bottom of the north side.

Initially, the spill formed a thick film and moved upriver with the flood tide. A southeast wind moved oil to the Pennsylvania side of the river. With the second flood tide, the oil was transported as far north as the Petty Island area. Several days later, stronger winds transported oil to the New Jersey side. After the storm, the oil weathered and formed tarballs. By 28 November, oil extended down river to the Delaware Memorial Bridge. Overflight observations of the floating oil have consistently been within the uncertainties of the NOAA trajectory model predictions. The 24-48 hour forecasts of the floating oil will continue until the overflight observer is no longer able to detect the leading edge of the spill.

B. Long-term Transport

With the type and quantity of oil spilled, tarballs are expected to persist for several months in the Delaware River system. Over the next few weeks, scattered tarball are expected to contact shoreline anywhere along Delaware Bay. There is a possibility of oil movement through the Chesapeake – Delaware Canal into upper Chesapeake Bay. The exact location and amount of oil depends on the wind, oil fate, and amount of oil mobilizing upstream. Within several weeks of the initial spill, tarball contact is anticipated along the outer coast. The mean current along the outer coast is southward and anticipate most of the contacts south of Delaware Bay. Local wind events could push tarballs to the north up to 50 miles north of Cape May and as far south as the entrance to Chesapeake Bay. While the general trend for the number of tarballs contacting the outer coast is expected to decrease within a month or two, the amount of subsurface oil in the Delaware River remains unknown. Thus, there remains a possibility that a strong meteorological event or vessel movement could mobilize oil resulting in an episodic increase of tarballs.

IV. SPILL INFORMATION

A. Floating Oil

Weather permitting, overflights of the spill area have shown a general decline in floating oil. Observer have reported mostly scattered sheens with tarballs ranging from < 0.5 cm (pea size) to about 20 cm (dinner plate). The few exceptions occurred when the on-scene winds were calm or at slack tide. Without any waves or strong tidal mixing to disperse the sheening tarballs, large areas of continuous sheens were reported from the observers. Any increase in the wind generated waves dispersing the sheens. Without associated sheens, it is extremely difficult to track the tarballs. A decrease in the wind speed or at slack tide would allow the observer to once again see the sheens. This pattern repeated itself several times during the spill event. Finally, observers indicated that some of the tarballs had weathered to the point of not sheening.

For the long term, tarballs are very persistent in the environment and can travel hundreds of miles. They are expected to move out of Delaware Bay and through the C&D Canal into the upper Chesapeake Bay. Natural collection areas, such as the surface interface between the freshwater and saltwater and convergence zones on ebb tides, are good locations for finding the tarballs. If tarballs appear on the shoreline, it is likely they were nearshore, difficult to detect and onshore winds brought them ashore.

B. Non-floating Oil

a. Pooled Oil

i. Survey Methods

Pooled oil is defined as oil that has accumulated in depressions and is not readily mobilized by normal riverine and tidal currents. Both NOAA and EPA used different sonar systems to detect areas of pooled oil. Experts from NOAA, EPA, and Navy Supervisor of Salvage reviewed these data and determined the systems could not identify pooled oil. Therefore, coring and sorbent probes were used to search for pooled oil in likely accumulation areas. The US Army Corps of Engineers bathymetric maps of the channel and adjacent areas (generated from data obtained on 5 December 2004) were used to identify targets for the pooled oil survey teams. Divers were also used to observe areas where pooled oil was found. The locations that were searched for pooled oil included:

- The shallow bay north of Tinicum Island, including two deep depressions
- Four depressions on the south side of the channel across from Tinicum Island (Tinicum Range channel)
- Tinicum Range channel
- Shallows around Chester Island

ii. Locations

Pooled oil was found only at the collision site, in a trench described as 6-8 ft wide, 2 ft deep, and 41 ft long. On 9 December, a diver surveyed the trench area and measured the oil thickness as between 1.5-2 ft deep. A second trench was also detected and estimated to be 2 ft wide by 2 ft deep by 15 ft long.

iii. Volumes

The volume of pooled oil in the trenches at the collision site was estimated to be approximately 3,390-3,610 gallons, depending on the assumed oil thickness in the second trench (Table 2).

A sample of the oil from the trench (density of 0.943 g/ml) floated in fresh water. It was tested for cohesiveness and found to adhere to sediments. Based all the information available, the oil in the trench at the collision site was "injected" into the sediment under the pressure of the release, creating it's own trench. The viscous oil adhered to the sediments and not refloated, even though it should based on density. The oil is immobile due to highly cohesive forces exerted by the viscous oil.

Table 2. Estimated volume of oil on the bottom at the collision site.

Length	Trench Width (feet)	Depth of Trench (feet)	Depth of Oil (feet)	Amount of Oil (gallons)
Trench 1				
0+00	6	2	1.5	910
0+10	8	3	2	310
0+13	6	2.67	2	890
0+23	6	2.5	1.5	610
0+33	5	2.5	1.5	450
0+41	0	0	0	3,170
Trench 2				
15	2	2	If assume 1	220
			If assume 2	440

iv. Pooled Oil Recovery Methods

Several methods were evaluated for recovery of the pooled oil in the trench. The viscous oil is expected to float when disturbed, therefore special containment systems are needed. Options include:

- Diver-directed pumping systems with positive displacement pumps that can move viscous oils
- Dredging systems of different sizes
- Subsurface recovery using sorbents, either by divers or remote techniques

Divers using viscous oil pumps will begin oil recovery on 12 December. Booms and sorbents will be used to recover any floating oil; a submerged bottom filter fence will recover any oil transported in the water column downcurrent from the recovery site. The oil recovery is estimated to be completed in four days.

b. Mobile Oil

i. Survey Methods

Mobile oil is defined as oil that is negatively buoyant and subject to transport by riverine and tidal currents. It is present throughout the water column, though it appears most of the mobile oil is within a few feet of the bottom. To track the vertical distribution of the oil and the geographical extent over time, two survey methods were used:

- Snare Samplers: These samplers consist of an anchor, 50 ft of snare on a rope, and a float (shown in Fig. 2). The snares are composed of thin sheets of polypropylene, and viscous oils readily adhere to them, even under water. They are visually inspected for the presence of oil with depth, and the amount of oil is estimated as a percent coverage. The snare/rope is replaced when oiled, and they are monitored over time, weather permitting.

- V-SORS: The Vessel-Submerged Oil Recovery System (V-SORS) consists of a pipe with attached chains and snare (Fig. 3). The V-SORS is towed behind a vessel on the bottom at slow speeds. It is pulled up regularly and inspected for oil. Five V-SORS were used to both identify areas of submerged oil (including in the navigation channels where it was not possible to place the snare samplers) and to recover oil in all potential accumulation areas.

ii. Locations

Figures 4-6 shows all the locations where snare samplers were deployed at any time. The spill area was divided into three monitoring zones: MA extends from the Tacony-Palmyra Bridge to the Delaware Memorial Bridge; MB extends from the Delaware Memorial Bridge to just below the Salem Nuclear Power Plant; MC extends from the Salem Nuclear Power Plant to mid-Delaware Bay. Appendix 1 includes the results plotted for each monitoring division for the different deployment and retrieval periods. Weather and logistics prevented inspection of all snare samplers every day. In areas with strong currents, the snares would often be lost between inspections. Existing samplers in areas with strong currents are being replaced with heavier anchors, more visible buoys, and better attachment methods.

Figure 2. The snare sampler system consists of an anchor, a 50 ft string of snare on a rope, and a float. The samplers are inspected regularly and the percent oil coverage at different intervals is recorded. Most of the time, the heaviest oiling is on the bottom several feet.

Figure 3. The Vessel-Submerged Oil Recovery System (V-SORS) that is being used to search for and recover submerged mobile oil on the river bottom. The chains keep the sorbents along the bottom. The oil readily adheres to the snares underwater.

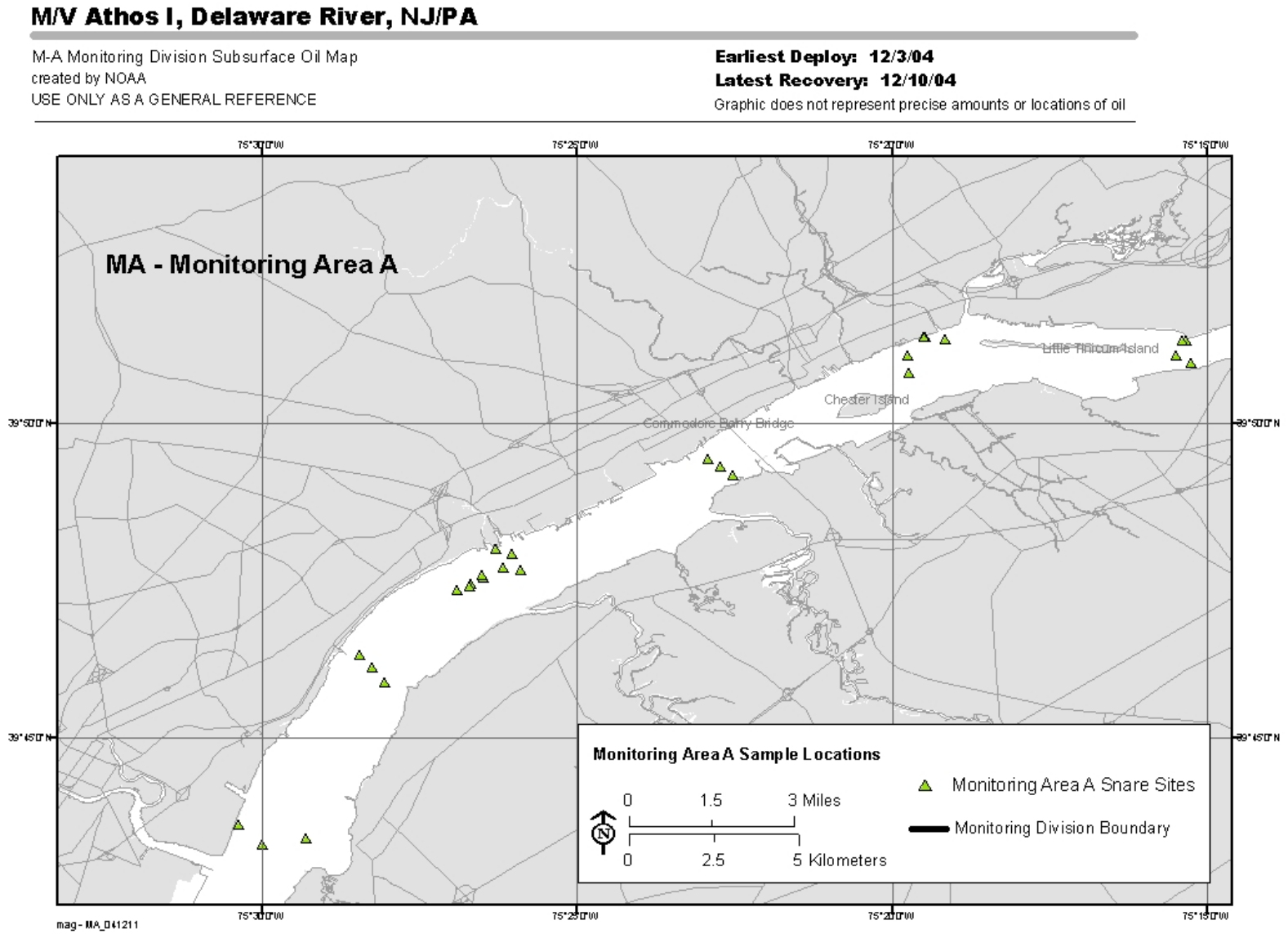


Figure 4. Location map showing the distribution of the snare sampling locations in the upper part of the spill zone (Division A).

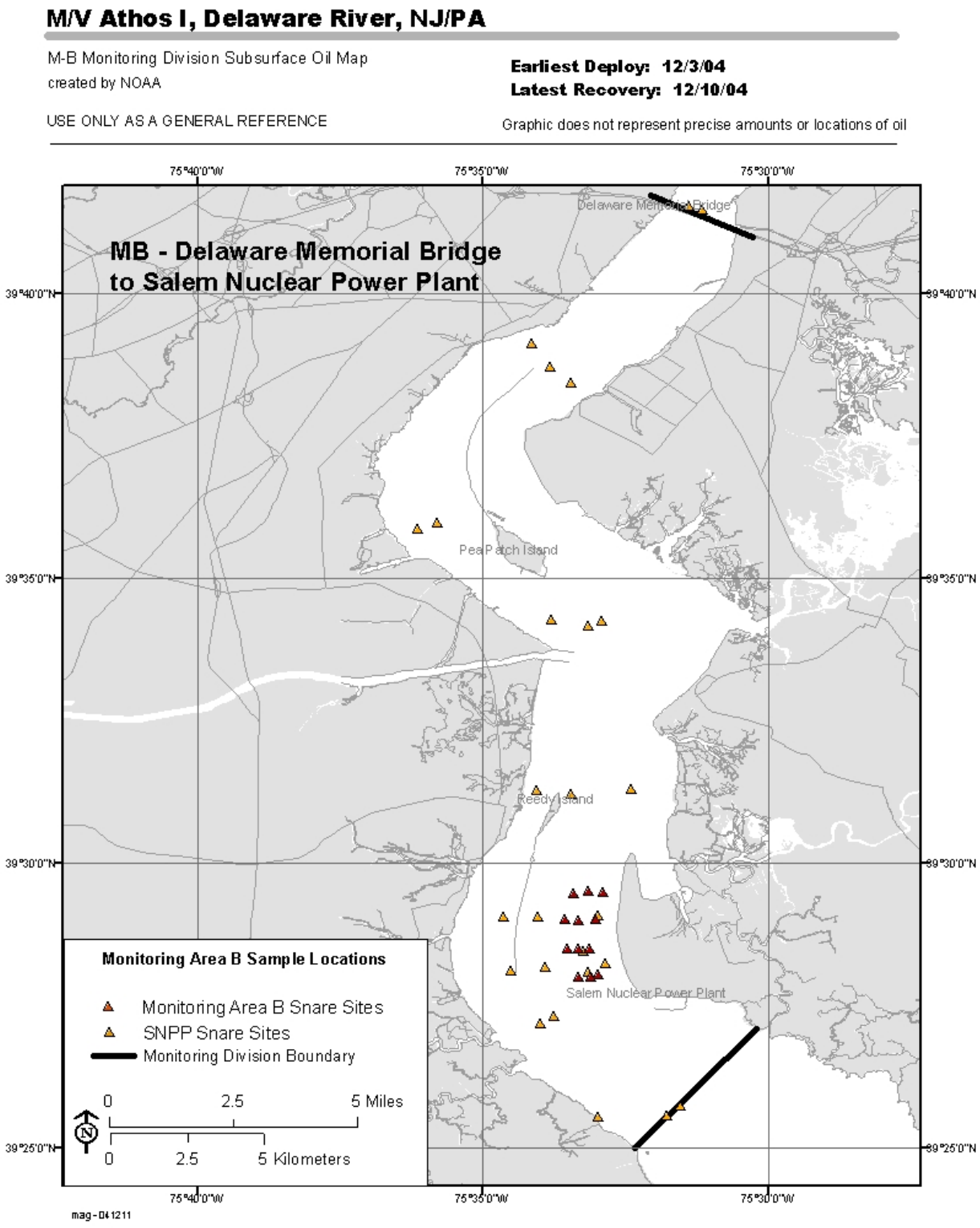


Figure 5. Location map showing the distribution of the snare sampling locations in the middle part of the spill zone (Division B).

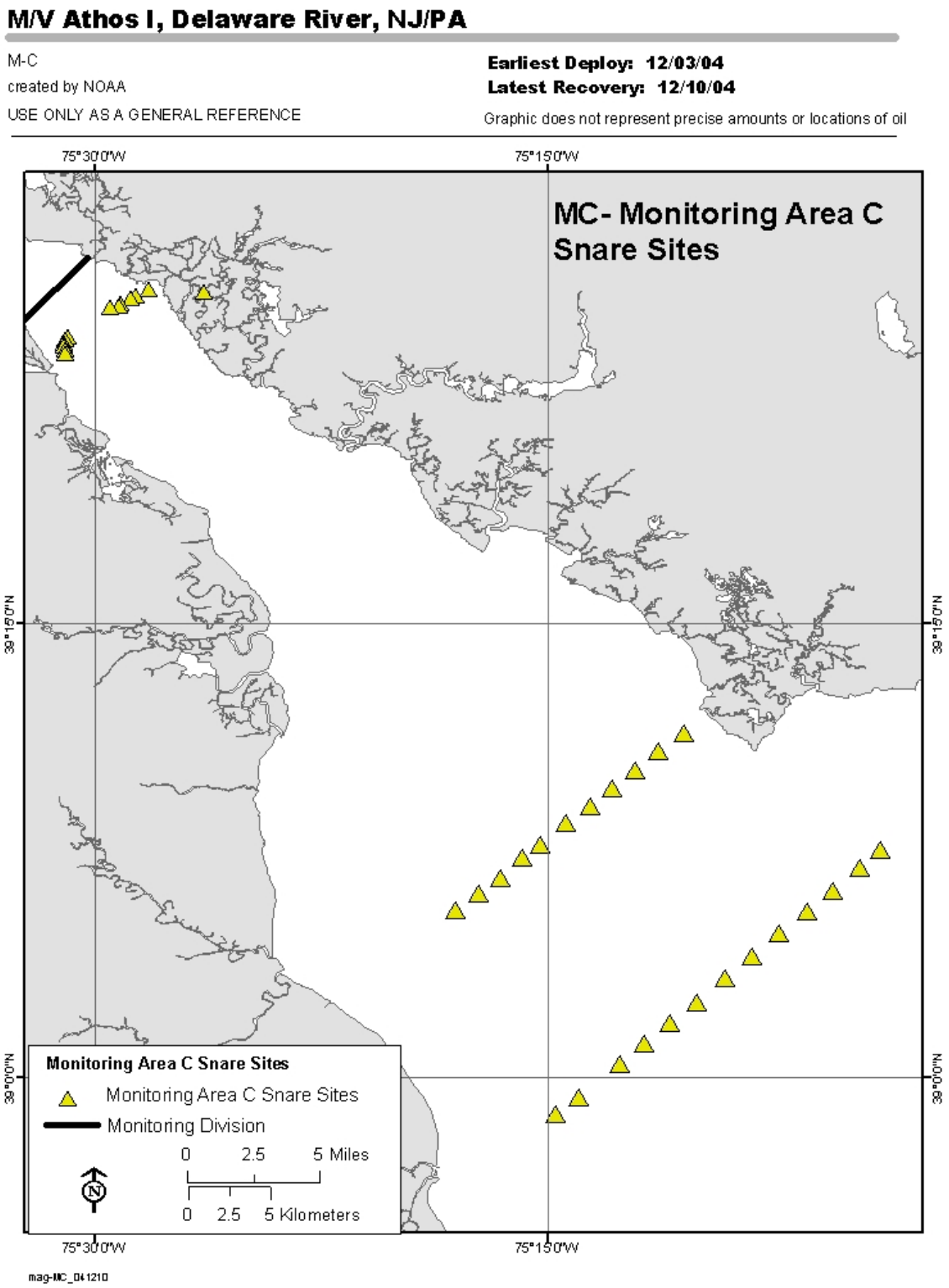


Figure 6. Location map showing the distribution of the snare sampling locations in the lower part of the spill zone (Division C).

iii. Results

Most of the submerged, mobile oil occurred several feet off the bottom, though small amounts of oil were present on the snares suspended in the middle and upper water column. Highest amounts of oil were detected around Tinicum Island. Refer to the maps in Appendix 1 for detailed data presentation for all monitoring sites. Figure 7 shows the temporal trend for station MA-1A that is located just north of Tinicum Island and consistently had the highest amount of oil on the snare. The snare was first deployed on 4 December and recovered on 5 December, and there was 50% oil coverage of the lower snares. The next day, the oil coverage was 30%. The snare was inspected two days later, on 8 December, and the coverage was 65%. For the next three days, the oil coverage was less than 15%. The steady decline for the last three days is consistent with the V-SORS tows, which also show decreasing amounts of oil recovery around Tinicum Island over the same period. There were scattered stations with high oil coverage observed on one day over the period 3-8 December. Many of the other snare samplers in the upper river never were oiled. Since 9 December, the maximum oil coverage on snares in this area was 10-15% (near Tinicum Island). It appears that the submerged oil in this upper spill zone has decreased significantly.

Figure 8 shows the temporal trend for station MB-3B, which is west of Pea Patch Island, and the detailed maps are included in Appendix 1. The distribution of the submerged oil in this area is difficult to assess because of the spotty data.

No oil or less than 1% was observed on any of the snare samplers in Division MC, which covers the upper Delaware Bay. Again, the data are spotty because many of the original stations were lost due to the strong currents in this area. However, it appears that little to no submerged oil has entered the upper bay as of 11 December.

iv. Mobile Oil Recovery Methods and Results

The V-SORS were towed in a wide range of locations that were identified as likely areas of submerged oil. The highest oil recovery was in the vicinity of Tinicum Island. Figure 9 shows the track lines of the V-SORS tows near Tinicum Island, color-coded with the amount of oil observed on the snares for each tow track. A large amount of oil stranded on the sandy tidal flat on the southern side of Tinicum Island. Oil stranded on many other shoreline areas but the shoreline types upstream of Tinicum Island are mostly seawalls, riprap, and mixed sand and gravel beaches. Tinicum Island is the main area with a largely sandy substrate. The oil is very sticky and would pick up sand, and only 2-4 % sand by weight would be enough to make the oil slightly negatively buoyant. By 30 November, oil on Tinicum Island did not re-float with the rising tide, and pieces of oil were being eroded from the shoreline by wave action. This area is thought to be the major source of the oil that became submerged and moved with the currents along the bottom of the river. Most of the oil recovered by the V-SORS was from the subtidal areas south of Tinicum Island. Very little oil was detected in the shallow area north of the island, both by the V-SORS tows and the pooled oil surveys.

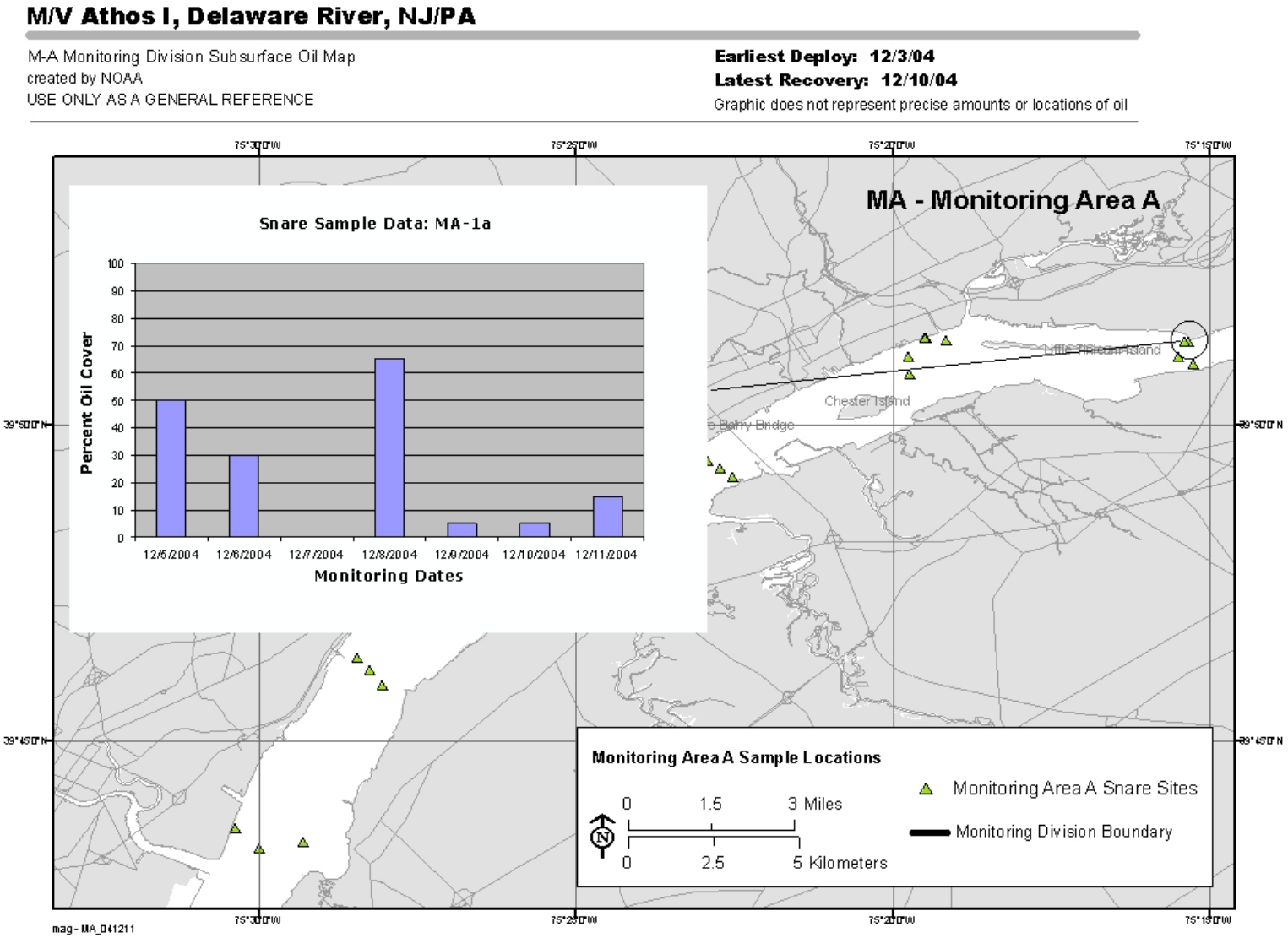


Figure 7. The oil coverage on the snare sampler just north of Tinicum Island (the location with the highest amount of oil consistently) over time. The oil coverage on 8 December represents two days of deployment, compared to the one-day deployment of the other dates. The amount of oil has been below 15% for the last three dates.

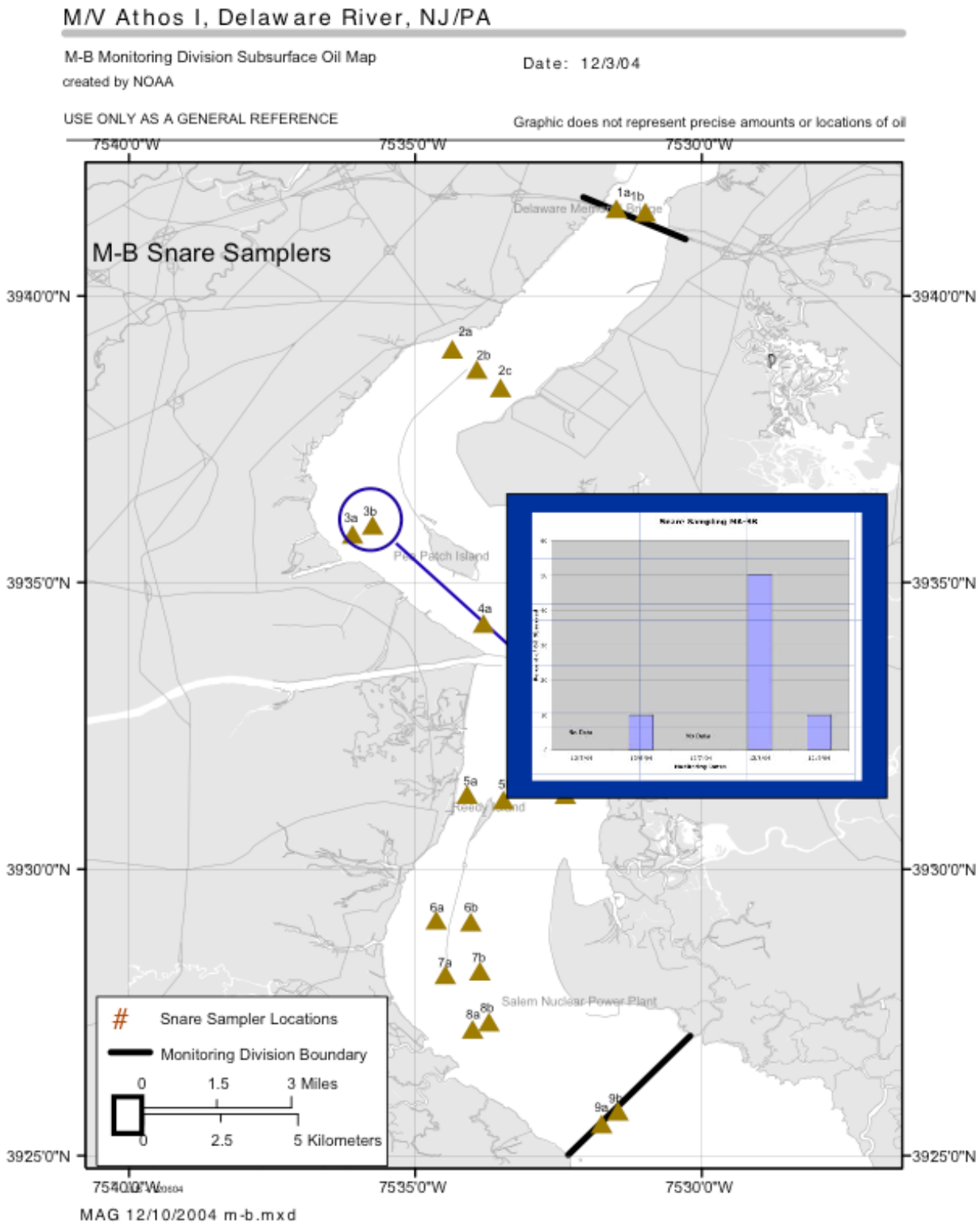


Figure 8. The oil coverage on the snare sampler west of Pea Patch Island. There was a peak on 8 December, representing two days of deployment.

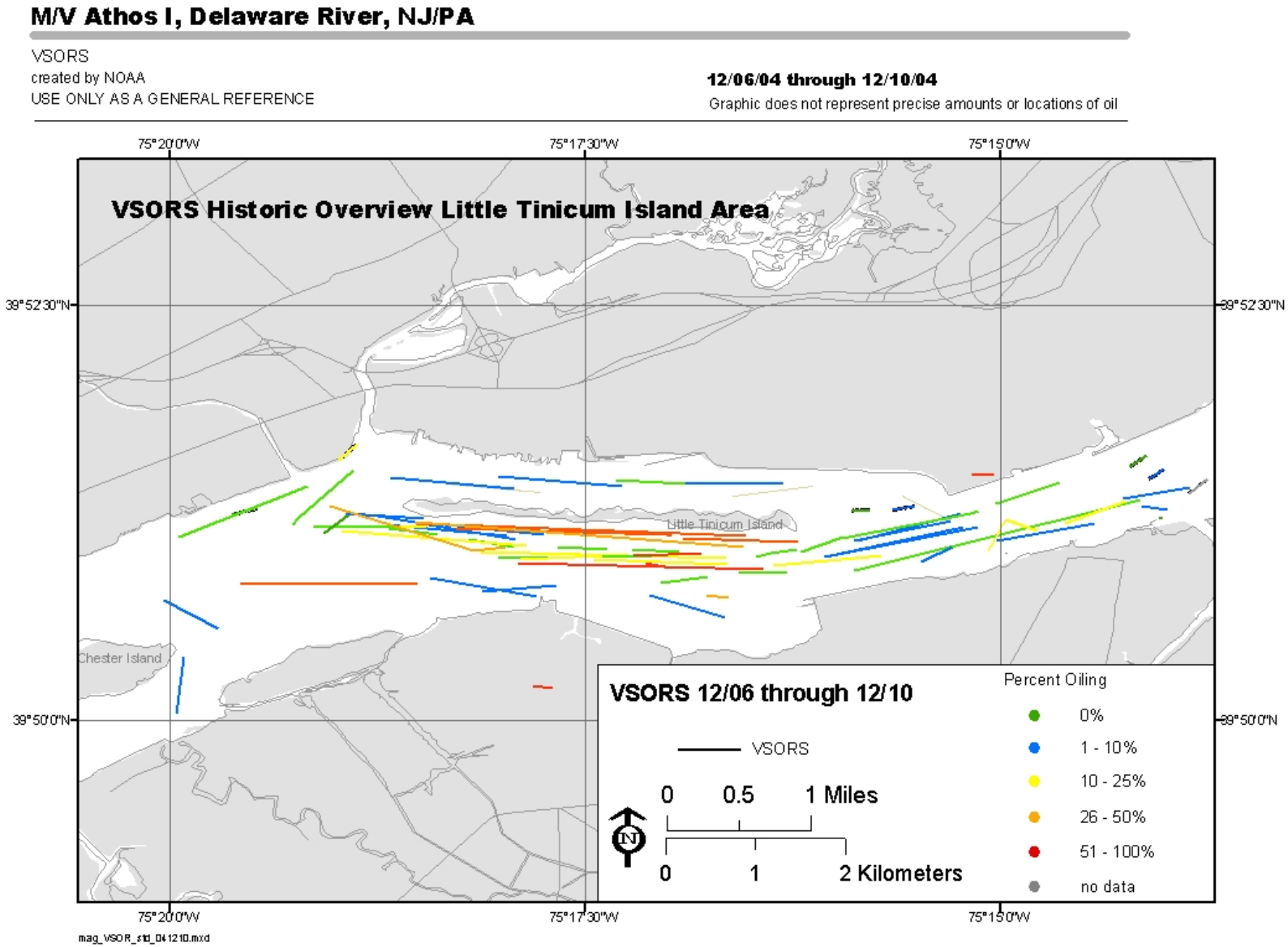


Figure 9. Track lines for the V-SORS coded according to the percent of visual oil coverage on the snares.

Additional V-SORS tows were conducted off the Salem Nuclear Power Plant on 8 December, with no oil detected. Small amounts of oil (~10%) were detected in Division MA, between the Commodore Barry Bridge and the Delaware Memorial Bridge on 8 December. Little to no oil was detected in the main shipping channel.

On 11 December, the V-SORS were directed to search for and recover oil in seventeen potential accumulation areas. Table 3 is a summary of these results. Oil was detected in the Marcus Hook Anchorage 7; a trace amount was found near Penns Grove, New Jersey (Cherry Flats).

Table 3. V-SORS results for potential submerged oil accumulation sites on 11 December 2004.

Potential Oil Accumulation Site	Percent Oil on Snares
Camden	0
Pier slip in Philadelphia	0
Pier slip in Philadelphia	0
Philadelphia airport 1	0
Philadelphia airport 2	0
Philadelphia airport 3	0
Marcus Hook Anchorage 7	50
Cherry Flats DE side	0
Cherry Flats NJ side	2
DE Memorial bridge	0
Travis Cove	0
Pea Patch Island NJ side	0
Pea Patch Island anchorage	0
Delaware City	0
Reedy Island NJ side	0
Reedy Island DE side	0
Hope Creek jetty	low tide-did not survey

V. SUMMARY

A significant but unknown amount of oil from the *Athos 1* oil spill did not float. The oil itself is buoyant, even after weathering, however two different mechanisms caused the oil to become submerged:

1. During the initial release, the oil was released under high pressure, cutting it's own trench in to the bottom. The highly viscous oil was held in the trench by cohesive forces. This is the only location where "pooled" oil was found.

2. The rest of the released oil initially floated and formed thick slicks. Most of the heavy oil stranded on man-made shorelines (seawalls and riprap), coating the intertidal zone. However, some thick slicks stranded on sandy shorelines (e.g., the wide intertidal sand flats on Tinicum Island) where the sticky oil picked up enough sandy sediments to make the oil slightly negatively buoyant. When this oil was eroded from the shoreline, it moved

along the bottom with the tidal currents. The mobile oil has not accumulated in significant amounts in depressions along the upper river.

The recovery of the oil in the trench will remove the only known area of pooled oil. There have been significant efforts to remove as much of the mobile oil as possible through shoreline cleanup of the re-floatable oil stranded on the intertidal zone and recovery of mobile, submerged oil using the V-SORS. Data from both the snare samplers and the V-SORS tows indicate that the amount of submerged oil has decreased over time.

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