

**ATTACHMENT I  
LIMITATIONS**

## ATTACHMENT I

## RISK CHARACTERIZATION LIMITATIONS

1. The interpretations and conclusions presented in this report were based solely upon the services described herein, and not on scientific tasks or procedures beyond the scope of described services. The work described in this report was carried out in accordance with the agreed upon Terms and Conditions.
2. ENTRIX's risk characterization was performed in accordance with generally accepted practices of relevant regulatory agencies, specifically the Massachusetts Department of Environmental Protection and other consultants undertaking similar studies. The findings of the risk characterization are dependent on numerous assumptions and uncertainties inherent in the risk assessment process. Sources of uncertainty may include the description of site conditions and the nature and extent of chemical distribution and the use of toxicity information. Consequently, the findings of the risk characterization are not an absolute characterization of actual risks, but rather serve to highlight potential sources of risk at the site. Although the range of uncertainties has not been quantified, the use of conservative assumptions and parameters throughout the assessment would be expected to err on the side of protection of human health and the environment.
3. The analysis and conclusions submitted in this report are based on data generated by GeoInsight Inc. during environmental investigations from January 2004 to October 2005.
4. This report has been prepared for the exclusive use of Bouchard Transportation Company Inc., for specific application to the Site of the Barge B120 Oil Spill in Buzzards Bay Massachusetts, in accordance with generally accepted risk assessment practices. No other warranty, express or implied, is made.

**ATTACHMENT II  
ANALYTICAL RESULTS**

**TABLE II-A**

SUBTIDAL ANALYTICAL DATA USED IN RISK CHARACTERIZATION

Barge B120 Oil Spill  
Buzzards Bay, Massachusetts

Analyte	Sample ID:	W1C02-P2-SUB-01	W1C02-P2-SUB-02	W1E02-P2-SUB-01	W1E02-P2-SUB-02	W1E03-P2-SUB-01	W1E03-P2-SUB-02	W1F02-P2-SUB-01	W1F02-P2-SUB-02
	Sampling Date:	9/13/05	9/13/05	8/31/05	8/31/05	8/31/05	8/31/05	9/14/2005	9/13/2005
<i>Extractable Petroleum Hydrocarbons (EPH)</i>									
C <sub>9</sub> -C <sub>18</sub> Aliphatic Hydrocarbons		<40	<39	<36	<52	<35	<33	<38	<36
C <sub>19</sub> -C <sub>36</sub> Aliphatic Hydrocarbons		<40	<39	<36	<52	<35	<33	<38	<36
C <sub>11</sub> -C <sub>22</sub> Aromatic Hydrocarbons		<40	<39	<36	<52	<35	<33	<38	<36
<i>Polycyclic Aromatic Hydrocarbons (PAH)</i>									
Naphthalene		<0.017	<0.017	<0.012	<0.019	<0.012	0.010J	<0.017	<0.017
2-Methylnaphthalene		<0.017	<0.017	<0.012	<0.019	<0.012	<0.011	<0.017	<0.017
Acenaphthylene		<0.017	<0.017	<0.012	<0.019	<0.012	<0.011	<0.017	<0.017
Acenaphthene		<0.017	<0.017	<0.012	<0.019	<0.012	<0.011	<0.017	<0.017
Fluorene		<0.017	<0.017	<0.012	<0.019	<0.012	<0.011	<0.017	<0.017
Phenanthrene		<0.017	<0.017	<0.012	<0.019	<0.012	0.010J	<0.017	<0.017
Anthracene		<0.017	<0.017	<0.012	<0.019	<0.012	<0.011	<0.017	<0.017
Fluoranthene		<0.017	<0.017	<0.012	<0.019	<0.012	<0.011	<0.017	<0.017
Pyrene		<0.017	<0.017	<0.012	<0.019	<0.012	0.006J	0.009J	<0.017
Benzo(a)anthracene		<0.017	<0.017	<0.012	<0.019	<0.012	<0.011	<0.017	<0.017
Chrysene		<0.017	<0.017	<0.012	<0.019	<0.012	<0.011	<0.017	<0.017
Benzo(b)fluoranthene		<0.017	<0.017	<0.012	<0.019	<0.012	<0.011	<0.017	<0.017
Benzo(k)fluoranthene		<0.017	<0.017	<0.012	<0.019	<0.012	<0.011	<0.017	<0.017
Benzo(a)pyrene		<0.017	<0.017	<0.012	<0.019	<0.012	<0.011	<0.017	<0.017
Indeno(1,2,3-cd)pyrene		<0.017	<0.017	<0.012	<0.019	<0.012	<0.011	0.010J	<0.017
Dibenzo(a,h)anthracene		<0.017	<0.017	<0.012	<0.019	<0.012	<0.011	0.014J	<0.017
Benzo(g,h,i)perylene		<0.017	<0.017	<0.012	<0.019	<0.012	<0.011	<0.017	<0.017
Total PAH <sup>4</sup>		ND	ND	ND	ND	ND	0.103	0.152	ND

Notes:

1. Concentrations in parts per million (ppm) or milligrams per kilogram (mg/kg).
  2. PAH analyzed by gas chromatograph/mass spectrometer-select ion monitoring (GC/MS-SIM), EPA Method 8270.
  3. J = estimated value less than detection limit; "<" less than detection limit; "--" = not analyzed, "ND" = not detected
  4. Total PAH value represents the sum of detected concentrations plus one-half detection limit if a constituent was not detected. "ND" indicates no PAH were detected.
- \* Sample W2A10-ST-S07, its duplicate -XXX, and -S09 were analyzed by 2 labs. Results were averaged together for use in summary statistics.

**TABLE II-A**

SUBTIDAL ANALYTICAL DATA USED IN RISK CHARACTERIZATION

Barge B120 Oil Spill  
Buzzards Bay, Massachusetts

Analyte	Sample ID:	W1F02-P2-SUB-03	W1F02-P2-SUB-04	W1F02-P2-SUB-05	W1F02-P2-SUB-06	W1F02-P2-SUB-07	W1F02-P2-SUB-08	PB-SS-S01	PB-SS-S02	BSS-01
	Sampling Date:	9/13/2005	9/13/2005	9/13/2005	9/14/2005	9/14/2005	9/14/2005	8/11/2004	8/11/2004	8/11/2004
<i>Extractable Petroleum Hydrocarbons (EPH)</i>										
C <sub>9</sub> -C <sub>18</sub> Aliphatic Hydrocarbons		<35	<36	<34	<35	<36	<37	<39	<38	<38
C <sub>19</sub> -C <sub>36</sub> Aliphatic Hydrocarbons		<35	<36	<34	<35	<36	<37	<39	<38	<38
C <sub>11</sub> -C <sub>22</sub> Aromatic Hydrocarbons		<35	<36	<34	<35	<36	<37	<39	<38	<38
<i>Polycyclic Aromatic Hydrocarbons (PAH)</i>										
Naphthalene		<0.017	<0.017	<0.017	<0.017	<0.017	<0.017	<0.013	<0.013	<0.013
2-Methylnaphthalene		<0.017	<0.017	<0.017	<0.017	<0.017	<0.017	<0.013	<0.013	<0.013
Acenaphthylene		<0.017	<0.017	<0.017	<0.017	<0.017	<0.017	<0.013	<0.013	<0.013
Acenaphthene		<0.017	<0.017	<0.017	<0.017	<0.017	<0.017	<0.013	<0.013	<0.013
Fluorene		<0.017	<0.017	<0.017	<0.017	<0.017	<0.017	<0.013	<0.013	<0.013
Phenanthrene		<0.017	<0.017	<0.017	<0.017	<0.017	<0.017	<0.013	<0.013	<0.013
Anthracene		<0.017	<0.017	<0.017	<0.017	<0.017	<0.017	<0.013	<0.013	<0.013
Fluoranthene		<0.017	<0.017	<0.017	<0.017	<0.017	<0.017	<0.013	<0.013	<0.013
Pyrene		<0.017	<0.017	<0.017	<0.017	<0.017	<0.017	<0.013	<0.013	<0.013
Benzo(a)anthracene		<0.017	<0.017	<0.017	<0.017	<0.017	<0.017	<0.013	<0.013	<0.013
Chrysene		<0.017	<0.017	<0.017	<0.017	<0.017	<0.017	<0.013	<0.013	<0.013
Benzo(b)fluoranthene		<0.017	<0.017	<0.017	<0.017	<0.017	<0.017	<0.013	<0.013	<0.013
Benzo(k)fluoranthene		<0.017	<0.017	<0.017	<0.017	<0.017	<0.017	<0.013	<0.013	<0.013
Benzo(a)pyrene		<0.017	<0.017	<0.017	<0.017	<0.017	<0.017	<0.013	<0.013	<0.013
Indeno(1,2,3-cd)pyrene		<0.017	<0.017	<0.017	<0.017	<0.017	<0.017	<0.013	<0.013	<0.013
Dibenzo(a,h)anthracene		<0.017	<0.017	<0.017	<0.017	<0.017	<0.017	<0.013	<0.013	<0.013
Benzo(g,h,i)perylene		<0.017	<0.017	<0.017	<0.017	<0.017	<0.017	<0.013	<0.013	<0.013
Total PAH <sup>4</sup>		ND	ND	ND	ND	ND	ND	ND	ND	ND

Notes:

1. Concentrations in parts per million (ppm) or milligrams per kilogram (mg/kg).
  2. PAH analyzed by gas chromatograph/mass spectrometer-select ion monitoring (GC/MS-SIM), EPA Method 8270.
  3. J = estimated value less than detection limit; "<" less than detection limit; "-" = not analyzed, "ND" = not detected
  4. Total PAH value represents the sum of detected concentrations plus one-half detection limit if a constituent was not detected. "ND" indicates no PAH were detected.
- \* Sample W2A10-ST-S07, its duplicate -XXX, and -S09 were analyzed by 2 labs. Results were averaged together for use in summary statistics.

**TABLE II-A**

SUBTIDAL ANALYTICAL DATA USED IN RISK CHARACTERIZATION

Barge B120 Oil Spill  
Buzzards Bay, Massachusetts

Analyte	Sample ID:	PB-SS-S03	PB-SS-S04	PB-DS-S01	PB-DS-S02	PB-DS-S03	PB-DS-S04	W2A10-ST-S01	W2A10-ST-S02	W2A10-ST-S03	W2A10-ST-S04
	Sampling Date:	8/11/2004	8/11/2004	8/11/2004	8/11/2004	8/11/2004	8/11/2004	7/22/2004	7/22/2004	7/22/2004	7/22/2004
<i>Extractable Petroleum Hydrocarbons (EPH)</i>											
C <sub>9</sub> -C <sub>18</sub> Aliphatic Hydrocarbons		<33	<36	<45	<49	<48	<40	<35	<35	<37	<35
C <sub>19</sub> -C <sub>36</sub> Aliphatic Hydrocarbons		<33	<36	47	78	53	<40	<35	<35	<37	<35
C <sub>11</sub> -C <sub>22</sub> Aromatic Hydrocarbons		<33	<36	<45	<49	<48	<40	<35	<35	<37	<35
<i>Polycyclic Aromatic Hydrocarbons (PAH)</i>											
Naphthalene		<0.011	<0.012	<0.015	<0.016	<0.016	<0.014	0.009J	0.011J	0.009J	0.009J
2-Methylnaphthalene		<0.011	<0.012	<0.015	<0.016	<0.016	<0.014	<0.012	<0.012	<0.012	<0.012
Acenaphthylene		<0.011	<0.012	<0.015	<0.016	<0.016	<0.014	<0.012	<0.012	<0.012	<0.012
Acenaphthene		<0.011	<0.012	<0.015	<0.016	<0.016	<0.014	<0.012	<0.012	<0.012	<0.012
Fluorene		<0.011	<0.012	<0.015	<0.016	<0.016	<0.014	<0.012	<0.012	<0.012	<0.012
Phenanthrene		<0.011	<0.012	0.067	0.035	0.023	0.023	<0.012	<0.012	<0.012	<0.012
Anthracene		<0.011	<0.012	0.025	<0.016	<0.016	<0.014	<0.012	<0.012	<0.012	<0.012
Fluoranthene		0.011	<0.012	0.190	0.077	0.058	0.050	<0.012	<0.012	<0.012	<0.012
Pyrene		<0.011	<0.012	0.140	0.064	0.050	0.051	<0.012	0.009J	<0.012	<0.012
Benzo(a)anthracene		<0.011	<0.012	0.075	0.033	0.025	0.026	<0.012	<0.012	<0.012	<0.012
Chrysene		<0.011	<0.012	0.072	0.030	0.027	0.026	<0.012	0.012	<0.012	<0.012
Benzo(b)fluoranthene		<0.011	<0.012	0.058	0.025	0.021	0.021	<0.012	<0.012	<0.012	<0.012
Benzo(k)fluoranthene		<0.011	<0.012	0.068	0.025	0.020	0.020	<0.012	<0.012	<0.012	<0.012
Benzo(a)pyrene		<0.011	<0.012	0.087	0.034	0.028	0.029	<0.012	0.008J	<0.012	<0.012
Indeno(1,2,3-cd)pyrene		<0.011	<0.012	0.043	0.019	<0.016	0.015	<0.012	<0.012	<0.012	<0.012
Dibenzo(a,h)anthracene		<0.011	<0.012	<0.015	<0.016	<0.016	<0.014	<0.012	<0.012	<0.012	<0.012
Benzo(g,h,i)perylene		<0.011	<0.012	0.045	0.020	0.017	0.017	<0.012	<0.012	<0.012	<0.012
Total PAH <sup>4</sup>		0.099	ND	0.915	0.418	0.333	0.327	0.105	0.118	0.105	0.105

Notes:

- Concentrations in parts per million (ppm) or milligrams per kilogram (mg/kg).
  - PAH analyzed by gas chromatograph/mass spectrometer-select ion monitoring (GC/MS-SIM), EPA Method 8270.
  - J = estimated value less than detection limit; "<" less than detection limit; "-" = not analyzed, "ND" = not detected
  - Total PAH value represents the sum of detected concentrations plus one-half detection limit if a constituent was not detected. "ND" indicates no PAH were detected.
- \* Sample W2A10-ST-S07, its duplicate -XXX, and -S09 were analyzed by 2 labs. Results were averaged together for use in summary statistics.

**TABLE II-A**  
SUBTIDAL ANALYTICAL DATA USED IN RISK CHARACTERIZATION

Barge B120 Oil Spill  
Buzzards Bay, Massachusetts

Analyte	Sample ID:	W2A10-ST-S05		W2A10-ST-S06*		W2A10-ST-S07*		W2A10-ST-XXX*		W2A10-ST-S08*		W2A10-ST-S09*		LI-DS-S01	LI-DS-S02	LI-DS-S03
	Sampling Date:	7/22/2004		7/22/2004		7/22/2004		7/22/2004		7/22/2004		7/22/2004		8/11/2004	8/11/2004	8/11/2004
<i>Extractable Petroleum Hydrocarbons (EPH)</i>																
C <sub>9</sub> -C <sub>18</sub> Aliphatic Hydrocarbons		<39	<36	--	<110	--	<92	--	<32	--	<36	--	<52	<44	<34	
C <sub>19</sub> -C <sub>36</sub> Aliphatic Hydrocarbons		<39	<36	--	<110	--	130	--	<32	--	<36	--	<52	<44	<34	
C <sub>11</sub> -C <sub>22</sub> Aromatic Hydrocarbons		<39	<36	--	110	--	110	--	<32	--	<36	--	<52	<44	<34	
<i>Polycyclic Aromatic Hydrocarbons (PAH)</i>																
Naphthalene		0.011J	0.010J	0.005J	0.033J	0.014J	0.031	0.0132	0.009J	0.0048	0.008	0.0005	<0.018	<0.015	<0.011	
2-Methylnaphthalene		<0.013	<0.012	0.0036	0.031J	0.0113	0.023J	0.0096	<0.011	0.003	<0.012	0.0005	<0.018	<0.015	<0.011	
Acenaphthylene		<0.013	<0.012	0.0082	<0.035	0.0213	<0.031	0.0235	<0.011	0.005	<0.012	0.0006	<0.018	<0.015	<0.011	
Acenaphthene		<0.013	<0.012	0.0054	<0.035	0.007	<0.031	0.0059	<0.011	0.0055	<0.012	0.000J	<0.018	<0.015	<0.011	
Fluorene		<0.013	<0.012	0.006	<0.035	0.0155	<0.031	0.0113	<0.011	0.0051	<0.012	0.000J	<0.018	<0.015	<0.011	
Phenanthrene		0.032	0.01	0.0598	0.075	0.136	0.053	0.083	0.018	0.0439	<0.012	0.0003	<0.018	<0.015	<0.011	
Anthracene		<0.013	<0.012	0.0154	<0.035	0.0538	<0.031	0.0311	<0.011	0.0123	<0.012	0.0006	<0.018	<0.015	<0.011	
Fluoranthene		0.017	0.023	0.153	0.18	0.275	0.15	0.216	0.025	0.109	<0.012	0.0012	0.033	0.018	<0.011	
Pyrene		0.025	0.021	0.158	0.23	0.371	0.17	0.273	0.023	0.1	<0.012	0.0016	0.032	0.024	<0.011	
Benzo(a)anthracene		0.012J	0.015J	0.127J	0.190J	0.467J	0.12	0.262	0.014	0.0867	<0.012	0.0017	<0.018	0.016	<0.011	
Chrysene		0.014	0.022	0.135	0.33	0.566	0.21	0.302	0.02	0.0933	<0.012	0.0022	0.019	0.016	<0.011	
Benzo(b)fluoranthene		<0.013	0.014	0.0942	0.17	0.15	0.13	0.164	0.014	0.059	<0.012	0.0026	<0.018	<0.015	<0.011	
Benzo(k)fluoranthene		<0.013	0.011	0.0289	0.1	0.0226	0.086	0.0501	0.011	0.0189	<0.012	0.0009	<0.018	<0.015	<0.011	
Benzo(a)pyrene		0.010J	0.019J	0.091J	0.220J	0.131J	0.15	0.166	0.018J	0.0551	<0.012	0.0025	0.019	0.017	<0.011	
Indeno(1,2,3-cd)pyrene		<0.013	<0.012	0.0734	0.056	0.0676	0.039	0.0983	<0.011	0.0421	<0.012	0.0019	<0.018	<0.015	<0.011	
Dibenzo(a,h)anthracene		<0.013	<0.012	0.0144	0.033J	0.0208	0.023J	0.0262	<0.011	0.0081	<0.012	0.0003	<0.018	<0.015	<0.011	
Benzo(g,h,i)perylene		<0.013	0.009	0.0599	0.073	0.0495	0.049	0.0779	0.008	0.0295	<0.012	0.0016	<0.018	<0.015	<0.011	
Total PAH <sup>4</sup>		0.186	0.196	1.04	1.79	2.38	1.30	1.81	0.199	0.681	0.104	0.019	0.220	0.181	ND	

Notes:

1. Concentrations in parts per million (ppm) or milligrams per kilogram (mg/kg).
  2. PAH analyzed by gas chromatograph/mass spectrometer-select ion monitoring (GC/MS-SIM), EPA Method 8270.
  3. J = estimated value less than detection limit; "<" less than detection limit; "--" = not analyzed, "ND" = not detected
  4. Total PAH value represents the sum of detected concentrations plus one-half detection limit if a constituent was not detected. "ND" indicates no PAH were detected.
- \* Sample W2A10-ST-S07, its duplicate -XXX, and -S09 were analyzed by 2 labs. Results were averaged together for use in summary statistics.

**TABLE II-A**

SUBTIDAL ANALYTICAL DATA USED IN RISK CHARACTERIZATION

Barge B120 Oil Spill  
Buzzards Bay, Massachusetts

Analyte	Sample ID:	LI-DS-S04	BJ-SS-S01	BJ-SS-S02	BJ-SS-S03	BJ-SS-S04	BJ-DS-S01	BJ-DS-S02	BJ-DS-S03	BJ-DS-S04	SN-SS-S01
	Sampling Date:	8/11/2004	09/02/04	09/02/04	09/02/04	09/02/04	09/02/04	09/02/04	09/02/04	09/02/04	08/12/04
<i>Extractable Petroleum Hydrocarbons (EPH)</i>											
C <sub>9</sub> -C <sub>18</sub> Aliphatic Hydrocarbons		<38	<37	<46	<36	<40	<40	<38	<38	<42	<38
C <sub>19</sub> -C <sub>36</sub> Aliphatic Hydrocarbons		<38	<37	<46	<36	<40	<40	<38	<38	<42	<38
C <sub>11</sub> -C <sub>22</sub> Aromatic Hydrocarbons		<38	<37	<46	<36	<40	<40	<38	<38	<42	<38
<i>Polycyclic Aromatic Hydrocarbons (PAH)</i>											
Naphthalene		<0.012	<0.012	<0.016	<0.012	<0.013	0.005J	<0.013	<0.012	<0.014	<0.013
2-Methylnaphthalene		<0.012	<0.012	<0.016	<0.012	<0.013	0.005J	<0.013	<0.012	<0.014	<0.013
Acenaphthylene		<0.012	<0.012	<0.016	<0.012	<0.013	<0.013	<0.013	<0.012	<0.014	<0.013
Acenaphthene		<0.012	<0.012	<0.016	<0.012	<0.013	<0.013	<0.013	<0.012	<0.014	<0.013
Fluorene		<0.012	<0.012	<0.016	<0.012	<0.013	<0.013	<0.013	<0.012	<0.014	<0.013
Phenanthrene		<0.012	<0.012	0.007J	<0.012	<0.013	0.007J	<0.013	<0.012	<0.014	<0.013
Anthracene		<0.012	<0.012	<0.016	<0.012	<0.013	<0.013	<0.013	<0.012	<0.014	<0.013
Fluoranthene		<0.012	<0.012	0.007J	<0.012	<0.013	0.008J	<0.013	<0.012	<0.014	<0.013
Pyrene		<0.012	<0.012	0.011J	<0.012	<0.013	0.006J	<0.013	<0.012	<0.014	<0.013
Benzo(a)anthracene		<0.012	<0.012	0.006J	<0.012	<0.013	0.005J	<0.013	<0.012	<0.014	<0.013
Chrysene		<0.012	<0.012	0.006J	<0.012	<0.013	<0.013	<0.013	<0.012	<0.014	<0.013
Benzo(b)fluoranthene		<0.012	<0.012	<0.016	<0.012	<0.013	<0.013	<0.013	<0.012	<0.014	<0.013
Benzo(k)fluoranthene		<0.012	<0.012	<0.016	<0.012	<0.013	<0.013	<0.013	<0.012	<0.014	<0.013
Benzo(a)pyrene		<0.012	<0.012	0.005J	<0.012	<0.013	<0.013	<0.013	<0.012	<0.014	<0.013
Indeno(1,2,3-cd)pyrene		<0.012	<0.012	<0.016	<0.012	<0.013	<0.013	<0.013	<0.012	<0.014	<0.013
Dibenzo(a,h)anthracene		<0.012	<0.012	<0.016	<0.012	<0.013	<0.013	<0.013	<0.012	<0.014	<0.013
Benzo(g,h,i)perylene		<0.012	<0.012	<0.016	<0.012	<0.013	<0.013	<0.013	<0.012	<0.014	<0.013
Total PAH <sup>1</sup>		ND	ND	0.130	ND	ND	0.108	ND	ND	ND	ND

Notes:

- Concentrations in parts per million (ppm) or milligrams per kilogram (mg/kg).
  - PAH analyzed by gas chromatograph/mass spectrometer-select ion monitoring (GC/MS-SIM), EPA Method 8270.
  - J = estimated value less than detection limit; "<" less than detection limit; "--" = not analyzed, "ND" = not detected
  - Total PAH value represents the sum of detected concentrations plus one-half detection limit if a constituent was not detected. "ND" indicates no PAH were detected.
- \* Sample W2A10-ST-S07, its duplicate -XXX, and -S09 were analyzed by 2 labs. Results were averaged together for use in summary statistics.



**TABLE II-A**

SUBTIDAL ANALYTICAL DATA USED IN RISK CHARACTERIZATION

Barge B120 Oil Spill  
Buzzards Bay, Massachusetts

Analyte	Sample ID:	SN-SS-S02	SN-SS-S03	SN-SS-S04	SN-DS-S01	SN-DS-S02	SN-DS-S03	SN-DS-S04	BSS-S02	DL-SS-S01	DL-SS-S02
	Sampling Date:	08/12/04	08/12/04	08/12/04	08/12/04	08/12/04	08/12/04	08/12/04	08/12/04	08/12/04	08/12/04
<i>Extractable Petroleum Hydrocarbons (EPH)</i>											
C <sub>9</sub> -C <sub>18</sub> Aliphatic Hydrocarbons		<37	<36	<37	<37	<36	<34	<43	<35	<35	<36
C <sub>19</sub> -C <sub>36</sub> Aliphatic Hydrocarbons		<37	<36	<37	<37	<36	<34	65	<35	<35	<36
C <sub>11</sub> -C <sub>22</sub> Aromatic Hydrocarbons		<37	<36	<37	<37	<36	<34	<43	<35	<35	<36
<i>Polycyclic Aromatic Hydrocarbons (PAH)</i>											
Naphthalene		<0.013	0.015	<0.013	<0.013	<0.012	<0.012	0.016	<0.012	<0.012	<0.012
2-Methylnaphthalene		<0.013	0.015	<0.013	<0.013	<0.012	<0.012	0.015	<0.012	<0.012	<0.012
Acenaphthylene		<0.013	<0.012	<0.013	<0.013	<0.012	<0.012	<0.014	<0.012	<0.012	<0.012
Acenaphthene		<0.013	<0.012	<0.013	<0.013	<0.012	<0.012	<0.014	<0.012	<0.012	<0.012
Fluorene		<0.013	<0.012	<0.013	<0.013	<0.012	<0.012	<0.014	<0.012	<0.012	<0.012
Phenanthrene		<0.013	<0.012	<0.013	<0.013	<0.012	<0.012	0.015	<0.012	<0.012	<0.012
Anthracene		<0.013	<0.012	<0.013	<0.013	<0.012	<0.012	<0.014	<0.012	<0.012	<0.012
Fluoranthene		<0.013	<0.012	<0.013	<0.013	<0.012	<0.012	0.04	<0.012	<0.012	<0.012
Pyrene		<0.013	<0.012	<0.013	<0.013	<0.012	<0.012	0.04	<0.012	<0.012	<0.012
Benzo(a)anthracene		<0.013	<0.012	<0.013	<0.013	<0.012	<0.012	0.023	<0.012	<0.012	<0.012
Chrysene		<0.013	<0.012	<0.013	<0.013	<0.012	<0.012	0.025	<0.012	<0.012	<0.012
Benzo(b)fluoranthene		<0.013	<0.012	<0.013	<0.013	<0.012	<0.012	0.019	<0.012	<0.012	<0.012
Benzo(k)fluoranthene		<0.013	<0.012	<0.013	<0.013	<0.012	<0.012	0.024	<0.012	<0.012	<0.012
Benzo(a)pyrene		<0.013	<0.012	<0.013	<0.013	<0.012	<0.012	0.03	<0.012	<0.012	<0.012
Indeno(1,2,3-cd)pyrene		<0.013	<0.012	<0.013	<0.013	<0.012	<0.012	<0.014	<0.012	<0.012	<0.012
Dibenzo(a,h)anthracene		<0.013	<0.012	<0.013	<0.013	<0.012	<0.012	<0.014	<0.012	<0.012	<0.012
Benzo(g,h,i)perylene		<0.013	<0.012	<0.013	<0.013	<0.012	<0.012	<0.014	<0.012	<0.012	<0.012
Total PAH <sup>1</sup>		ND	0.120	ND	ND	ND	ND	0.296	ND	ND	ND

Notes:

1. Concentrations in parts per million (ppm) or milligrams per kilogram (mg/kg).
2. PAH analyzed by gas chromatograph/mass spectrometer-select ion monitoring (GC/MS-SIM), EPA Method 8270.
3. J = estimated value less than detection limit; "<" less than detection limit; "--" = not analyzed, "ND" = not detected
4. Total PAH value represents the sum of detected concentrations plus one-half detection limit if a constituent was not detected. "ND" indicates no PAH were detected.

\* Sample W2A10-ST-S07, its duplicate -XXX, and -S09 were analyzed by 2 labs. Results were averaged together for use in summary statistics.

**TABLE II-A**

SUBTIDAL ANALYTICAL DATA USED IN RISK CHARACTERIZATION

Barge B120 Oil Spill  
 Buzzards Bay, Massachusetts

Analyte	Sample ID:	DL-SS-S03	DL-SS-S04	DL-DS-S01	DL-DS-S02	DL-DS-S03	DL-DS-S04
	Sampling Date:	08/12/04	08/12/04	08/12/04	08/12/04	08/12/04	08/12/04
<i>Extractable Petroleum Hydrocarbons (EPH)</i>							
C <sub>9</sub> -C <sub>18</sub> Aliphatic Hydrocarbons		<38	<38	<36	<40	<38	<39
C <sub>19</sub> -C <sub>36</sub> Aliphatic Hydrocarbons		<38	<38	<36	<40	<38	<39
C <sub>11</sub> -C <sub>22</sub> Aromatic Hydrocarbons		<38	<38	<36	<40	<38	<39
<i>Polycyclic Aromatic Hydrocarbons (PAH)</i>							
Naphthalene		<0.013	<0.013	<0.012	<0.013	<0.012	<0.013
2-Methylnaphthalene		<0.013	<0.013	<0.012	<0.013	<0.012	<0.013
Acenaphthylene		<0.013	<0.013	<0.012	<0.013	<0.012	<0.013
Acenaphthene		<0.013	<0.013	<0.012	<0.013	<0.012	<0.013
Fluorene		<0.013	<0.013	<0.012	<0.013	<0.012	<0.013
Phenanthrene		<0.013	<0.013	<0.012	<0.013	<0.012	<0.013
Anthracene		<0.013	<0.013	<0.012	<0.013	<0.012	<0.013
Fluoranthene		<0.013	<0.013	<0.012	<0.013	<0.012	<0.013
Pyrene		<0.013	<0.013	<0.012	<0.013	<0.012	<0.013
Benzo(a)anthracene		<0.013	<0.013	<0.012	<0.013	<0.012	<0.013
Chrysene		<0.013	<0.013	<0.012	<0.013	<0.012	<0.013
Benzo(b)fluoranthene		<0.013	<0.013	<0.012	<0.013	<0.012	<0.013
Benzo(k)fluoranthene		<0.013	<0.013	<0.012	<0.013	<0.012	<0.013
Benzo(a)pyrene		<0.013	<0.013	<0.012	<0.013	<0.012	<0.013
Indeno(1,2,3-cd)pyrene		<0.013	<0.013	<0.012	<0.013	<0.012	<0.013
Dibenzo(a,h)anthracene		<0.013	<0.013	<0.012	<0.013	<0.012	<0.013
Benzo(g,h,i)perylene		<0.013	<0.013	<0.012	<0.013	<0.012	<0.013
Total PAH <sup>1</sup>		ND	ND	ND	ND	ND	ND

TABLE II-B

INTERTIDAL SEDIMENT ANALYTICAL DATA USED IN RISK CHARACTERIZATION

Barge B120 Oil Spill  
Buzzards Bay, Massachusetts

Segment ID	W1E-03	W1E-03	W1E-03	W1E-04	W1E-04	W1E-04	W1E-04	W1E-04	W1E-04	W1E-04	W1E-04
Sample ID Sample Date	WIE03-UIT-01 1/21/2004	WIE03-UIT-02 1/21/2004	WIE03-UIT-03 1/21/2004	WIE04-UIT-01 1/21/2004	DDD01-UIT-01 1/21/04	WIE04-LIT-01 1/21/2004	DDD01-LIT-01 1/21/04	WIE04-UIT-02 1/21/2004	WIE04-LIT-02 1/21/2004	WIE04-UIT-03 1/21/2004	WIE04-LIT-03 1/21/2004
<i>Extractable Petroleum Hydrocarbons (EPH)</i>											
C <sub>9</sub> -C <sub>18</sub> Aliphatic Hydrocarbons	<36	<33	<30	<34	<31	<36	<31	<32	<30	<31	<30
C <sub>19</sub> -C <sub>36</sub> Aliphatic Hydrocarbons	<36	<33	<30	<34	<31	<36	<31	<32	<30	<31	<30
C <sub>11</sub> -C <sub>22</sub> Aromatic Hydrocarbons	<36	<33	<30	<34	<31	<36	<31	<32	<30	<31	<30
<i>Polycyclic Aromatic Hydrocarbons (PAH)</i>											
Naphthalene	0.013	0.011	0.008J	0.010J	0.010	0.011J	0.010	0.011	0.010	0.010	0.009J
2-Methylnaphthalene	0.010J	0.008J	0.006J	0.006J	0.007J	0.007J	0.008J	0.007J	0.006J	0.006J	0.007J
Acenaphthylene	<0.012	<0.011	<0.010	<0.011	<0.010	<0.012	<0.010	<0.011	<0.010	<0.010	<0.010
Acenaphthene	<0.012	<0.011	<0.010	<0.011	<0.010	<0.012	<0.010	<0.011	<0.010	<0.010	<0.010
Fluorene	<0.012	<0.011	<0.010	<0.011	<0.010	<0.012	<0.010	<0.011	<0.010	<0.010	<0.010
Phenanthrene	<0.012	<0.011	<0.010	<0.011	0.006J	<0.012	<0.010	0.011	0.018	0.015	0.012
Anthracene	<0.012	<0.011	<0.010	<0.011	<0.010	<0.012	<0.010	<0.011	<0.010	<0.010	<0.010
Fluoranthene	<0.012	<0.011	0.007J	<0.011	0.019	<0.012	<0.010	0.016	0.024	0.030	0.026
Pyrene	<0.012	<0.011	0.007J	<0.011	0.017	<0.012	<0.010	0.02	0.028	0.027	0.023
Benzo(a)anthracene	<0.012	<0.011	<0.010	<0.011	0.008J	<0.012	<0.010	0.006J	0.008J	0.014	0.008J
Chrysene	<0.012	<0.011	<0.010	<0.011	0.010J	<0.012	<0.010	0.013	0.014	0.014	0.013
Benzo(b)fluoranthene	<0.012	<0.011	<0.010	<0.011	0.008J	<0.012	<0.010	0.006J	0.007J	0.012	0.010
Benzo(k)fluoranthene	<0.012	<0.011	<0.010	<0.011	0.007J	<0.012	<0.010	0.006J	0.008J	0.012	0.009J
Benzo(a)pyrene	<0.012	<0.011	<0.010	<0.011	0.008J	<0.012	<0.010	0.006J	0.007J	0.014	0.011
Indeno(1,2,3-cd)pyrene	<0.012	<0.011	<0.010	<0.011	<0.010	<0.012	<0.010	<0.011	<0.010	0.008J	0.008J
Dibenzo(a,h)anthracene	<0.012	<0.011	<0.010	<0.011	<0.010	<0.012	<0.010	<0.011	<0.010	<0.010	<0.010
Benzo(g,h)perylene	<0.012	<0.011	<0.010	<0.011	0.006J	<0.012	<0.010	<0.011	0.005J	0.009J	0.009J
Total PAH <sup>1</sup>	0.11	0.10	0.09	0.10	0.14	0.11	0.09	0.14	0.17	0.20	0.17

Notes:

- Concentrations in parts per million (ppm) or milligrams per kilogram (mg/kg).
- PAH analyzed by gas chromatograph/mass spectrometer-select ion monitoring (GC/MS-SIM), EPA Method 8270.
- J = estimated value less than detection limit; "<" less than detection limit; "-" = not analyzed, "ND" = not detected
- Total PAH value represents the sum of detected concentrations plus one-half detection limit if a constituent was not detected. "ND" indicates no PAH were detected.

TABLE II-B

INTERTIDAL SEDIMENT ANALYTICAL DATA USED IN RISK CHARACTERIZATION

Barge B120 Oil Spill  
Buzzards Bay, Massachusetts

Segment ID	W1E-04	W1E-04	W1E-04	W1E-04	W1F-02	W1F-02	W1F-02	W1F-02	W1F-02	W1F-02
Sample ID	W1E04-P2-UIT-01	W1E04-P2-LIT-01	W1E04-P2-UIT-02	W1E04-P2-LIT-02	W1F02-P2-UIT-01	W1F02-P2-LIT-01	W1F02-P2-UIT-02	W1F02-P2-LIT-02	HB-SED-01	HB-DUP-01
Sample Date	8/31/2005	8/31/2005	9/1/2005	9/1/2005	9/14/2005	9/14/2005	9/14/2005	9/14/2005	12/09/04	12/09/04
<i>Extractable Petroleum Hydrocarbons (EPH)</i>										
C <sub>7</sub> -C <sub>18</sub> Aliphatic Hydrocarbons	<30	<37	<31	<34	<30	<34	<31	<32	<33	<35
C <sub>19</sub> -C <sub>36</sub> Aliphatic Hydrocarbons	<30	<37	<31	<34	<30	<34	<31	<32	<33	<35
C <sub>11</sub> -C <sub>22</sub> Aromatic Hydrocarbons	<30	<37	<31	<34	<30	<34	<31	<32	<33	<35
<i>Polycyclic Aromatic Hydrocarbons (PAH)</i>										
Naphthalene	0.005J	0.007J	<0.013	0.006J	<0.017	<0.017	<0.017	<0.017	0.0001	0.0002
2-Methylnaphthalene	<0.01	<0.012	<0.013	<0.011	<0.017	<0.017	<0.017	<0.017	0.0001	0.0002
Acenaphthylene	<0.01	<0.012	<0.013	<0.011	<0.017	<0.017	<0.017	<0.017	0.0001J	0.0001J
Acenaphthene	<0.01	<0.012	<0.013	<0.011	<0.017	<0.017	<0.017	<0.017	0.0001	0.0002
Fluorene	<0.01	<0.012	<0.013	0.006J	<0.017	<0.017	<0.017	<0.017	0.0001J	<0.0002
Phenanthrene	<0.01	0.008J	<0.013	0.037	<0.017	<0.017	<0.017	<0.017	0.0002	0.0003
Anthracene	<0.01	<0.012	<0.013	<0.011	<0.017	<0.017	<0.017	<0.017	0.0001J	<0.0002
Fluoranthene	0.006J	0.023	<0.013	0.023	<0.017	<0.017	<0.017	<0.017	0.0005	0.0006
Pyrene	0.005J	0.020	<0.013	0.025	<0.017	<0.017	<0.017	<0.017	0.0007	0.0013
Benzo(a)anthracene	<0.01	0.014	<0.013	0.011	<0.017	<0.017	<0.017	<0.017	0.0004	0.0007
Chrysene	<0.01	0.015	<0.013	0.011	<0.017	<0.017	<0.017	<0.017	0.0013	0.0011
Benzo(b)fluoranthene	<0.01	0.007J	<0.013	<0.011	<0.017	<0.017	<0.017	<0.017	0.0005	0.0009
Benzo(k)fluoranthene	<0.01	0.007J	<0.013	<0.011	<0.017	<0.017	<0.017	<0.017	0.0002	0.0001
Benzo(a)pyrene	<0.01	<0.012	<0.013	<0.011	<0.017	<0.017	<0.017	<0.017	0.0003	0.0007
Indeno(1,2,3-cd)pyrene	0.007J	0.013	<0.013	0.008J	<0.017	<0.017	<0.017	<0.017	0.0002	0.0004
Dibenzo(a,h)anthracene	<0.01	<0.012	<0.013	<0.011	<0.017	<0.017	<0.017	<0.017	0.0001J	0.0001J
Benzo(g,h,i)perylene	<0.01	0.007J	<0.013	<0.011	<0.017	<0.017	<0.017	<0.017	0.0002	0.0005
Total PAH*	0.09	0.16	ND	0.18	ND	ND	ND	ND	0.005	0.008

Notes:

1. Concentrations in parts per million (ppm) or milligrams per kilogram (mg/kg).
2. PAH analyzed by gas chromatograph/mass spectrometer-select ion monitoring (GC/MS-SIM), EPA Method 8270.
3. J = estimated value less than detection limit; "<" less than detection limit; "--" = not analyzed, "ND" = not detected
4. Total PAH value represents the sum of detected concentrations plus one-half detection limit if a constituent was not detected. "ND" indicates no PAH were detected.

TABLE II-B

INTERTIDAL SEDIMENT ANALYTICAL DATA USED IN RISK CHARACTERIZATION

Barge B120 Oil Spill  
Buzzards Bay, Massachusetts

Segment ID	W1F-02	W1F-02	W1F-02	W1F-02	W1F-02	W1F-02	W1F-02	W1F-02	W1F-02	W2A-02	W2A-02
Sample ID	HB-SED-02	HB-SED-03	HB-SED-04	HB-SED-05	HB-SED-06	HB-SED-07	HB-SED-08	HB-SED-09	W2A02-82905-01	W2A02-82905-02	
Sample Date	12/09/04	12/09/04	12/09/04	12/09/04	12/09/04	12/09/04	12/09/04	12/09/04	8/29/2005	8/29/2005	
<i>Extractable Petroleum Hydrocarbons (EPH)</i>											
C <sub>9</sub> -C <sub>18</sub> Aliphatic Hydrocarbons	<34	<34	<34	<33	<33	<34	<35	<35	<33	<36	
C <sub>19</sub> -C <sub>26</sub> Aliphatic Hydrocarbons	<34	<34	<34	<33	<33	<34	<35	<35	<33	<36	
C <sub>11</sub> -C <sub>22</sub> Aromatic Hydrocarbons	<34	<34	<34	<33	<33	<34	<35	<35	<33	<36	
<i>Polycyclic Aromatic Hydrocarbons (PAH)</i>											
Naphthalene	0.0002	0.0002	0.0001	0.0001	0.0001	0.0002	0.0002	0.0002	<0.011	<0.012	
2-Methylnaphthalene	0.0001	0.0002	0.0001	0.0001	0.0002	0.0002	0.0002	0.0002	<0.011	<0.012	
Acenaphthylene	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	0.0001J	<0.0002	<0.011	<0.012	
Acenaphthene	0.0001	0.0001	<0.0001	0.0001	0.0001	<0.0001	<0.0001	0.0002	<0.011	<0.012	
Fluorene	<0.0002	0.0001J	<0.0002	<0.0002	0.0001J	<0.0002	0.0003	0.0001J	<0.011	<0.012	
Phenanthrene	0.0001	0.0007	0.0002	0.0002	0.0003	0.0003	0.0007	0.0005	0.042	0.019	
Anthracene	<0.0002	0.0001J	<0.0002	<0.0002	<0.0002	0.0001	0.0007	<0.0002	<0.011	<0.012	
Fluoranthene	0.0002	0.0007	0.0002	0.0004	0.0003	0.0006	0.0023	0.0004	0.110	0.033	
Pyrene	0.0003	0.0029	0.0004	0.0005	0.0004	0.0035	0.0126	0.0005	0.130	0.029	
Benzo(a)anthracene	0.0001	0.0017	0.0002	0.0002	0.0002	0.0055	0.0094	0.0002	0.055	0.014	
Chrysene	0.0004	0.0036	0.0009	0.0010	0.0005	0.0123	0.0182	0.0004	0.063	0.013	
Benzo(b)fluoranthene	0.0004	0.0009	0.0004	0.0006	0.0004	0.0031	0.0040	0.0005	0.063	<0.012	
Benzo(k)fluoranthene	0.0001	0.0002	0.0001	0.0001	0.0001	0.0004	0.0004	0.0001	0.027	<0.012	
Benzo(a)pyrene	0.0003	0.0010	0.0005	0.0003	0.0003	0.0043	0.0059	0.0003	0.043	<0.012	
Indeno(1,2,3-cd)pyrene	0.0001	0.0002	0.0002	0.0002	0.0002	0.0005	0.0008	0.0002	0.036	0.012	
Dibenzo(a,h)anthracene	0.0001J	0.0001J	0.0002	0.0001J	0.0001J	0.0006	0.0007	<0.0002	0.017	<0.012	
Benzo(g,h,i)perylene	0.0002	0.0003	0.0003	0.0002	0.0003	0.0011	0.0014	0.0002	0.029	<0.012	
Total PAH <sup>1</sup>	0.003	0.013	0.004	0.004	0.004	0.033	0.058	0.004	0.65	0.19	

Notes:

- Concentrations in parts per million (ppm) or milligrams per kilogram (mg/kg).
- PAH analyzed by gas chromatograph/mass spectrometer-select ion monitoring (GC/MS-SIM), EPA Method 8270.
- J = estimated value less than detection limit; "<" less than detection limit; "-" = not analyzed, "ND" = not detected
- Total PAH value represents the sum of detected concentrations plus one-half detection limit if a constituent was not detected. "ND" indicates no PAH were detected.

TABLE II-B

INTERTIDAL SEDIMENT ANALYTICAL DATA USED IN RISK CHARACTERIZATION

Barge B120 Oil Spill  
Buzzards Bay, Massachusetts

Segment ID	W2A-03	W2A-03	W2A-03	W2A-03	W2A-03	W2A-10	W2A-10	W2A-10
	Sample ID W2A03-UIT-01	Sample ID W2A03-LIT-01	Sample ID W2A03-UIT-02	Sample ID W2A03-UIT-03	Sample ID W2A03-LIT-03	Sample ID W2A-10-P2-UIT-01	Sample ID W2A-10-P2-LIT-01	Sample ID W2A-10-P2-UIT-02
Sample Date	1/19/2004	1/19/2004	1/19/2004	1/19/2004	1/19/2004	8/30/2005	8/30/2005	8/30/2005
<i>Extractable Petroleum Hydrocarbons (EPH)</i>								
C <sub>7</sub> -C <sub>18</sub> Aliphatic Hydrocarbons	<31	<38	<34	<37	<35	<35	<34	<30
C <sub>19</sub> -C <sub>26</sub> Aliphatic Hydrocarbons	<31	<38	<34	<37	<35	<35	<34	<30
C <sub>11</sub> -C <sub>22</sub> Aromatic Hydrocarbons	<31	<38	<34	<37	<35	<35	<34	<30
<i>Polycyclic Aromatic Hydrocarbons (PAH)</i>								
Naphthalene	0.009J	0.014	0.008J	0.014	0.012	<0.016	<0.018	<0.012
2-Methylnaphthalene	<0.010	<0.013	<0.011	<0.012	<0.012	<0.016	<0.018	<0.012
Acenaphthylene	<0.010	<0.013	<0.011	0.011J	<0.012	<0.016	<0.018	<0.012
Acenaphthene	<0.010	<0.013	<0.011	<0.012	<0.012	<0.016	<0.018	<0.012
Fluorene	<0.010	<0.013	<0.011	0.011J	<0.012	<0.016	<0.018	<0.012
Phenanthrene	0.006J	<0.013	0.041	0.160	0.072	<0.016	<0.018	<0.012
Anthracene	<0.010	<0.013	0.009J	0.025	0.012	<0.016	<0.018	<0.012
Fluoranthene	0.010	<0.013	0.060	0.310	0.160	<0.016	<0.018	<0.012
Pyrene	0.009J	<0.013	0.048	0.300	0.130	<0.016	<0.018	<0.012
Benzo(a)anthracene	<0.010	<0.013	0.021	0.110	0.060	<0.016	<0.018	<0.012
Chrysene	0.006J	<0.013	0.025	0.130	0.079	<0.016	<0.018	<0.012
Benzo(b)fluoranthene	0.006J	<0.013	0.022	0.110	0.064	<0.016	<0.018	<0.012
Benzo(k)fluoranthene	<0.010	<0.013	0.019	0.095	0.061	<0.016	<0.018	<0.012
Benzo(a)pyrene	<0.010	<0.013	0.029	0.170	0.080	<0.016	<0.018	<0.012
Indeno(1,2,3-cd)pyrene	<0.010	<0.013	0.016	0.097	0.042	<0.016	<0.018	<0.012
Dibenzo(a,h)anthracene	<0.010	<0.013	<0.011	0.019	0.012	<0.016	<0.018	<0.012
Benzo(g,h,i)perylene	<0.010	<0.013	0.020	0.120	0.046	<0.016	<0.018	<0.012
Total PAH*	0.10	0.12	0.35	1.69	0.85	ND	ND	ND

Notes:

1. Concentrations in parts per million (ppm) or milligrams per kilogram (mg/kg).
2. PAH analyzed by gas chromatograph/mass spectrometer-select ion monitoring (GC/MS-SIM), EPA Method 8270.
3. J = estimated value less than detection limit; "<" less than detection limit; "--" = not analyzed, "ND" = not detected
4. Total PAH value represents the sum of detected concentrations plus one-half detection limit if a constituent was not detected. "ND" indicates no PAH were detected.

TABLE II-B

INTERTIDAL SEDIMENT ANALYTICAL DATA USED IN RISK CHARACTERIZATION

Barge B120 Oil Spill  
Buzzards Bay, Massachusetts

Segment ID	W2A-10	W2A-10	W2A-10	W2A-10	W2A-10	W2A-11	W2A-11	W2A-11	W2A-11	W2A-11
Sample ID	W2A10-P2-LIT-02	W2A-10-P2-UIT-03	W2A-10-P2-LIT-03	W2A-10-P2-UIT-05	W2A-10-P2-LIT-05	W2A11-UIT-01	W2A11-LIT-01	W2A11-UIT-02	W2A11-LIT-02	W2A11-UIT-03
Sample Date	8/30/2005	8/30/2005	8/30/2005	8/30/2005	8/30/2005	1/20/2004	1/20/2004	1/20/2004	1/20/2004	1/20/2004
<i>Extractable Petroleum Hydrocarbons (EPH)</i>										
C <sub>9</sub> -C <sub>18</sub> Aliphatic Hydrocarbons	<36	<32	<36	<32	<35	<33	<35	<30	<36	<35
C <sub>19</sub> -C <sub>26</sub> Aliphatic Hydrocarbons	<36	<32	<36	<32	<35	<33	<35	<30	<36	<35
C <sub>11</sub> -C <sub>22</sub> Aromatic Hydrocarbons	<36	<32	<36	<32	<35	<33	<35	<30	<36	<35
<i>Polycyclic Aromatic Hydrocarbons (PAH)</i>										
Naphthalene	0.015	<0.012	<0.014	<0.012	0.006J	0.010J	0.011J	0.009J	0.010J	0.010J
2-Methylnaphthalene	<0.012	<0.012	<0.014	<0.012	<0.012	<0.011	0.007J	<0.010	<0.012	0.006J
Acenaphthylene	<0.012	<0.012	<0.014	<0.012	<0.012	<0.011	<0.012	<0.010	<0.012	<0.012
Acenaphthene	<0.012	<0.012	<0.014	<0.012	<0.012	<0.011	<0.012	<0.010	<0.012	<0.012
Fluorene	<0.012	<0.012	<0.014	<0.012	<0.012	<0.011	<0.012	<0.010	<0.012	<0.012
Phenanthrene	0.007J	<0.012	<0.014	<0.012	<0.012	<0.011	<0.012	<0.010	<0.012	<0.012
Anthracene	<0.012	<0.012	<0.014	<0.012	<0.012	<0.011	<0.012	<0.010	<0.012	<0.012
Fluoranthene	0.024	0.011J	<0.014	<0.012	<0.012	<0.011	<0.012	<0.010	<0.012	<0.012
Pyrene	0.022	0.009J	<0.014	<0.012	<0.012	<0.011	<0.012	<0.010	<0.012	<0.012
Benzo(a)anthracene	0.012	<0.012	<0.014	<0.012	<0.012	<0.011	<0.012	<0.010	<0.012	<0.012
Chrysene	0.010J	<0.012	<0.014	<0.012	<0.012	<0.011	<0.012	<0.010	<0.012	<0.012
Benzo(b)fluoranthene	<0.012	<0.012	<0.014	<0.012	<0.012	<0.011	<0.012	<0.010	<0.012	<0.012
Benzo(k)fluoranthene	<0.012	<0.012	<0.014	<0.012	<0.012	<0.011	<0.012	<0.010	<0.012	<0.012
Benzo(a)pyrene	<0.012	<0.012	<0.014	<0.012	<0.012	<0.011	<0.012	<0.010	<0.012	<0.012
Indeno(1,2,3-cd)pyrene	0.011J	0.008J	<0.014	<0.012	<0.012	<0.011	<0.012	<0.010	<0.012	<0.012
Dibenzo(a,h)anthracene	<0.012	<0.012	<0.014	<0.012	<0.012	<0.011	<0.012	<0.010	<0.012	<0.012
Benzo(g,h,i)perylene	<0.012	<0.012	<0.014	<0.012	<0.012	<0.011	<0.012	<0.010	<0.012	<0.012
Total PAH*	0.16	0.11	ND	ND	0.10	0.10	0.11	0.09	0.11	0.11

Notes:

1. Concentrations in parts per million (ppm) or milligrams per kilogram (mg/kg).
2. PAH analyzed by gas chromatograph/mass spectrometer-select ion monitoring (GC/MS-SIM), EPA Method 8270.
3. J = estimated value less than detection limit; "<" less than detection limit; "-" = not analyzed, "ND" = not detected
4. Total PAH value represents the sum of detected concentrations plus one-half detection limit if a constituent was not detected. "ND" indicates no PAH were detected.

TABLE II-B

INTERTIDAL SEDIMENT ANALYTICAL DATA USED IN RISK CHARACTERIZATION

Barge B120 Oil Spill  
Buzzards Bay, Massachusetts

Segment ID	W2A-11	W2A-11	W2A-11	W2A-11	W2A-11	W2A-11	W2A-11	W3A-05	W3A-05	W3A-05
Sample ID Sample Date	W2A11-LIT-03 1/20/2004	W2A11-P2-LIT-01 8/29/2005	W2A11-P2-LIT-02 8/29/2005	DDD-P2-02 8/29/05	W2A11-P2-UIT-01 8/29/2005	W2A11-P2-UIT-02 8/29/2005	DDD-P2-01 8/29/05	W3A05-P2-UIT-01 9/1/2005	W3A05-P2-LIT-01 9/1/2005	W3A05-P2-UIT-02 9/1/2005
<i>Extractable Petroleum Hydrocarbons (EPH)</i>										
C <sub>7</sub> -C <sub>18</sub> Aliphatic Hydrocarbons	<35	<36	<30	<32	<30	<31	<33	<30	<35	<30
C <sub>19</sub> -C <sub>36</sub> Aliphatic Hydrocarbons	<35	<36	<30	<32	<30	<31	<33	<30	<35	<30
C <sub>11</sub> -C <sub>22</sub> Aromatic Hydrocarbons	<35	<36	<30	<32	<30	<31	<33	<30	<35	<30
<i>Polycyclic Aromatic Hydrocarbons (PAH)</i>										
Naphthalene	0.010J	<0.012	<0.01	<0.012	<0.01	<0.012	<0.014	0.006	<0.012	<0.01
2-Methylnaphthalene	<0.012	<0.012	<0.01	<0.012	<0.01	<0.012	<0.014	<0.01	<0.012	<0.01
Acenaphthylene	<0.012	<0.012	<0.01	<0.012	<0.01	<0.012	<0.014	<0.01	<0.012	<0.01
Acenaphthene	<0.012	<0.012	<0.01	<0.012	<0.01	<0.012	<0.014	<0.01	<0.012	<0.01
Fluorene	<0.012	<0.012	<0.01	<0.012	<0.01	<0.012	<0.014	0.006	<0.012	<0.01
Phenanthrene	<0.012	<0.012	<0.01	<0.012	<0.01	<0.012	<0.014	0.019	<0.012	0.032
Anthracene	<0.012	<0.012	<0.01	<0.012	<0.01	<0.012	<0.014	0.013	<0.012	0.006
Fluoranthene	<0.012	<0.012	<0.01	<0.012	<0.01	<0.012	<0.014	0.035	<0.012	0.065
Pyrene	<0.012	<0.012	<0.01	<0.012	0.006J	<0.012	<0.014	0.029	<0.012	0.047
Benzo(a)anthracene	<0.012	<0.012	<0.01	<0.012	<0.01	<0.012	<0.014	0.027	<0.012	0.020
Chrysene	<0.012	<0.012	<0.01	<0.012	<0.01	<0.012	<0.014	0.027	<0.012	0.023
Benzo(b)fluoranthene	<0.012	<0.012	<0.01	<0.012	<0.01	<0.012	<0.014	0.020	<0.012	0.022
Benzo(k)fluoranthene	<0.012	<0.012	<0.01	<0.012	<0.01	<0.012	<0.014	0.023	<0.012	0.012
Benzo(a)pyrene	<0.012	<0.012	<0.01	<0.012	<0.01	<0.012	<0.014	0.016	<0.012	0.009
Indeno(1,2,3-cd)pyrene	<0.012	<0.012	<0.01	<0.012	0.007J	<0.012	<0.014	0.025	<0.012	0.017
Dibenzo(a,h)anthracene	<0.012	<0.012	<0.01	<0.012	0.011	<0.012	<0.014	0.025	<0.012	<0.01
Benzo(g,h,i)perylene	<0.012	<0.012	<0.01	<0.012	<0.01	<0.012	<0.014	0.021	<0.012	0.011
Total PAH*	0.11	ND	ND	ND	0.09	ND	ND	0.31	ND	0.29

Notes:

1. Concentrations in parts per million (ppm) or milligrams per kilogram (mg/kg).
2. PAH analyzed by gas chromatograph/mass spectrometer-select ion monitoring (GC/MS-SIM), EPA Method 8270.
3. J = estimated value less than detection limit; "<" less than detection limit; "-" = not analyzed, "ND" = not detected
4. Total PAH value represents the sum of detected concentrations plus one-half detection limit if a constituent was not detected. "ND" indicates no PAH were detected.



TABLE II-B

INTERTIDAL SEDIMENT ANALYTICAL DATA USED IN RISK CHARACTERIZATION

Barge B120 Oil Spill  
Buzzards Bay, Massachusetts

Segment ID	W3A-05	W3A-05	W3A-05	W3C-03	W3C-03	W3C-03	W3C-03	W3C-03	W3C-03
Sample ID	W3A05-P2-UIT-03	DDD-P2-04	W3A05-P2-LIT-03	W3C03-UIT-01	W3C03-MIT-01	W3C03-LIT-01	W3C03-UIT-02	W3C03-MIT-02	W3C03-LIT-02
Sample Date	9/1/2005	9/1/2005	9/1/2005	1/22/2004	1/22/2004	1/22/2004	1/22/2004	1/22/2004	1/22/2004
<i>Extractable Petroleum Hydrocarbons (EPH)</i>									
C <sub>9</sub> -C <sub>18</sub> Aliphatic Hydrocarbons	<32	<30	<32	<32	<30	<31	<33	<31	<31
C <sub>19</sub> -C <sub>36</sub> Aliphatic Hydrocarbons	<32	<30	<32	<32	<30	<31	<33	<31	<31
C <sub>11</sub> -C <sub>22</sub> Aromatic Hydrocarbons	<32	<30	<32	<32	<30	<31	<33	<31	<31
<i>Polycyclic Aromatic Hydrocarbons (PAH)</i>									
Naphthalene	<0.012	<0.01	0.006J	0.008J	0.016	0.007J	0.007J	0.008J	0.008J
2-Methylnaphthalene	<0.012	<0.01	<0.011	<0.011	0.018	<0.010	<0.011	<0.010	<0.010
Acenaphthylene	<0.012	<0.01	<0.011	<0.011	<0.010	<0.010	<0.011	<0.010	<0.010
Acenaphthene	<0.012	<0.01	<0.011	0.010J	<0.010	<0.010	<0.011	<0.010	<0.010
Fluorene	<0.012	<0.01	0.006J	<0.011	<0.010	<0.010	<0.011	<0.010	<0.010
Phenanthrene	<0.012	0.028	0.061	<0.011	<0.010	<0.010	<0.011	<0.010	<0.010
Anthracene	<0.012	0.005J	0.026	<0.011	<0.010	<0.010	<0.011	<0.010	<0.010
Fluoranthene	<0.012	0.063	0.130	<0.011	<0.010	<0.010	<0.011	<0.010	<0.010
Pyrene	<0.012	0.047	0.097	<0.011	<0.010	<0.010	<0.011	<0.010	<0.010
Benzo(a)anthracene	<0.012	0.028	0.053	<0.011	<0.010	<0.010	<0.011	<0.010	<0.010
Chrysene	<0.012	0.024	0.044	<0.011	<0.010	<0.010	<0.011	<0.010	<0.010
Benzo(b)fluoranthene	<0.012	0.025	0.050	<0.011	<0.010	<0.010	<0.011	<0.010	<0.010
Benzo(k)fluoranthene	<0.012	0.013	0.023	<0.011	<0.010	<0.010	<0.011	<0.010	<0.010
Benzo(a)pyrene	<0.012	0.013	0.035	<0.011	<0.010	<0.010	<0.011	<0.010	<0.010
Indeno(1,2,3-cd)pyrene	<0.012	0.019	0.030	<0.011	<0.010	<0.010	<0.011	<0.010	<0.010
Dibenzo(a,h)anthracene	<0.012	0.013	0.015	<0.011	<0.010	<0.010	<0.011	<0.010	<0.010
Benzo(g,h,i)perylene	<0.012	0.013	0.023	<0.011	<0.010	<0.010	<0.011	<0.010	<0.010
Total PAH <sup>4</sup>	ND	0.32	0.62	0.10	0.11	0.09	0.10	0.09	0.09

Notes:

1. Concentrations in parts per million (ppm) or milligrams per kilogram (mg/kg).
2. PAH analyzed by gas chromatograph/mass spectrometer-select ion monitoring (GC/MS-SIM), EPA Method 8270.
3. J = estimated value less than detection limit; "<" less than detection limit; "--" = not analyzed, "ND" = not detected
4. Total PAH value represents the sum of detected concentrations plus one-half detection limit if a constituent was not detected. "ND" indicates no PAH were detected.

TABLE II-B

INTERTIDAL SEDIMENT ANALYTICAL DATA USED IN RISK CHARACTERIZATION

Barge B120 Oil Spill  
Buzzards Bay, Massachusetts

Segment ID	W3C-03	W3C-03	W3C-03	W3C-04	W3C-04	W3C-04	W3C-04	W3C-04	W3C-04
	Sample ID W3C03-UIT-03 Sample Date 1/22/2004	Sample ID W3C03-MIT-03 Sample Date 1/22/2004	Sample ID W3C03-LIT-03 Sample Date 1/22/2004	Sample ID W3C04-P2-UIT-01 Sample Date 9/1/2005	Sample ID W3C04-P2-LIT-01 Sample Date 9/1/2005	Sample ID W3C04-P2-UIT-02 Sample Date 9/1/2005	Sample ID W3C04-P2-LIT-02 Sample Date 9/1/2005	Sample ID W3C04-P2-UIT-03 Sample Date 9/1/2005	Sample ID W3C04-P2-LIT-03 Sample Date 9/1/2005
<i>Extractable Petroleum Hydrocarbons (EPH)</i>									
C <sub>9</sub> -C <sub>18</sub> Aliphatic Hydrocarbons	<31	<31	<31	<39	<33	<32	<37	<30	<33
C <sub>19</sub> -C <sub>36</sub> Aliphatic Hydrocarbons	<31	<31	<31	<39	<33	<32	<37	<30	<33
C <sub>11</sub> -C <sub>22</sub> Aromatic Hydrocarbons	<31	<31	<31	<39	<33	<32	<37	<30	<33
<i>Polycyclic Aromatic Hydrocarbons (PAH)</i>									
Naphthalene	0.007J	0.007J	0.006J	<0.013	0.007J	<0.011	0.013	0.006J	<0.011
2-Methylnaphthalene	<0.010	<0.010	<0.010	<0.013	<0.011	<0.011	<0.012	<0.01	<0.011
Acenaphthylene	<0.010	<0.010	<0.010	<0.013	<0.011	<0.011	<0.012	<0.01	<0.011
Acenaphthene	<0.010	<0.010	<0.010	<0.013	<0.011	<0.011	<0.012	<0.01	<0.011
Fluorene	<0.010	<0.010	<0.010	<0.013	<0.011	<0.011	<0.012	<0.01	<0.011
Phenanthrene	<0.010	<0.010	<0.010	<0.013	0.013	<0.011	<0.012	0.031	<0.011
Anthracene	<0.010	<0.010	<0.010	<0.013	0.010J	<0.011	<0.012	0.007J	<0.011
Fluoranthene	<0.010	<0.010	<0.010	<0.013	0.025	<0.011	0.009J	0.061	<0.011
Pyrene	<0.010	<0.010	<0.010	<0.013	0.021	<0.011	0.008J	0.045	<0.011
Benzo(a)anthracene	<0.010	<0.010	<0.010	<0.013	<0.011	<0.011	<0.012	0.026	<0.011
Chrysene	<0.010	<0.010	<0.010	<0.013	0.012	<0.011	<0.012	0.025	<0.011
Benzo(b)fluoranthene	<0.010	<0.010	<0.010	<0.013	<0.011	<0.011	<0.012	0.022	<0.011
Benzo(k)fluoranthene	<0.010	<0.010	<0.010	<0.013	<0.011	<0.011	<0.012	0.012	<0.011
Benzo(a)pyrene	<0.010	<0.010	<0.010	<0.013	<0.011	<0.011	<0.012	0.011	<0.011
Indeno(1,2,3-cd)pyrene	<0.010	<0.010	<0.010	<0.013	0.010J	<0.011	0.008J	0.019	<0.011
Dibenzo(a,h)anthracene	<0.010	<0.010	<0.010	<0.013	<0.011	<0.011	<0.012	0.014	<0.011
Benzo(g,h,i)perylene	<0.010	<0.010	<0.010	<0.013	<0.011	<0.011	<0.012	0.012	<0.011
Total PAH*	0.09	0.09	0.09	ND	0.15	ND	0.12	0.31	ND

Notes:

1. Concentrations in parts per million (ppm) or milligrams per kilogram (mg/kg).
2. PAH analyzed by gas chromatograph/mass spectrometer-select ion monitoring (GC/MS-SIM), EPA Method 8270.
3. J = estimated value less than detection limit; "<" less than detection limit; "--" = not analyzed, "ND" = not detected
4. Total PAH value represents the sum of detected concentrations plus one-half detection limit if a constituent was not detected. "ND" indicates no PAH were detected.

TABLE II-C

MARSH SEDIMENT ANALYTICAL DATA USED IN RISK CHARACTERIZATION

Barge B120 Oil Spill  
Buzzards Bay, Massachusetts

Segment ID	W1C-02	W1D-01	W1D-01	W1D-01	W1D-01	W1D-01	W1D-01	W1D-01	W1E-02	W1E-02	W1E-02
Sample ID	W1C02-MS01	W1D01-M-01	W1D01-M-02	W1D01-M-03	W1D01-P2-M-01	W1D01-P2-M-02	W1D01-P2-M-03	W1E02-P2-M-01	DDD-P2-03	W1E02-P2-M-02	
Sample Date	8/24/2004	1/21/2004	1/21/2004	1/21/2004	9/1/2005	9/1/2005	10/19/2005	8/31/2005	8/31/05	8/31/2005	
<i>Extractable Petroleum Hydrocarbons (EPH)</i>											
C <sub>9</sub> -C <sub>18</sub> Aliphatic Hydrocarbons	<47	<30	<42	<30	<36	<36	<61	<660	<77	<33	
C <sub>15</sub> -C <sub>36</sub> Aliphatic Hydrocarbons	<47	<30	<42	<30	<36	<36	<61	<660	<77	<33	
C <sub>11</sub> -C <sub>22</sub> Aromatic Hydrocarbons	<47	<30	<42	<30	<36	<36	<61	<660	<77	<33	
<i>Polycyclic Aromatic Hydrocarbons (PAH)</i>											
Naphthalene	0.006J	0.008J	0.011J	0.009J	0.006J	<0.012	<0.02	<0.22	0.015J	<0.011	
2-Methylnaphthalene	0.006J	<0.010	<0.014	<0.010	<0.012	<0.012	<0.02	<0.22	<0.026	<0.011	
Acenaphthylene	<0.016	<0.010	<0.014	<0.010	<0.012	<0.012	<0.02	<0.22	<0.026	<0.011	
Acenaphthene	<0.016	<0.010	<0.014	<0.010	<0.012	<0.012	<0.02	<0.22	<0.026	<0.011	
Fluorene	<0.016	<0.010	<0.014	<0.010	<0.012	<0.012	<0.02	<0.22	<0.026	<0.011	
Phenanthrene	0.006J	<0.010	<0.014	<0.010	<0.012	<0.012	<0.02	<0.22	<0.026	<0.011	
Anthracene	<0.016	<0.010	<0.014	<0.010	<0.012	0.007J	<0.02	<0.22	<0.026	<0.011	
Fluoranthene	0.014J	<0.010	<0.014	<0.010	<0.012	0.006J	<0.02	<0.22	<0.026	<0.011	
Pyrene	0.008J	<0.010	<0.014	<0.010	<0.012	0.011	0.011J	<0.22	<0.026	<0.011	
Benzo(a)anthracene	<0.016	<0.010	<0.014	<0.010	<0.012	0.010J	<0.02	<0.22	<0.026	<0.011	
Chrysene	0.006J	<0.010	<0.014	<0.010	<0.012	0.010J	<0.02	<0.22	<0.026	<0.011	
Benzo(b)fluoranthene	0.006J	<0.010	<0.014	<0.010	<0.012	0.010J	<0.02	<0.22	<0.026	<0.011	
Benzo(k)fluoranthene	0.005J	<0.010	<0.014	<0.010	<0.012	<0.012	<0.02	<0.22	<0.026	<0.011	
Benzo(a)pyrene	0.005J	<0.010	<0.014	<0.010	<0.012	0.010J	<0.02	<0.22	<0.026	<0.011	
Indeno(1,2,3-cd)pyrene	<0.016	<0.010	<0.014	<0.010	<0.012	0.013	<0.02	<0.22	<0.026	<0.011	
Dibenzo(a,h)anthracene	<0.016	<0.010	<0.014	<0.010	<0.012	0.018	<0.02	<0.22	<0.026	<0.011	
Benzo(g,h,i)perylene	<0.016	<0.010	<0.014	<0.010	<0.012	0.008J	<0.02	<0.22	<0.026	<0.011	
Total PAH	0.126	0.088	0.123	0.089	0.102	0.145	0.171	ND	0.223	ND	

- Notes:
1. Concentrations in parts per million (ppm) or milligrams per kilogram (mg/kg).
  2. PAH analyzed by gas chromatograph/mass spectrometer-select ion monitoring (GC/MS-SIM), EPA Method 8270.
  3. J = estimated value less than detection limit; "<" less than detection limit; "ND" = not detected, "--" = not analyzed
  4. Total PAH value represents the sum of detected concentrations plus one-half detection limit if a constituent was not detected. "ND" indicates no PAH were detected.

TABLE II-C

## MARSH SEDIMENT ANALYTICAL DATA USED IN RISK CHARACTERIZATION

Barge B120 Oil Spill  
Buzzards Bay, Massachusetts

Segment ID	W1E-02	W1E-02	W1E-02	W1F-02	W1F-02	W1F-05	W1F-05	W1F-05	W1F-05	W1F-05
Sample ID Sample Date	W1E02-P2-M-03 8/31/2005	W1E02-P2-M-04 8/31/2005	W1E02-P2-M-05 8/31/2005	W1F02-P2-M-01 9/14/2005	DDD-P2-06 9/14/2005	W1F05-MS01 8/24/2004	W1F05-P2-M-01 9/1/2005	W1F05-P2-M-02 9/1/2005	W1F05-P2-M-03 9/1/2005	DDD-P2-05 9/1/2005
<i>Extractable Petroleum Hydrocarbons (EPH)</i>										
C <sub>7</sub> -C <sub>18</sub> Aliphatic Hydrocarbons	<35	<34	<32	<50	<48	<59	<47	<44	<34	<37
C <sub>19</sub> -C <sub>36</sub> Aliphatic Hydrocarbons	<35	<34	<32	<50	<48	<59	<47	<44	<34	<37
C <sub>11</sub> -C <sub>22</sub> Aromatic Hydrocarbons	<35	<34	<32	<50	<48	<59	<47	<44	<34	<37
<i>Polycyclic Aromatic Hydrocarbons (PAH)</i>										
Naphthalene	<0.017	<0.011	<0.013	<0.017	<0.017	<0.020	<0.016	<0.015	<0.011	0.008J
2-Methylnaphthalene	<0.017	<0.011	<0.013	<0.017	<0.017	<0.020	<0.016	<0.015	<0.011	<0.012
Acenaphthylene	<0.017	<0.011	<0.013	<0.017	<0.017	<0.020	<0.016	<0.015	<0.011	<0.012
Acenaphthene	<0.017	<0.011	<0.013	<0.017	<0.017	<0.020	<0.016	<0.015	<0.011	<0.012
Fluorene	<0.017	<0.011	<0.013	<0.017	<0.017	<0.020	<0.016	<0.015	<0.011	<0.012
Phenanthrene	<0.017	<0.011	<0.013	0.010J	<0.017	0.009J	<0.016	<0.015	<0.011	<0.012
Anthracene	<0.017	<0.011	<0.013	<0.017	<0.017	<0.020	<0.016	<0.015	<0.011	<0.012
Fluoranthene	<0.017	<0.011	<0.013	0.023	<0.017	0.02	<0.016	<0.015	<0.011	0.010J
Pyrene	<0.017	<0.011	<0.013	0.019	<0.017	0.010J	<0.016	<0.015	<0.011	0.008J
Benzo(a)anthracene	<0.017	<0.011	<0.013	0.010J	<0.017	0.009J	<0.016	<0.015	<0.011	<0.012
Chrysene	<0.017	<0.011	<0.013	0.010J	<0.017	0.011J	<0.016	0.008J	<0.011	<0.012
Benzo(b)fluoranthene	<0.017	<0.011	<0.013	<0.017	<0.017	0.011J	<0.016	<0.015	<0.011	<0.012
Benzo(k)fluoranthene	<0.017	<0.011	<0.013	<0.017	<0.017	<0.020	<0.016	<0.015	<0.011	<0.012
Benzo(a)pyrene	<0.017	<0.011	<0.013	<0.017	<0.017	<0.020	<0.016	<0.015	<0.011	<0.012
Indeno(1,2,3-cd)pyrene	<0.017	<0.011	<0.013	0.015J	<0.017	<0.020	<0.016	0.012J	0.008J	0.011J
Dibenzo(a,h)anthracene	<0.017	<0.011	<0.013	<0.017	<0.017	<0.020	<0.016	0.019	<0.011	<0.012
Benzo(g,h,i)perylene	<0.017	<0.011	<0.013	<0.017	<0.017	<0.020	<0.016	<0.015	<0.011	<0.012
Total PAH	ND	ND	ND	0.181	ND	0.180	ND	0.144	0.096	0.115

## Notes:

- Concentrations in parts per million (ppm) or milligrams per kilogram (mg/kg).
- PAH analyzed by gas chromatograph/mass spectrometer-select ion monitoring (GC/MS-SIM), EPA Method 8270.
- J = estimated value less than detection limit; "<" less than detection limit; "ND" = not detected, "-" = not analyzed
- Total PAH value represents the sum of detected concentrations plus one-half detection limit if a constituent was not detected. "ND" indicates no PAH were detected.

**TABLE II-C**

MARSH SEDIMENT ANALYTICAL DATA USED IN RISK CHARACTERIZATION

Barge B120 Oil Spill  
Buzzards Bay, Massachusetts

Segment ID	W2A-02	W2A-03	W2A-03	W2A-03	W2A-03	W2A-03
Sample ID	W2A02-P2-M-04	W2A03-P2-M01	W2A03-P2-M02	W2A03-P2-M04	W2A03-P2-M05	W2A03-P2-M06
Sample Date	8/29/2005	8/30/2005	8/30/2005	8/30/2005	8/30/2005	8/30/2005
<i>Extractable Petroleum Hydrocarbons (EPH)</i>						
C <sub>9</sub> -C <sub>18</sub> Aliphatic Hydrocarbons	<35	<40	<39	<62	<39	<41
C <sub>19</sub> -C <sub>36</sub> Aliphatic Hydrocarbons	<35	<40	<39	<62	<39	<41
C <sub>11</sub> -C <sub>22</sub> Aromatic Hydrocarbons	<35	<40	<39	<62	<39	<41
<i>Polycyclic Aromatic Hydrocarbons (PAH)</i>						
Naphthalene	0.007J	0.010J	0.01	0.011J	0.013	0.009J
2-Methylnaphthalene	<0.012	<0.013	<0.013	<0.021	0.009J	<0.014
Acenaphthylene	<0.012	<0.013	<0.013	<0.021	0.007J	<0.014
Acenaphthene	<0.012	<0.013	<0.013	<0.021	<0.013	<0.014
Fluorene	<0.012	<0.013	<0.013	<0.021	<0.013	<0.014
Phenanthrene	0.010J	0.009J	0.032	<0.021	0.053	0.016
Anthracene	<0.012	<0.013	0.007	<0.021	0.013	<0.014
Fluoranthene	0.028	0.011J	0.099	<0.021	0.13	0.042
Pyrene	0.029	0.015	0.094	<0.021	0.12	0.039
Benzo(a)anthracene	0.012	<0.013	0.047	<0.021	0.065	0.021
Chrysene	0.012	0.007J	0.048	<0.021	0.07	0.024
Benzo(b)fluoranthene	0.006J	<0.013	0.045	<0.021	0.075	0.022
Benzo(k)fluoranthene	<0.012	<0.013	0.02	<0.021	0.03	0.011J
Benzo(a)pyrene	<0.012	<0.013	0.035	<0.021	0.053	0.012J
Indeno(1,2,3-cd)pyrene	0.013	0.010J	0.032	0.012J	0.044	0.019
Dibenzo(a,h)anthracene	0.013	<0.013	0.017	<0.021	0.02	0.016
Benzo(g,h,i)perylene	0.008J	<0.013	0.025	<0.021	0.036	0.013J
Total PAH	0.180	0.134	0.537	0.181	0.751	0.279

Notes:

1. Concentrations in parts per million (ppm) or milligrams per kilogram (mg/kg).
2. PAH analyzed by gas chromatograph/mass spectrometer-select ion monitoring (GC/MS-SIM), EPA Method 8270.
3. J = estimated value less than detection limit; "<" less than detection limit; "ND" = not detected, "-" = not analyzed
4. Total PAH value represents the sum of detected concentrations plus one-half detection limit if a constituent was not detected. "ND" indicates no PAH were detected.

TABLE II-C

MARSH SEDIMENT ANALYTICAL DATA USED IN RISK CHARACTERIZATION

Barge B120 Oil Spill  
Buzzards Bay, Massachusetts

Segment ID	W2A-10	W2A-10	W2A-10	W2A-10	W2A-10	W2A-10	W2A-10	W2A-10
Sample ID	W2A10-C01	W2A10-C02	W2A10-C03	W2A10-C04	W2A10-P2-M-01	W2A10-P2-M-02	W2A10-P2-M-03	W2A10-P2-M-04
Sample Date	8/24/2004	8/24/2004	8/24/2004	8/24/2004	8/30/2005	8/30/2005	8/30/2005	8/30/2005
<i>Extractable Petroleum Hydrocarbons (EPH)</i>								
C <sub>9</sub> -C <sub>18</sub> Aliphatic Hydrocarbons	<43	<140	<45	<39	<49	<38	<56	<38
C <sub>19</sub> -C <sub>36</sub> Aliphatic Hydrocarbons	110	<140	<45	<39	<49	<38	<56	<38
C <sub>11</sub> -C <sub>22</sub> Aromatic Hydrocarbons	180	<140	<45	<39	62	<38	<56	<38
<i>Polycyclic Aromatic Hydrocarbons (PAH)</i>								
Naphthalene	<0.014	0.009J	<0.015	<0.013	0.010J	<0.018	0.010J	<0.014
2-Methylnaphthalene	0.037	0.022J	<0.015	0.008J	<0.016	<0.018	<0.019	<0.014
Acenaphthylene	<0.014	<0.046	<0.015	<0.013	<0.016	<0.018	<0.019	<0.014
Acenaphthene	0.014	<0.046	<0.015	<0.013	<0.016	<0.018	<0.019	<0.014
Fluorene	0.026	<0.046	<0.015	<0.013	<0.016	<0.018	<0.019	<0.014
Phenanthrene	0.120	<0.046	<0.015	0.005J	0.012J	<0.018	<0.019	<0.014
Anthracene	0.021	<0.046	<0.015	<0.013	<0.016	<0.018	<0.019	<0.014
Fluoranthene	0.043	<0.046	<0.015	<0.013	0.031	<0.018	0.015J	<0.014
Pyrene	0.170	<0.046	<0.015	<0.013	0.033	<0.018	0.017J	<0.014
Benzo(a)anthracene	0.098	<0.046	<0.015	<0.013	0.016	<0.018	<0.019	<0.014
Chrysene	0.130	<0.046	<0.015	<0.013	0.09	<0.018	<0.019	<0.014
Benzo(b)fluoranthene	0.070	<0.046	<0.015	<0.013	0.049	<0.018	<0.019	<0.014
Benzo(k)fluoranthene	0.014	<0.046	<0.015	<0.013	0.008J	<0.018	<0.019	<0.014
Benzo(a)pyrene	0.093	<0.046	<0.015	<0.013	0.066	<0.018	<0.019	<0.014
Indeno(1,2,3-cd)pyrene	0.012J	<0.046	<0.015	<0.013	0.034	<0.018	0.016J	<0.014
Dibenzo(a,h)anthracene	0.012J	<0.046	<0.015	<0.013	0.031	<0.018	0.021	<0.014
Benzo(g,h,i)perylene	0.015	<0.046	<0.015	<0.013	0.042	<0.018	<0.019	<0.014
Total PAH	0.889	0.376	ND	0.111	0.463	ND	0.193	ND

Notes:

1. Concentrations in parts per million (ppm) or milligrams per kilogram (mg/kg).
2. PAH analyzed by gas chromatograph/mass spectrometer-select ion monitoring (GC/MS-SIM), EPA Method 8270.
3. J = estimated value less than detection limit; "<" less than detection limit; "ND" = not detected, "-" = not analyzed
4. Total PAH value represents the sum of detected concentrations plus one-half detection limit if a constituent was not detected. "ND" indicates no PAH were detected.

TABLE II-D

## SHELLFISH ANALYTICAL DATA USED IN RISK CHARACTERIZATION

Barge B120 Oil Spill  
Buzzards Bay, Massachusetts

Analyte	Sample ID Collection Date	Maximum Detected (ppb)	PCMA-QH-2-A, B, and C 6/9/03		LNGB-SS-2-A, B, and C 6/9/03		Swift-SS-2-A, B, and C 6/9/03		MDWI-OY-2-A, B, and C 6/9/03		MDWI-SS-2-A, B, and C 6/9/03		SHCV-QH-2-A, B, and C 6/10/03		MHFH-QH-2-A, B, and C 6/10/03	
Naphthalene		5.3	3.3		4.2		4.3		5.3		3.7		2.1		2.1	
C1-Naphthalenes		5.3	2.7	J	2.7	J	2.9	J	3.4		2.2	J	1.8	J	1.9	J
C2-Naphthalenes		4.9	2.9		2.1	J	2.2	J	2.5	J	1.9	J	1.8	J	1.6	J
C3-Naphthalenes		3.5	1.5	J	0.8	J	1.9	J	2.2	J	1.1	J	1.3	J	1.2	J
C4-Naphthalenes		3.7	1.2	J	0.6	J	1.8	J	2.8	J	1.1	J	1.7	J	1.8	J
Benzo(b)fluoranthene		0.2	0.2	J	0.2	J	0.2	J	0.1	J	0.2	J	0.2	J	0.1	J
C1-Benzothiophenes		1.3	1	J	0.4	J	0.6	J	1.3	J	0.7	J	0.7	J	0.8	J
C2-Benzothiophenes		0.3	<1.2	U	<1.3	U	0.3	J	<1.2	U	<1.2	U	<1.2	U	<1.2	U
C3-Benzothiophenes		ND	<1.2	U	<1.3	U	<1.3	U	<1.2	U	<1.2	U	<1.2	U	<1.2	U
Biphenyl		1.3	0.7		0.6		0.6		0.6		0.6		0.6		0.7	
Acenaphthylene		0.6	0.1	J	0.1	J	0.1	J	0.2	J	0.1	J	0.1	J	0.1	J
Acenaphthene		1.9	0.5		0.5		0.5		0.5		0.3	J	0.3	J	0.3	J
Dibenzofuran		1.4	<0.4	U	0.3	J	0.3	J	0.4	J	0.4	J	0.3	J	0.3	J
Fluorene		0.9	0.2	J	0.2	J	0.2	J	0.2	J	0.2	J	0.2	J	0.2	J
C1-Fluorenes		1.4	0.4	J	0.3	J	0.6	J	0.6	J	0.4	J	0.6	J	0.5	J
C2-Fluorenes		4.5	1.4		0.4	J	1.9		2.5		1.1		1.8		2.2	
C3-Fluorenes		6	2.1		<0.9	U	3.1		2.8		0.9	J	3.4		1.8	
Carbazole		0.1	0.1	J	0.1	J	<1.8	U	<1.8	U	<1.8	U	0.1	J	0.1	J
Anthracene		1.3	0.1	J	0.1	J	0.2		0.4		0.2		0.1	J	0.2	
Phenanthrene		3.4	0.9		0.6		1.2		1		0.6		1.1		0.8	
C1-Phenanthrene/Anthracenes		6.9	4.6		1	J	5.2		4.3		1.9		5.5		3.7	
C2-Phenanthrene/Anthracenes		24.3	20.1		2.9		21.9		24.3		9.2		22.4		19.2	
C3-Phenanthrene/Anthracenes		30.8	27.8		3.2		29.1		19.4		11.6		25.6		20.2	
C4-Phenanthrene/Anthracenes		15.7	15.7		1.6		13.9		7.2		6.2		13.9		9	
Dibenzothiophene		0.3	0.1	J	0.1	J	0.2	J	0.1	J	0.1	J	0.2	J	0.1	J
C1-Dibenzothiophenes		1.1	0.5	J	0.2	J	0.7	J	0.5	J	0.3	J	0.8	J	0.5	J
C2-Dibenzothiophenes		4.6	2.6		0.5	J	3		3.1		1.2		3		2.7	
C3-Dibenzothiophenes		5.5	4.5		0.5	J	5		2.2		2.1		4.4		3.7	
Fluoranthene		12.3	1.2	J	1.5	J	2.6		2.4		1.6		1.7		2.9	
Pyrene		8.6	2.4		1.6		4.6		2.3		2.3		2.3		2.8	
C1-Fluoranthenes/Pyrenes		13.9	7.1		1.8	J	10.7		4.3		4.1		12.3		10.2	
C2-Fluoranthenes/Pyrenes		20.8	13.8		1.9	J	13.9		2.1		5		18.3		11.4	
C3-Fluoranthenes/Pyrenes		11.7	7.1		1	J	6.4		0.6	J	2.5		9.2		4.2	
Benzo(a)anthracene		3.5	1.2		0.4	J	2.3		1		0.9		1.1		0.8	
Chrysene		11.8	6.7		2		8.1		8.4		4.5		7.3		5.2	
C1-Chrysenes		13.6	12.6		2		13.6		4.1		6.1		10.8		5.1	
C2-Chrysenes		10.9	10.9		1.7	J	6.2		1.6	J	3.1		9.1		3	
C3-Chrysenes		4.9	3.6		<1.7	U	2.7		<1.7	U	1.5	J	3.5		0.7	J
C4-Chrysenes		0.5	<1.6	U	<1.7	U	<1.7	U	<1.7	U	<1.7	U	<1.7	U	<1.6	U
Benzo(b)fluoranthene		6.3	1.1		0.6	J	1.5		1		0.9		1.8		2.4	
Benzo(k)fluoranthene		2.5	0.9		0.7		1.4		0.5		1		0.7		1	
Benzo(e)pyrene		7.1	2.2		1.5		4.2		1.2		3		2.9		2.8	
Benzo(a)pyrene		1.3	0.7		0.2	J	0.9		0.1	J	0.4		0.8		0.5	
Perylene		1.2	0.4	J	0.6	J	0.8	J	0.1	J	0.6	J	0.6	J	0.5	J
Indeno(1,2,3-c,d)pyrene		1.6	0.4	J	0.3	J	0.5	J	0.1	J	0.4	J	0.6	J	0.7	J
Dibenzo(a,h)anthracene		0.2	0.1	J	0.1	J	0.1	J	<0.4	U	0.1	J	0.2	J	0.1	J
Benzo(g,h,i)perylene		2.5	0.6		0.6		1.4		0.1	J	0.7		0.8		0.7	
Total PAHs		186.2	170		46		186		122		90		180		133	

## Notes:

1. J=Below the MDL, U=Not detected
2. Concentrations are in micrograms per kilogram ( $\mu\text{g}/\text{kg}$ ) or parts per billion (ppb).
3. Total PAHs are the sum of detected PAH compounds and one half the detection limit of non-detected compounds.

TABLE II-D

## SHELLFISH ANALYTICAL DATA USED IN RISK CHARACTERIZATION

Barge B120 Oil Spill  
Buzzards Bay, Massachusetts

Analyte	Sample ID	COWY-QH-3, A, B, and C	SLOC-OY-3-A, B, and C	FHSB-SS-2-A, B, and C	MPDA-QH-3, A, B, and C	NBOHFR-QH-2-A, B, and C	SHCV-SS-3-A, B, and C	BASS-OY-2-A, B, and C	BASS-SS-2-A, B, and C						
	Collection Date	7/8/03	7/8/03	7/8/03	7/8/03	7/9/03	7/9/03	7/9/03	7/9/03						
Naphthalene		2	2.9	1.8	2.1	1.8	2.3	4.4	2.5						
C1-Naphthalenes		0.7	J	1.3	J	0.8	J	1.9	J	3.7	1.8	J			
C2-Naphthalenes		0.8	J	1.5	J	0.8	J	1.8	J	3.4	1.8	J			
C3-Naphthalenes		1	J	1.8	J	0.7	J	1.2	J	2.9	J	1.2	J		
C4-Naphthalenes		1.3	J	2.6	J	0.6	J	1.8	J	3.2	1.2	J			
Benzo(b)fluoranthene		<0.6	U	0.2	J	<0.6	U	0.1	J	<0.6	U	<0.6	U		
C1-Benzo(b)fluoranthenes		<1.3	U	<1.2	U	<1.3	U	<1.3	U	<1.3	U	<1.3	U		
C2-Benzo(b)fluoranthenes		<1.3	U	<1.2	U	<1.3	U	<1.3	U	<1.3	U	<1.3	U		
C3-Benzo(b)fluoranthenes		<1.3	U	<1.2	U	<1.3	U	<1.3	U	<1.3	U	<1.3	U		
Biphenyl		0.6	0.8	0.5	0.9	0.5	0.7	1	0.7	1	0.7	0.7	J		
Acenaphthylene		<0.4	U	0.2	J	0.1	J	0.6	0.1	J	0.3	J	0.2	J	
Acenaphthene		0.1	J	0.2	J	<0.3	U	0.1	J	0.5	0.4	0.6	0.4	J	
Dibenzofuran		0.6	0.9	0.6	0.6	0.6	0.7	0.6	0.9	0.9	0.8	0.8	0.8	J	
Fluorene		0.2	J	0.4	J	0.2	J	0.4	J	0.3	J	0.5	0.3	J	
C1-Fluorenes		0.4	J	1	0.4	J	0.5	J	1.1	0.6	J	1.4	0.7	J	
C2-Fluorenes		1.2	3	0.8	J	1.3	2.9	1	4.5	1	4.5	1.2	1.2	J	
C3-Fluorenes		1.3	3.5	<0.9	U	1.9	2.1	1.9	6	1.9	6	1.9	1.9	J	
Carbazole		0.1	J	0.1	J	<1.8	U	0.1	J	0.1	J	0.1	J	1.8	U
Anthracene		0.1	J	0.4	0.1	J	0.1	J	1.3	0.1	J	0.4	0.1	J	
Phenanthrene		0.8	1.7	1.2	0.7	1.8	1.8	0.8	2.1	0.8	2.1	1.2	1.2	J	
C1-Phenanthrene/Anthracenes		2.8	4.9	1.3	2.9	1.7	1.6	6.9	2.2	6.9	2.2	2.2	2.2	J	
C2-Phenanthrene/Anthracenes		7.3	14.4	2.7	8.8	3.5	5.6	22	6	22	6	6	6	J	
C3-Phenanthrene/Anthracenes		9.6	18.9	3.2	14.4	3.7	10.1	30.8	8.2	30.8	8.2	8.2	8.2	J	
C4-Phenanthrene/Anthracenes		4.6	8	1.2	9.0	1.7	5.2	12	4.2	12	4.2	4.2	4.2	J	
Dibenzothiophene		0.1	J	0.2	J	0.1	J	0.2	J	0.1	J	0.3	0.1	J	
C1-Dibenzothiophenes		0.5	J	0.9	0.3	J	0.5	J	0.3	J	1.1	0.5	0.5	J	
C2-Dibenzothiophenes		1.4	3.1	0.6	2.1	1	1	4.6	1.2	4.6	1.2	1.2	1.2	J	
C3-Dibenzothiophenes		2	3.5	0.7	2.8	1.3	1.6	5.5	1.7	5.5	1.7	1.7	1.7	J	
Fluoranthene		1.4	J	3.1	3.2	1.2	J	6	1.2	J	3.7	1.6	1.6	J	
Pyrene		1.8	2.4	2	1.6	6.4	0.9	J	2.5	0.9	J	2.5	1.5	J	
C1-Fluoranthenes/Pyrenes		4.4	6.1	1.5	J	6.9	3.2	3.8	8.4	3.8	8.4	4	4	J	
C2-Fluoranthenes/Pyrenes		5.3	5.1	1.1	J	11.1	1.4	J	5.4	1.4	J	7.5	4.5	J	
C3-Fluoranthenes/Pyrenes		2.6	1.8	J	0.6	J	5.8	0.4	J	2.7	2.4	2.4	2.1	J	
Benzo(a)anthracene		1.1	1.1	0.8	0.8	1.8	1.1	1.1	1.6	1.1	1.6	1.2	1.2	J	
Chrysene		2.1	5.9	1.5	3.2	2.6	3	9.4	2.5	3	9.4	2.5	2.5	J	
C1-Chrysenes		3.5	5.3	1	J	6.5	1.1	J	6	1.1	6	8.6	4.2	J	
C2-Chrysenes		2.8	2.6	0.5	J	6.1	0.3	J	3.5	0.3	3.5	4.2	1.9	J	
C3-Chrysenes		1.3	J	<1.6	U	<1.7	U	2.8	1.4	J	1.1	J	1	J	
C4-Chrysenes		<1.7	U	<1.6	U	<1.7	U	0.5	J	0.2	J	<1.7	U	J	
Benzo(b)fluoranthene		0.8	2.2	1.3	1.0	2.1	0.8	1.6	0.9	0.8	1.6	0.9	0.9	J	
Benzo(k)fluoranthene		0.2	J	0.5	0.3	J	0.8	J	0.3	J	0.3	J	0.3	J	
Benzo(e)pyrene		0.8	1.8	1.7	1.6	1.7	1.6	1.2	1.8	1.6	1.2	1.8	1.8	J	
Benzo(a)pyrene		0.3	0.4	0.4	0.6	0.7	0.3	0.3	0.1	J	0.1	J	0.4	J	
Perylene		0.3	J	1.1	0.3	J	0.3	J	0.3	J	0.1	J	0.8	J	
Indeno(1,2,3-c,d)pyrene		0.2	J	0.3	J	0.3	J	0.3	J	0.3	J	0.2	J	J	
Dibenzo(a,h)anthracene		0.1	J	0.1	J	0.1	J	0.1	J	0.1	J	0.1	J	J	
Benzo(g,h,i)perylene		0.3	J	0.3	J	0.7	0.5	0.9	0.6	0.5	0.9	0.2	J	J	
Total PAHs		72	120	41	107	69	76	175	73	175	73	73	73	J	

## Notes:

1. J=Below the MDL, U=Not detected
2. Concentrations are in micrograms per kilogram ( $\mu\text{g}/\text{kg}$ ) or parts per billion (ppb).
3. Total PAHs are the sum of detected PAH compounds and one half the detection limit of non-detected compounds.



TABLE II-D

## SHELLFISH ANALYTICAL DATA USED IN RISK CHARACTERIZATION

Barge B120 Oil Spill  
Buzzards Bay, Massachusetts

Analyte	Sample ID	BASS-BM-2-A, B, and C	BASS-QH-2-A, B, and C	BIMT-QH-3-A, B, and C	MEHH-SS-2-A, B, and C	GBWP-QH-2-A, B, and C	FHIN-OY-4-A, B, and C	FHIN-SP-4, A, B, and C	
	Collection Date	7/9/03	7/9/03	7/10/03	7/10/03	7/10/03	8/27/03	8/27/03	
Naphthalene		2.5	1.7	2	2.8	2	3	3.4	
C1-Naphthalenes		2.2	J	1.3	J	1.4	J	1.2	J
C2-Naphthalenes		2.3	J	1.6	J	1.6	J	1.5	J
C3-Naphthalenes		2	J	1.3	J	1.7	J	1.7	J
C4-Naphthalenes		2	J	1.2	J	1.9	J	2.4	J
Benzo(a)anthracene		<0.6	U	<0.6	U	<0.6	U	<0.6	U
C1-Benzothiophenes		<1.2	U	<1.2	U	<1.3	U	<1.2	U
C2-Benzothiophenes		<1.2	U	<1.2	U	<1.3	U	<1.3	U
C3-Benzothiophenes		<1.2	U	<1.2	U	<1.3	U	<1.3	U
Biphenyl		0.7	1	0.7	0.8	0.9	0.9	0.9	1
Acenaphthylene		0.2	J	0.1	J	0.1	J	0.2	J
Acenaphthene		0.3	J	0.2	J	0.3	J	0.2	J
Dibenzofuran		0.8	0.7	0.7	0.7	0.7	0.7	0.9	1
Fluorene		0.4	J	0.2	J	0.3	J	0.2	J
C1-Fluorenes		0.9	0.6	J	1.1	1	0.5	J	0.4
C2-Fluorenes		2.1	1	2.1	3	0.7	J	0.4	J
C3-Fluorenes		3.2	1.7	3.7	4.2	0.8	J	<0.9	U
Carbazole		0.1	J	0.1	J	<1.8	U	0.1	J
Anthracene		0.3	0.1	J	0.2	0.3	0.1	J	0.1
Phenanthrene		1.6	0.9	1.2	1.7	0.6	1	2	2
C1-Phenanthrene/Anthracenes		4.3	1.9	3.9	4.5	1	J	0.6	J
C2-Phenanthrene/Anthracenes		12.5	5.2	11.6	14.8	2.5	J	0.6	J
C3-Phenanthrene/Anthracenes		27.4	7.5	15.2	22	3.7	1.4	2	1
C4-Phenanthrene/Anthracenes		14.2	3.5	7.9	9.7	1.7	0.3	J	1
Dibenzothiophene		0.2	J	0.1	J	0.1	J	0.1	J
C1-Dibenzothiophenes		0.7	0.3	J	0.6	0.8	J	0.2	J
C2-Dibenzothiophenes		2.7	1	2.1	3.1	0.5	J	<0.6	U
C3-Dibenzothiophenes		4.2	1.2	3.1	4	0.6	U	<0.6	U
Fluoranthene		2.4	1.1	J	1.9	5	0.7	J	0.6
Pyrene		2.3	1.3	2.6	5	0.8	J	0.6	J
C1-Fluoranthenes/Pyrenes		7	3.3	7	9.4	1.4	J	0.5	J
C2-Fluoranthenes/Pyrenes		12.6	3.9	8.4	9.3	2	J	0.4	J
C3-Fluoranthenes/Pyrenes		5.4	1.6	J	3.9	3.3	0.9	J	<1.9
Benzo(a)anthracene		2	1.7	0.7	3.5	0.4	J	0.3	J
Chrysene		4.8	1.3	3.8	6.2	1.2	J	0.6	J
C1-Chrysenes		8.3	3.1	5.1	7.9	1.2	J	0.5	J
C2-Chrysenes		4.4	2	2.1	3.7	0.6	J	0.3	J
C3-Chrysenes		1	J	1.1	J	0.9	J	<1.7	U
C4-Chrysenes		0.1	J	0.1	J	0.2	J	<1.7	U
Benzo(b)fluoranthene		1.5	0.6	J	0.9	2.7	0.9	1	3.4
Benzo(k)fluoranthene		0.3	J	0.2	J	0.8	0.3	J	2
Benzo(e)pyrene		1.9	0.5	1.2	2.7	0.8	0.7	0.7	2.1
Benzo(a)pyrene		0.2	J	0.2	J	0.3	0.3	J	1.3
Perylene		0.3	J	0.2	J	0.8	J	0.1	J
Indeno(1,2,3-c,d)pyrene		0.2	J	0.2	J	0.6	J	0.3	J
Dibenzo(a,h)anthracene		0.1	J	<0.4	U	0.1	J	<0.4	U
Benzo(g,h,i)perylene		0.2	J	0.2	J	0.5	0.8	0.4	J
Total PAHs		145	59	108	148	38	35	57	

## Notes:

1. J=Below the MDL, U=Not detected
2. Concentrations are in micrograms per kilogram ( $\mu\text{g}/\text{kg}$ ) or parts per billion (ppb).
3. Total PAHs are the sum of detected PAH compounds and one half the detection limit of non-detected compounds.

TABLE II-D

SHELLFISH ANALYTICAL DATA USED IN RISK CHARACTERIZATION

Barge B120 Oil Spill  
Buzzards Bay, Massachusetts

Sample ID Collection Date	MONB-SP-3-A, B, and C 8/27/03	WHBR-QH-4-A, B, and C 8/27/03	BIMT-OY-4-A, B, and C 8/27/03	BJB-SC-3-A, B, and C 8/28/03	MDWI-QH-3-A, B, and C 10/23/03	EEHH-OY-5-A, B, and C 10/23/03	MNHH-SS-5 5/13/04	
Naphthalene	5.1	2.6	4.5	3	1.1	J	0.9	J
C1-Naphthalenes	5.3	2.2	J	3.8	1.3	J	0.6	J
C2-Naphthalenes	4.9	2.6	J	4	1.1	J	0.7	J
C3-Naphthalenes	2.8	J	J	3.5	0.9	J	1.1	J
C4-Naphthalenes	1.6	J	J	3.7	0.8	J	1.7	J
Benzo(b)fluoranthene	<0.6	U	<0.6	U	<0.6	U	<0.6	U
C1-Benzo(b)fluoranthenes	<1.2	U	<1.2	U	<1.2	U	<1.2	U
C2-Benzo(b)fluoranthenes	<1.2	U	<1.2	U	<1.2	U	<1.2	U
C3-Benzo(b)fluoranthenes	<1.2	U	<1.2	U	<1.2	U	<1.2	U
Biphenyl	1.3	0.8	1.1	0.6	1.2	U	0.4	J
Acenaphthylene	0.4	0.3	J	0.2	J	<0.4	0.2	J
Acenaphthene	1.9	1	1.4	0.3	J	<0.3	0.1	J
Dibenzofuran	1.4	0.8	1.1	0.4	J	0.3	0.3	J
Fluorene	0.9	0.7	0.7	0.2	J	0.1	0.3	J
C1-Fluorenes	0.6	J	0.6	J	0.4	J	0.8	J
C2-Fluorenes	1	1.6	2.6	1.3	<0.9	U	2	J
C3-Fluorenes	<0.9	U	2.3	3.3	<0.9	U	2.3	J
Carbazole	0.1	J	<1.8	U	<1.8	U	<1.7	U
Anthracene	0.5	0.5	0.3	0.1	J	0.1	0.2	J
Phenanthrene	2.7	2	2.2	0.8	0.5	J	1.5	J
C1-Phenanthrene/Anthracenes	1.5	2.6	4.6	1	J	0.6	3.3	J
C2-Phenanthrene/Anthracenes	2.3	6.4	14.9	2.4	0.8	J	8.2	J
C3-Phenanthrene/Anthracenes	5.2	8.9	23	3.2	0.6	J	10.9	J
C4-Phenanthrene/Anthracenes	2.7	5.4	12.4	1.7	<1.2	U	3.9	J
Dibenz(a,h)anthracene	0.3	0.2	J	0.2	J	<0.3	0.1	J
C1-Dibenz(a,h)anthracenes	0.3	J	0.4	0.9	0.3	J	0.6	J
C2-Dibenz(a,h)anthracenes	0.5	J	1.6	2.6	0.4	J	1.7	J
C3-Dibenz(a,h)anthracenes	0.7	2.1	3.7	0.4	J	<0.6	1.9	J
Fluoranthene	2.3	5	3.7	0.9	J	0.9	3.8	J
Pyrene	2.2	4.3	3.3	0.8	J	0.6	1.8	J
C1-Fluoranthenes/Pyrenes	2.6	7.6	10.7	1.9	0.7	J	5	J
C2-Fluoranthenes/Pyrenes	2.8	9.2	12.2	3.3	<1.9	U	4.1	J
C3-Fluoranthenes/Pyrenes	1.3	J	4.1	4.8	<1.9	U	1.6	J
Benzo(a)anthracene	1.4	1.6	1.2	0.9	0.2	J	0.5	J
Chrysene	3.1	3.6	2.8	1.5	0.5	J	3.5	J
C1-Chrysenes	3.1	4.2	8.6	4.6	<1.7	U	2.6	J
C2-Chrysenes	2.3	3.5	5.4	4.8	<1.7	U	1.7	J
C3-Chrysenes	0.7	J	1.8	1.9	<1.7	U	0.8	J
C4-Chrysenes	0.1	J	0.2	J	<1.7	U	<1.6	U
Benzo(b)fluoranthene	3.4	2.3	2.6	0.8	<0.7	U	0.9	J
Benzo(k)fluoranthene	1.7	0.8	0.7	0.3	J	<0.4	0.4	J
Benzo(e)pyrene	2.3	3	2.8	0.7	<0.4	U	2.4	J
Benzo(a)pyrene	1.2	0.6	0.3	0.5	<0.3	U	0.5	J
Perylene	0.5	J	0.5	J	<0.9	U	0.2	J
Indeno(1,2,3-c,d)pyrene	0.8	0.6	0.3	J	0.3	J	0.3	J
Dibenzo(a,h)anthracene	0.2	J	0.1	J	0.1	J	<0.4	U
Benzo(g,h,i)perylene	0.7	1	0.4	0.4	0.4	J	1.2	U
Total PAHs	79	107	161	52	24	126	79	

Notes:  
 1. J=Below the MDL, U=Not detected  
 2. Concentrations are in micrograms per kilogram (µg/kg) or parts per billion (ppb).  
 3. Total PAHs are the sum of detected PAH compounds and one half the detection limit of non-detected compounds.

TABLE II-D

## SHELLFISH ANALYTICAL DATA USED IN RISK CHARACTERIZATION

Barge B120 Oil Spill  
Buzzards Bay, Massachusetts

Sample ID Collection Date	MNHQ-QH-5 5/13/04	SWLQ-QH-5 5/13/04	FTPH-QH-5 5/13/04	WCNS-QH-5 5/13/04	WCNS-SS-5 5/13/04	FHHS-OY-5 5/13/04	FHHS-SS-5 5/13/04	FHHS-QH-5 5/13/04							
Naphthalene	0.9	J	0.8	J	0.7	J	1	J	1.4	J	1.3	J	1.8	J	3
C1-Naphthalenes	0.5	J	0.4	J	0.4	J	0.4	J	0.7	J	0.7	J	0.9	J	1.3
C2-Naphthalenes	0.7	J	0.9	J	0.7	J	0.6	J	0.8	J	0.8	J	0.8	J	1.0
C3-Naphthalenes	0.7	J	1.5	J	0.7	J	0.6	J	0.8	J	1.7	J	1	J	0.7
C4-Naphthalenes	0.8	J	2.4	J	1.5	J	0.6	J	1.5	J	1.9	J	1.9	J	1.3
Benzo(b)fluoranthene	<0.6	U	<0.6	U	<0.6	U	<0.6	U	<0.6	U	<0.6	U	<0.6	U	0.1
C1-Benzothiophenes	<1.2	U	<1.2	U	<1.2	U	<1.2	U	1	J	<1.2	U	<1.2	U	<1.2
C2-Benzothiophenes	<1.2	U	<1.2	U	<1.2	U	<1.2	U	<1.2	U	<1.2	U	<1.2	U	<1.2
C3-Benzothiophenes	<1.2	U	<1.2	U	<1.2	U	<1.2	U	<1.2	U	<1.2	U	<1.2	U	<1.2
Biphenyl	0.3	J	0.4	J	0.4	J	0.3	J	0.5	J	0.5	J	0.4	J	0.4
Acenaphthylene	0.1	J	0.1	J	0.1	J	0.1	J	0.2	J	0.2	J	0.2	J	0.1
Acenaphthene	0.1	J	0.1	J	0.1	J	0.1	J	0.2	J	0.1	J	0.3	J	0.2
Dibenzofuran	0.2	J	0.3	J	0.3	J	0.2	J	0.3	J	0.5	J	0.3	J	0.3
Fluorene	0.2	J	0.1	J	0.2	J	0.1	J	0.3	J	0.4	J	0.4	J	0.2
C1-Fluorenes	0.5	J	0.8	J	0.6	J	0.5	J	0.8	J	1.2	J	1.1	J	0.6
C2-Fluorenes	0.7	J	2	J	1.7	J	0.8	J	1.4	J	2.9	J	2.1	J	1.0
C3-Fluorenes	<0.9	U	4.3	J	1.3	J	<0.9	U	2.5	J	2.8	J	3.1	J	0.8
Carbazole	<1.8	U	<1.8	U	<1.7	U	<1.8	U	<1.7	U	<1.7	U	0.1	J	<1.8
Anthracene	0.1	J	0.1	J	0.3	J	0.1	J	0.3	J	0.5	J	0.3	J	0.2
Phenanthrene	0.8	J	0.9	J	1.1	J	0.7	J	1.7	J	2.5	J	3.4	J	1.5
C1-Phenanthrene/Anthracenes	1.2	J	4	J	1.9	J	1	J	2.6	J	4.6	J	3.9	J	2.0
C2-Phenanthrene/Anthracenes	2.7	J	15	J	4.8	J	2	J	5.4	J	11.9	J	9.3	J	4.0
C3-Phenanthrene/Anthracenes	3.3	J	23.6	J	5.4	J	2.6	J	8.1	J	15.6	J	12.9	J	4.8
C4-Phenanthrene/Anthracenes	1.3	J	12	J	1.6	J	0.9	J	2.8	J	3.3	J	4.8	J	1.2
Dibenzothiophene	0.1	J	0.1	J	0.1	J	0.1	J	0.2	J	0.3	J	0.2	J	0.1
C1-Dibenzothiophenes	0.2	J	0.7	J	0.4	J	0.3	J	0.6	J	1	J	0.8	J	0.3
C2-Dibenzothiophenes	0.5	J	2	J	1.1	J	0.5	J	1.1	J	2.4	J	2.1	J	0.8
C3-Dibenzothiophenes	0.5	J	3.5	J	1	J	0.4	J	1.1	J	1.5	J	3.2	J	0.7
Fluoranthene	1.1	J	1.3	J	5.9	J	1.6	J	4.9	J	6.8	J	12.3	J	3.6
Pyrene	0.6	J	2.2	J	2.4	J	0.8	J	2.8	J	3.4	J	8.6	J	2.1
C1-Fluoranthenes/Pyrenes	1.3	J	13.9	J	2.1	J	0.9	J	3.6	J	5.6	J	7.9	J	2.3
C2-Fluoranthenes/Pyrenes	1.5	J	20.8	J	1.1	J	0.8	J	2.5	J	3.4	J	5.8	J	1.9
C3-Fluoranthenes/Pyrenes	0.6	J	11.7	J	0.4	J	0.4	J	1.1	J	0.9	J	2.3	J	0.8
Benz(a)anthracene	0.2	J	1.2	J	0.5	J	0.2	J	0.7	J	1.1	J	2.3	J	0.4
Chrysene	1	J	7	J	2.3	J	1	J	3.2	J	7.8	J	11.8	J	2.4
C1-Chrysenes	0.8	J	13.1	J	0.7	J	0.5	J	1.8	J	3.3	J	4.5	J	1.1
C2-Chrysenes	0.7	J	10.5	J	0.4	J	0.4	J	1.1	J	1.7	J	2.6	J	0.6
C3-Chrysenes	0.3	J	4.9	J	0.2	J	0.2	J	0.6	J	0.5	J	1.4	J	0.3
C4-Chrysenes	<1.7	U	0.3	J	<1.6	U	<1.7	U	<1.6	U	<1.6	U	0.3	J	<1.7
Benzo(b)fluoranthene	0.4	J	1.4	J	1.1	J	0.7	J	1.3	J	1.8	J	6.3	J	1
Benzo(k)fluoranthene	0.1	J	0.3	J	0.5	J	0.1	J	0.5	J	0.4	J	2.5	J	0.4
Benzo(e)pyrene	0.4	J	2.1	J	0.8	J	0.4	J	2	J	1	J	7.1	J	0.7
Benzo(a)pyrene	0.1	J	0.7	J	0.3	J	0.1	J	0.4	J	0.3	J	1.1	J	0.2
Perylene	0.3	J	0.4	J	0.2	J	0.1	J	0.3	J	0.1	J	0.6	J	0.1
Indeno(1,2,3-c,d)pyrene	0.1	J	0.3	J	0.3	J	0.2	J	0.4	J	0.2	J	1.6	J	0.3
Dibenzo(a,h)anthracene	<0.4	U	0.1	J	<0.4	U	<0.4	U	0.1	J	<0.4	U	0.2	J	<0.4
Benzo(g,h,i)perylene	0.1	J	0.5	J	0.3	J	0.1	J	1.1	J	0.3	J	2.5	J	0.2
Total PAHs	31		172		50		27		68		101		139		49

## Notes:

1. J=Below the MDL, U=Not detected
2. Concentrations are in micrograms per kilogram ( $\mu\text{g}/\text{kg}$ ) or parts per billion (ppb).
3. Total PAHs are the sum of detected PAH compounds and one half the detection limit of non-detected compounds.

TABLE II-D

SHELLFISH ANALYTICAL DATA USED IN RISK CHARACTERIZATION

Barge B120 Oil Spill  
Buzzards Bay, Massachusetts

Analyte	Sample ID	Rt88-BM-01-A and B	Brook-OY-1-A and B	MHRS-OY-1-A and B	PPBR-OY-1-A, B and C	WFHRS-OY-1-A, B and C	BRM-QH-1-A, B and C	LNGB-QH-1-A and B	MHRS-QH-1-A and B					
	Collection Date	5/6/03	5/6/03	5/6/03	5/6/03	5/7/03	5/6/03	5/5/03	5/6/03					
		Baseline	Baseline	Baseline	Baseline	Baseline	Baseline	Baseline	Baseline					
Naphthalene		2.4	3.6	2.7	3.4	3.9	1.9	1.3	J	1.7				
C1-Naphthalenes		3.5	6	4	3.4	4.5	1.8	J	1.4	J	2			
C2-Naphthalenes		5	6.3	5	2.8	J	4.4	1.7	J	1.4	J	2.3		
C3-Naphthalenes		4.6	3.9	J	4.9	1.9	J	3.4	1.1	J	1.1	J	2.1	
C4-Naphthalenes		3.2	2.2	J	2.8	J	1	J	0.7	J	0.8	J	1.5	
Benzothiophene		0.1	J	0.1	J	0.2	J	0.3	J	0.1	J	0.1	J	0.1
C1-Benzothiophenes		0.3	J	0.6	J	0.5	J	0.6	J	<1.2	U	0.3	J	0.3
C2-Benzothiophenes		<1.2	U	0.9	J	1.4	1	J	1.3	<1.2	U	<1.2	U	<1.2
C3-Benzothiophenes		<1.2	U	<1.2	U	0.4	J	0.3	J	<1.2	U	<1.2	U	<1.2
Biphenyl		1.2	1	1.3	1.3	1.3	1.4	0.8	J	0.1	J	0.1	J	0.1
Acenaphthylene		0.5	0.2	J	0.2	J	0.2	J	0.1	J	0.1	J	0.1	J
Acenaphthene		0.9	0.7	0.6	0.6	0.8	0.4	0.3	J	0.3	J	0.3	J	0.3
Dibenzofuran		1.4	0.8	0.8	0.8	1	0.6	0.4	J	0.4	J	0.6	J	0.6
Fluorene		1.2	0.6	0.7	0.5	0.7	0.3	J	0.2	J	0.2	J	0.3	J
C1-Fluorenes		1.6	1.2	1.7	0.4	J	1.4	0.5	J	0.5	J	0.8	J	0.8
C2-Fluorenes		3.5	2.3	3.9	0.8	J	2.3	0.6	J	1.1	1.5	1.5	J	1.5
C3-Fluorenes		3.5	1.8	2.5	0.3	J	2	0.4	J	1.5	1.9	1.9	J	1.9
Carbazole		0.5	J	0.1	J	0.1	J	0.1	J	0.1	J	<1.8	U	<1.8
Anthracene		1.6	0.5	0.3	0.3	0.2	0.1	J	0.1	J	0.1	J	0.1	J
Phenanthrene		13	4.7	6.6	2.6	4.5	2	1.8	2.5	5.6	6.1	6.1	J	6.1
C1-Phenanthrene/Anthracenes		16.8	8	13	1.8	7.5	2.5	5.6	6.1	8.3	8.3	8.3	J	8.3
C2-Phenanthrene/Anthracenes		29.5	9.3	15.5	1.6	10.1	2.5	11.8	8.3	3.9	3.9	3.9	J	3.9
C3-Phenanthrene/Anthracenes		20.1	3.8	7	0.9	J	4	1.1	J	8.5	1	1	J	1
C4-Phenanthrene/Anthracenes		7.3	0.9	J	1.3	0.3	J	0.8	J	2.6	J	2.6	J	2.6
Dibenzothiophene		0.8	0.5	0.7	0.3	0.4	0.2	J	0.2	J	0.3	0.3	J	0.3
C1-Dibenzothiophenes		2.1	1.7	1.9	0.3	J	1.1	0.3	J	0.7	0.8	0.8	J	0.8
C2-Dibenzothiophenes		4.8	2.9	2.7	0.5	J	1.6	0.5	J	1.3	1.2	1.2	J	1.2
C3-Dibenzothiophenes		4.3	1.6	1	0.2	J	0.6	0.3	J	1.5	0.7	0.7	J	0.7
Fluoranthene		10.5	3.4	3.1	2	3.1	1.9	1.7	1.3	1.3	1.3	1.3	J	1.3
Pyrene		8.5	2.6	1.2	0.6	J	0.8	J	0.8	1.7	0.6	0.6	J	0.6
C1-Fluoranthenes/Pyrenes		10.7	2.4	J	2	0.5	J	1.3	J	0.6	J	4.9	1.3	1.3
C2-Fluoranthenes/Pyrenes		8.9	1.3	J	0.7	J	0.2	J	0.5	J	0.4	J	4.1	0.8
C3-Fluoranthenes/Pyrenes		2.9	0.4	J	<1.8	U	<1.8	U	0.1	J	1.2	J	0.2	J
Benzo(a)anthracene		2.6	0.5	0.2	J	0.1	J	0.1	J	0.3	J	0.1	J	0.1
Chrysene		11.3	1.9	2.9	0.7	J	1.9	0.6	J	1.7	0.8	0.8	J	0.8
C1-Chrysenes		5.1	0.8	J	0.8	J	0.1	J	0.4	J	1.3	J	0.4	J
C2-Chrysenes		2.2	0.5	J	0.3	J	<1.6	U	<1.6	U	<1.7	U	0.7	J
C3-Chrysenes		<1.6	U	<1.6	U	<1.6	U	<1.6	U	<1.6	U	<1.6	U	<1.6
C4-Chrysenes		<1.6	U	<1.6	U	<1.6	U	<1.6	U	<1.6	U	<1.6	U	<1.6
Benzo(b)fluoranthene		2.8	0.7	0.4	J	0.3	J	0.4	J	0.4	J	0.5	J	<0.7
Benzo(k)fluoranthene		1.7	0.3	J	0.1	J	0.2	J	0.2	J	0.2	J	<0.4	U
Benzo(a)pyrene		2.2	0.5	0.2	J	0.3	J	0.2	J	0.3	J	0.6	J	<0.4
Benzo(a)pyrene		0.8	0.2	J	0.1	J	<0.3	U	0.2	J	0.1	J	<0.3	U
Perylene		0.8	J	0.1	J	0.1	J	<0.9	U	0.1	J	0.3	J	<0.9
Indeno(1,2,3-c,d)pyrene		0.5	J	0.1	J	0.1	J	0.1	J	0.1	J	0.1	J	<0.5
Dibenzo(a,h)anthracene		0.1	J	<0.4	U	<0.4	U	0.1	J	<0.4	U	<0.4	U	<0.4
Benzo(g,h,i)perylene		0.5	0.2	J	0.1	J	0.1	J	0.1	J	0.1	J	<0.4	U
Total PAHs		209	85	99	37	75	32	68	53					

Notes:

1. J=Below the MDL, U=Not detected
2. Concentrations are in micrograms per kilogram (µg/kg) or parts per billion (ppb).
3. Total PAHs are the sum of detected PAH compounds and one half the detection limit of non-detected compounds.

TABLE II-D

## SHELLFISH ANALYTICAL DATA USED IN RISK CHARACTERIZATION

Barge B120 Oil Spill  
Buzzards Bay, Massachusetts

Analyte	Sample ID	RI-QH-01-A and B	WFHRS-QH-1-A and B	EPBR-SS-1-A, B and C	Great-SS-01-A and B	MHRS-SS-1-A, B and C	WFHRS-SS-1-A and B		
	Collection Date	5/6/03	5/7/03	5/6/03	5/6/03	5/6/03	5/7/03	Baseline	Baseline
Naphthalene		1.5	1.8	3.1	2.2	3	2.7		
C1-Naphthalenes		3	2.6	J	2.7	J	4.1	3.8	4.4
C2-Naphthalenes		4.2	3.4		2.6	J	4.9	4.2	5.1
C3-Naphthalenes		3	2.5	J	2.1	J	3.3	3.9	3.4
C4-Naphthalenes		1.4	J	1.9	J	1.3	J	2	2
Benzo(b)fluoranthene		0.1	J	0.1	J	0.2	J	0.2	J
C1-Benzo(b)fluoranthenes		0.6	J	0.6	J	0.4	J	0.7	J
C2-Benzo(b)fluoranthenes		0.5	J	<1.3	U	<1.2	U	0.5	J
C3-Benzo(b)fluoranthenes		<1.3	U	<1.3	U	<1.2	U	<1.3	U
Biphenyl		1.4		1.2		1.1		1.5	
Acenaphthylene		0.1	J	0.1	J	0.2	J	0.2	J
Acenaphthene		0.4		0.4		0.7		0.6	
Dibenzofuran		0.6		0.6		0.8		0.7	
Fluorene		0.3	J	0.4	J	0.6		0.5	
C1-Fluorenes		0.6	J	0.9	J	0.9	J	1.3	1.8
C2-Fluorenes		1.2		2.1		1.5		2.4	3
C3-Fluorenes		0.8	J	2		0.9	J	2.6	3.5
Carbazole		0.1	J	0.1	J	0.2	J	0.1	J
Anthracene		0.1	J	0.3		0.6		0.5	
Phenanthrene		2		2.6		5.3		4.8	5.1
C1-Phenanthrene/Anthracenes		4.1		10.3		5.2		10.1	11.9
C2-Phenanthrene/Anthracenes		6.3		13.5		6.6		13.2	16.9
C3-Phenanthrene/Anthracenes		2.6		5.8		3.7		6.8	8.4
C4-Phenanthrene/Anthracenes		0.7	J	1.3		1.3		2.2	2
Dibenzothiophene		0.2	J	0.5		0.4		0.7	0.5
C1-Dibenzothiophenes		0.6		2		0.7		2.2	1.7
C2-Dibenzothiophenes		1.2		3.5		1.2		4	2.6
C3-Dibenzothiophenes		0.8		1.9		0.9		2.8	1.6
Fluoranthene		1.7		3		9.4		3.8	4.4
Pyrene		1.4		2.2		5.1		4.2	1.4
C1-Fluoranthenes/Pyrenes		1.7	J	3.6		3.7		5	2.9
C2-Fluoranthenes/Pyrenes		1.2	J	1.9		2.3		2.9	1.8
C3-Fluoranthenes/Pyrenes		0.3	J	0.8	J	0.7	J	0.9	0.5
Benzo(a)anthracene		0.2	J	0.5	J	1.5		0.9	0.2
Chrysene		0.8	J	1.8		3.5		2.6	2.3
C1-Chrysenes		0.4	J	1.1	J	1.6	J	1.7	1
C2-Chrysenes		<1.7	U	0.4	J	0.6	J	0.8	0.3
C3-Chrysenes		<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
Benzo(b)fluoranthene		0.3	J	0.5	J	2.5		1.3	0.5
Benzo(k)fluoranthene		0.1	J	0.3	J	1.8		0.8	0.3
Benzo(e)pyrene		0.3	J	0.4	J	2.9		2.1	0.8
Benzo(a)pyrene		0.1	J	0.1	J	1.3		0.5	0.1
Perylene		0.1	J	0.3	J	0.7	J	0.7	0.3
Indeno(1,2,3-c,d)pyrene		0.1	J	0.1	J	0.9		0.4	0.1
Dibenzo(a,h)anthracene		<0.4	U	<0.4	U	0.1	J	0.1	J
Benzo(g,h,i)perylene		0.1	J	0.2	J	1.3		1	0.4
Total PAHs		51	83	88	107	102	109		

## Notes:

1. J=Below the MDL, U=Not detected
2. Concentrations are in micrograms per kilogram ( $\mu\text{g}/\text{kg}$ ) or parts per billion (ppb).
3. Total PAHs are the sum of detected PAH compounds and one half the detection limit of non-detected compounds.

**Entrix, Inc.**  
**Buzzards Bay Oil Spill Project**  
**Polycyclic Aromatic Hydrocarbon Data**  
**Client Submitted Samples**

Sample Name	ETX3692.D	ETX3693.D	ETX3694.D	ETX3695.D	ETX3696.D
Client Name	W2A10-ST-S06	W2A10-ST-S07	W2A10-ST-S08	W2A10-ST-S09	W2A10-ST-XXX
Matrix	Sediment	Sediment	Sediment	Sediment	Sediment
Collection Date	07/22/04	07/22/04	07/22/04	07/22/04	07/22/04
Received Date	07/24/04	07/24/04	07/24/04	07/24/04	07/24/04
Extraction Date	08/02/04	08/02/04	08/02/04	08/02/04	08/02/04
Extraction Batch	ENV 974	ENV 974	ENV 974	ENV 974	ENV 974
Date Acquired	08/05/04	08/05/04	08/05/04	08/05/04	08/05/04
Method	PAH-2002	PAH-2002	PAH-2002	PAH-2002	PAH-2002
Sample Dry Weight (g)	15.2	15.1	15.0	15.0	15.1
% Moisture	18	66	13	15	67
% Dry	82	35	87	85	33
Dilution	NA	NA	NA	NA	NA

Target Compounds	Su Corrected Conc. (ng/dry g)	Su Corrected Conc. (ng/dry g)	Su Corrected Conc. (ng/dry g)	Su Corrected Conc. (ng/dry g)	Su Corrected Conc. (ng/dry g)
Naphthalene	4.7	13.9	4.8	0.5	13.2
C1-Naphthalenes	3.0	9.8	2.5	0.4	8.2
C2-Naphthalenes	4.5	29.7	2.7	0.5	26.9
C3-Naphthalenes	4.9	43.1	3.0	0.4	34.0
C4-Naphthalenes	4.5	60.4	2.8	<0.4	43.3
Benzothiophene	0.3	0.6	0.2	<0.2	0.6
C1-Benzothiophenes	<0.3	0.7	<0.3	<0.3	0.5
C2-Benzothiophenes	<0.3	1.4	<0.3	<0.3	1.4
C3-Benzothiophenes	<0.3	2.6	<0.3	<0.3	1.9
Biphenyl	1.6	4.1	0.9	0.1J	2.8
Acenaphthylene	8.2	21.3	5.0	0.6	23.5
Acenaphthene	5.4	7.0	5.5	0.1J	5.9
Dibenzofuran	2.9	4.9	2.8	0.2J	5.1
Fluorene	6.0	15.5	5.1	0.1J	11.3
C1-Fluorenes	4.4	24.0	3.2	<0.4	17.8
C2-Fluorenes	9.7	95.6	6.6	<0.4	65.0
C3-Fluorenes	19.1	176	12.0	<0.4	109
Carbazole	7.3	12.8	6.4	<0.3	9.8
Anthracene	15.4	53.8	12.3	0.6	31.1
Phenanthrene	59.8	136	43.9	0.3	83
C1-Phenanthrene/Anthracenes	40.6	254	24.8	1.1	139
C2-Phenanthrene/Anthracenes	72.1	851	35.3	0.7	429
C3-Phenanthrene/Anthracenes	106	1530	62.2	2.1	678
C4-Phenanthrene/Anthracenes	70.2	1000	56.5	1.7	512
Dibenzothiophene	3.5	14.5	2.3	<0.2	7.4
C1-Dibenzothiophene	4.9	46.6	2.2	<0.3	19.1
C2-Dibenzothiophene	12.4	147	5.0	<0.3	67.7
C3-Dibenzothiophene	21.8	266	10.4	<0.3	112
Fluoranthene	153	275	109	1.2	216
Pyrene	158	371	100	1.6	273
C1-Fluoranthenes/Pyrenes	109	928	83.3	1.7	457
C2-Fluoranthenes/Pyrenes	126	1320	91.6	3.0	652
C3-Fluoranthenes/Pyrenes	80	913	75.0	2.4	504
Benzo(a)anthracene	127	467	86.7	1.7	262
Chrysene	135	566	93.3	2.2	302
C1-Chrysenes	165	1550	131	4.1	746
C2-Chrysenes	156	1610	129	4.3	822
C3-Chrysenes	82.6	682	54.5	2.3	425
C4-Chrysenes	10.8	39.6	6.2	<0.3	23.4
Benzo(b)fluoranthene	94.2	150	59.0	2.6	164
Benzo(k)fluoranthene	28.9	22.6	18.9	0.9	50.1
Benzo(e)pyrene	47.0	78.3	29.8	1.7	96.0
Benzo(a)pyrene	90.8	131.0	55.1	2.5	166
Perylene	20.1	26.8	13.3	0.5J	38.4
Indeno(1,2,3-c,d)pyrene	73.4	67.6	42.1	1.9	98.3
Dibenzo(a,h)anthracene	14.4	20.8	8.1	0.3	26.2
Benzo(g,h,i)perylene	59.9	49.5	29.5	1.6	77.9
<b>Total PAHs</b>	<b>2224</b>	<b>14091</b>	<b>1534</b>	<b>45.9</b>	<b>7858</b>

**Individual Alkyl Isomers and Hopane**

2-Methylnaphthalene	3.6	11.3	3.0	0.5	9.6
1-Methylnaphthalene	1.8	6.1	1.4	0.3	5.0
2,6-Dimethylnaphthalene	3.1	32.2	1.9	0.3	35.1
1,6,7-Trimethylnaphthalene	0.4	4.5	1.0	<0.1	5.9
1-Methylphenanthrene	9.3	60.6	5.7	0.8	23.0
C29-Hopane	29.6	54.2	18.5	1.9	53.8
18a-Oleanane	4.4	5.5	2.8	0.3	8.9
C30-Hopane	33.9	61.8	21.3	2.3	65.2

Surrogate (Su)	Su Recovery (%)	Su Recovery (%)	Su Recovery (%)	Su Recovery (%)	Su Recovery (%)
Naphthalene-d8	65	73	90	74	79
Acenaphthene-d10	70	90	87	80	89
Phenanthrene-d10	64	91	72	73	76
Chrysene-d12	82	91	79	83	95
Perylene-d12	62	91	60	68	81

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

Entrix, Inc.  
 Buzzards Bay Oil Spill Project  
 Polycyclic Aromatic Hydrocarbon Data  
 Client Submitted Samples

Client Name	HB-SED-01	HB-DUP-01	HB-SED-02	HB-SED-03	HB-SED-04	HB-SED-05	HB-SED-06	HB-SED-07	HB-SED-08	HB-SED-09
Matrix	Sediment	Sediment	Sediment	Sediment	Sediment	Sediment	Sediment	Sediment	Sediment	Sediment
Collection Date	12/09/04	12/09/04	12/09/04	12/09/04	12/09/04	12/09/04	12/09/04	12/09/04	12/09/04	12/09/04
Target Compounds	Su Corrected Conc. (ng/dry g)	Su Corrected Conc. (ng/dry g)	Su Corrected Conc. (ng/dry g)	Su Corrected Conc. (ng/dry g)	Su Corrected Conc. (ng/dry g)	Su Corrected Conc. (ng/dry g)	Su Corrected Conc. (ng/dry g)	Su Corrected Conc. (ng/dry g)	Su Corrected Conc. (ng/dry g)	Su Corrected Conc. (ng/dry g)
Naphthalene	0.1J	0.2	0.2	0.2	0.1J	0.1J	0.1J	0.2	0.2	0.2
C1-Naphthalenes	0.2J	0.3J	0.2J	0.3J	0.1J	0.2J	0.2J	0.2J	0.3J	0.3J
C2-Naphthalenes	<0.4	1.3	<0.4	<0.4	<0.4	<0.4	<0.4	0.6	1.6	1.7
C3-Naphthalenes	<0.4	0.8	<0.4	<0.4	<0.4	<0.4	<0.4	3.6	16.6	<0.4
C4-Naphthalenes	<0.4	1.2	<0.4	<0.4	<0.4	<0.4	<0.4	12.1	49.6	<0.4
Benzothiophene	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
C1-Benzothiophenes	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3
C2-Benzothiophenes	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3
C3-Benzothiophenes	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3
Biphenyl	0.1J	0.1J	0.1J	0.1J	0.1J	0.1J	0.1J	0.1	0.1J	0.1J
Acenaphthylene	0.1J	0.1J	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	0.1J	<0.2
Acenaphthene	0.100	0.200	0.100	0.100	<0.1	0.100	0.100	<0.1	<0.1	0.200
Dibenzofuran	<0.2	0.1J	0.1J	0.1J	<0.2	0.1J	0.1J	0.1	0.1J	0.1J
Fluorene	0.1J	<0.2	<0.2	0.1J	<0.2	<0.2	0.1J	<0.2	0.3	0.1J
C1-Fluorenes	<0.4	<0.4	<0.4	0.5	<0.4	<0.4	<0.4	<0.4	3.6	0.2J
C2-Fluorenes	<0.4	<0.4	<0.4	3.0	<0.4	<0.4	<0.4	<0.4	22.2	0.9
C3-Fluorenes	<0.4	<0.4	<0.4	6.3	<0.4	<0.4	<0.4	10.7	28.2	<0.4
Carbazole	0.1J	<0.3	0.2J	<0.3	0.1J	<0.3	<0.3	<0.3	<0.3	<0.3
Anthracene	0.1J	<0.2	<0.2	0.1J	<0.2	<0.2	<0.2	0.1J	0.7	<0.2
Phenanthrene	0.2	0.3	0.1J	0.7	0.2	0.2	0.3	0.3	0.7	0.5
C1-Phenanthrene/Anthracenes	<0.3	1.4	<0.3	13.6	0.3	<0.3	0.3	5.3	25.5	<0.3
C2-Phenanthrene/Anthracenes	<0.3	4.7	<0.3	21.4	0.6	<0.3	<0.3	34.2	119	<0.3
C3-Phenanthrene/Anthracenes	<0.3	3.4	<0.3	19.4	1.2	<0.3	<0.3	61.3	115	<0.3
C4-Phenanthrene/Anthracenes	<0.3	1.6	<0.3	9.2	1.1	<0.3	<0.3	38.4	54.4	<0.3
Dibenzothiophene	1.8	0.1J	0.8	0.4	0.2	0.2	0.3	0.2	0.4	0.3
C1-Dibenzothiophene	<0.3	0.2J	<0.3	0.8	<0.3	<0.3	<0.3	0.8	4.2	<0.3
C2-Dibenzothiophene	<0.3	0.7	<0.3	2.6	<0.3	<0.3	<0.3	5.1	18.2	<0.3
C3-Dibenzothiophene	<0.3	0.5	<0.3	3.3	<0.3	<0.3	<0.3	9.4	19.5	<0.3
Fluoranthene	0.5	0.6	0.2J	0.7	0.2J	0.4	0.3	0.6	2.3	0.4
Pyrene	0.7	1.3	0.3	2.9	0.4	0.5	0.4	3.5	12.6	0.5
C1-Fluoranthenes/Pyrenes	2.0	3.5	0.8	10.7	1.9	1.3	0.7	28.6	57.5	0.6
C2-Fluoranthenes/Pyrenes	1.4	3.3	1.7	13.3	3.3	1.8	1.3	52.9	77.3	1.2
C3-Fluoranthenes/Pyrenes	0.6	1.7	1.2	6.7	2.2	1.0	0.9	25.8	46.5	0.9
Benz(a)anthracene	0.4	0.7	0.1J	1.7	0.2	0.2	0.2	5.5	9.4	0.2
Chrysene	1.3	1.1	0.4	3.6	0.9	1.0	0.5	12.3	18.2	0.4
C1-Chrysenes	1.0	2.3	1.2	11.0	2.7	1.6	0.8	46.5	63.0	0.8
C2-Chrysenes	0.9	2.7	1.6	10.1	3.8	1.8	1.1	48.8	59.0	1.1
C3-Chrysenes	<0.3	1.3	1.2	4.5	2.7	<0.3	<0.3	19.5	26.3	<0.3
C4-Chrysenes	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3
Benzo(b)fluoranthene	0.5	0.9	0.4	0.9	0.4	0.6	0.4	3.1	4.0	0.5
Benzo(k)fluoranthene	0.2J	0.1J	0.1J	0.2J	0.1J	0.1J	0.1J	0.4	0.4	0.1J
Benzo(e)pyrene	0.4	0.7	0.5	0.8	0.6	0.5	0.4	3.1	3.6	0.3J
Benzo(a)pyrene	0.3	0.7	0.3	1.0	0.5	0.3	0.3	4.3	5.9	0.3
Perylene	0.1J	0.1J	0.1J	0.3J	0.2J	0.1J	0.1J	1.4	1.6	0.1J
Indeno(1,2,3-c,d)pyrene	0.2J	0.4	0.1J	0.2J	0.2J	0.2J	0.2J	0.5	0.8	0.2J
Dibenzo(a,h)anthracene	0.1J	0.1J	0.1J	0.1J	0.2	0.1J	0.1J	0.6	0.7	<0.2
Benzo(g,h,i)perylene	0.2	0.5	0.2	0.3	0.3	0.2	0.3	1.1	1.4	0.2
<b>Total PAHs</b>	<b>13.7</b>	<b>39.2</b>	<b>12.3</b>	<b>151</b>	<b>24.8</b>	<b>12.7</b>	<b>9.7</b>	<b>447</b>	<b>871</b>	<b>12.4</b>
<b>Individual Alkyl Isomers and Hopanes</b>										
2-Methylnaphthalene	0.1J	0.2J	0.1J	0.2J	0.1J	0.1J	0.2J	0.2J	0.2J	0.2J
1-Methylnaphthalene	0.1J	0.2	0.1J	0.3	0.1J	0.1J	0.1J	0.1J	0.2	0.2
2,6-Dimethylnaphthalene	<0.2	1.5	<0.2	<0.2	<0.2	<0.2	<0.2	0.5	2.2	1.8
1,6,7-Trimethylnaphthalene	<0.1	0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.4	1.7	<0.1
1-Methylphenanthrene	<0.2	0.7	<0.2	2.5	0.1J	<0.2	0.1J	2.0	6.8	<0.2
C29-Hopane	0.9J	0.6J	1.0J	1.8	1.7	1.1J	1.0J	4.1	2.3	1.3
18a-Oleanane	<1.1	<1.1	<1.1	<1.1	<1.1	<1.1	<1.1	<1.1	<1.1	<1.1
C30-Hopane	0.9J	1.3	1.3J	3.7	1.8	1.7	1.5	4.7	3.7	2.2

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

**ATTACHMENT III  
STATISTICAL ANALYSIS OF  
TOTAL PAH CONCENTRATIONS IN SHELLFISH TISSUE**



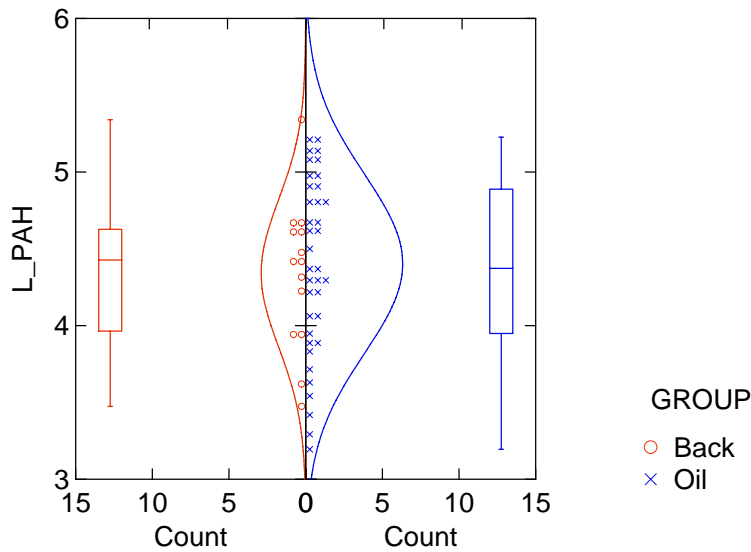
*Statistical Analysis of Total PAH concentrations in Shellfish Tissue  
Barge B120 Oil Spill  
Buzzards Bay, Massachusetts.*

A two-tailed two-sample t-test was performed on total PAH concentrations in shellfish tissue for oiled vs. baseline groups (see Table 7 for data). The mean total PAH was not statistically different. Natural log transformation was used as ln-transformed variables were normally distributed. The non-transformed data had the same conclusions. In addition, a non-parametric test (Kruskal-Wallis) was performed and it led to the same conclusions.

Two-sample t test on L\_PAH grouped by GROUP\$

T = -0.387

Prob = 0.701



**ATTACHMENT IV  
FORWARD-CALCULATION OF RISK ESTIMATES**

**TABLE IV-2**  
**RESIDENT EXPOSURE PROFILE**  
 Barge B120 Oil Spill  
 Buzzards Bay, Massachusetts

Equations Used to Calculate Average Daily Dose (ADD) and Lifetime Average Daily Dose (LADD)

**Exposure Pathway: Dermal Contact with Sediment**

$$ADD_{\text{sed-dermal}} = \frac{EPC_{\text{soil}} * DCR_{\text{soil}} * EF * ED * EP * RAF_{\text{dermal-nc}} * C1}{BW * AP_{\text{nc}}} \quad \text{Equation 1}$$

$$LADD_{\text{sed-dermal}} = \frac{EPC_{\text{soil}} * DCR_{\text{soil}} * EF * ED * EP * RAF_{\text{dermal-c}} * C1}{BW * AP_c} \quad \text{Equation 2}$$

Parameter	Definition	Units	Receptor Specific Values			Rationale/Reference
			Young Child Subchronic (ages 1<2 years)	Child Chronic (ages 1-8)	Child/Adult Lifetime (ages 1<31 years)	
ADD <sub>sed-dermal</sub>	Average Daily Dose	mg/kg-day	Equation 1	Equation 1	NA	Calculated
LADD <sub>sed-dermal</sub>	Lifetime Average Daily Dose	mg/kg-day	NA	NA	Equation 2	Calculated
EPC <sub>sed</sub>	Exposure Point Concentration in Sediment	mg/kg				Maximum Detected
DCR <sub>sed</sub>	Soil Dermal Contact Rate	mg/day	1914	2434	4905	USEPA, 1996; Kissel et. al. 1998. Lifetime DCR <sub>soil</sub> is age weighted = [(youth DCR <sub>soil</sub> * 7 years) + (adult DCR <sub>soil</sub> * 23 years)] / 30 years
EF	Exposure Frequency	events/year	87	87	87	MADEP, 1995; 4 days/week from May through September
ED	Exposure Duration	days/event	1	1	1	MADEP, 1995
EP	Exposure Period	years	1	7	30	equals age interval
RAF <sub>dermal</sub>	Relative Absorption Factor	unitless	constituent-specific	constituent-specific	constituent-specific	MADEP, 1995; MADEP, 1994; MADEP, 1992
C1	conversion factor for units	kg/mg	1.0E-06	1.0E-06	1.0E-06	Constant
BW	Body Weight of Receptor	kg	11.15	17.2	47.7	MADEP, 1995 (Table B-1); average for age range
AP <sub>nc</sub>	Averaging Period, non-cancer	days	365	2,555	NA	equals EP * 365 days/year
AP <sub>c</sub>	Averaging Period, cancer	days	NA	NA	27,375	equals average lifetime, 75 years * 365 days/year

Abbreviations:

AF = Adherence Factor; MADEP = Massachusetts Department of Environmental Protection; NA = Not Applicable; SA = Skin Surface Area.

**TABLE IV-2**  
**RESIDENT EXPOSURE PROFILE**  
 Barge B120 Oil Spill  
 Buzzards Bay, Massachusetts

Equations Used to Calculate Average Daily Dose (ADD) and Lifetime Average Daily Dose (LADD)

**Exposure Pathway: Incidental Ingestion of Sediment**

$$ADD_{\text{sed-oral}} = \frac{EPC_{\text{sed}} * IR_{\text{sed}} * EF * ED * EP * RAF_{\text{oral-nc}} * C1}{BW * AP_{\text{nc}}} \quad \text{Equation 3}$$

$$LADD_{\text{sed-oral}} = \frac{EPC_{\text{sed}} * IR_{\text{sed}} * EF * ED * EP * RAF_{\text{oral-c}} * C1}{BW * AP_{\text{c}}} \quad \text{Equation 4}$$

Parameter	Definition	Units	Receptor Specific Values			Rationale/Reference
			Young Child Subchronic (ages 1<2 years)	Child Chronic (ages 1<8)	Child/Adult Lifetime (ages 1<31 years)	
ADD <sub>sed-oral</sub>	Average Daily Dose	mg/kg-day	Equation 3	Equation 3	NA	Calculated
LADD <sub>sed-oral</sub>	Lifetime Average Daily Dose	mg/kg-day	NA	NA	Equation 4	Calculated
EPC <sub>sed</sub>	Exposure Point Concentration in Soil	mg/kg				Maximum Detected
IR <sub>sed</sub>	Soil Ingestion Rate	mg/day	100	93	60	MADEP, 1995.
EF	Exposure Frequency	events/year	87	87	87	MADEP, 1995; 4 days/week from May through September
ED	Exposure Duration	days/event	1	1	1	MADEP, 1995
EP	Exposure Period	years	1	7	30	equals age interval
RAF <sub>oral</sub>	Relative Absorption Factor	unitless	constituent-specific	constituent-specific	constituent-specific	MADEP, 1995; MADEP, 1994; MADEP, 1992
C1	conversion factor for units	kg/mg	1.0E-06	1.0E-06	1.0E-06	Constant
BW	Body Weight of Receptor	kg	11.15	17.2	47.7	MADEP, 1995 (Table B-1); average for age range
AP <sub>nc</sub>	Averaging Period, non-cancer	days	365	2,555	NA	equals EP * 365 days/year
AP <sub>c</sub>	Averaging Period, cancer	days	NA	NA	27,375	equals average lifetime, 75 years * 365 days/year

MADEP = Massachusetts Department of Environmental Protection; NA = Not Applicable.

**TABLE IV-2**  
**RESIDENT EXPOSURE PROFILE**  
**Barge B120 Oil Spill**  
**Buzzards Bay, Massachusetts**

**Exposure Pathway: Consumption of Shellfish**

$$ADD_{fish} = \frac{EPC_{fish} * FI * EF * EP * RAF_{oral}}{BW * AP_{nc}} \quad \text{Equation 5}$$

$$LADD_{fish} = \frac{EPC_{fish} * FI * EF * EP * RAF_{oral}}{BW * AP_c} \quad \text{Equation 6}$$

Parameter	Definition	Units	Receptor Specific Values			Rationale/Reference
			Young Child Subchronic (ages 1<2 years)	Child Chronic (ages 1<8)	Child/Adult Lifetime (ages 1<31 years)	
ADD <sub>fish</sub>	Average Daily Dose for ingestion of food	mg/kg-day	Equation 5	Equation 5	NA	Calculated
LADD <sub>fish</sub>	Lifetime Average Daily Dose for ingestion of food	mg/kg-day	NA	NA	Equation 6	Calculated
ADD <sub>fish</sub>	Average Daily Dose for ingestion of food	mg/kg-day	constituent-specific	constituent-specific	constituent specific	See Risk Tables
EPC <sub>fish</sub>	Exposure Point Concentration in Food	mg/kg	Table II-D	Table II-D	Table II-D	Maximum Detected
FI	Food Intake	kg/day	0.011	0.011	0.011	Ruffle et al (1995)
EF	Exposure Frequency	days/year	180	180	180	shellfish beds open 6 months/year
EP	Exposure Period	years	1	2	2	shellfish depurate contaminants less than two years
RAF	Relative Absorption Factor	unitless	constituent-specific	constituent-specific	constituent-specific	MADEP, 1995; MADEP, 1994; MADEP, 1992
BW	Body Weight of Receptor	kg	11	17	48	MADEP, 1995
APn	Averaging Period, non-cancer	days	365	730	NA	equals EP * 365 days/year
APc	Averaging Period, cancer	days	NA	NA	27,375	equals average lifetime, 75 years * 365 days/year

**TABLE IV-2**  
**RESIDENT EXPOSURE PROFILE**  
 Barge B120 Oil Spill  
 Buzzards Bay, Massachusetts

Equations Used to Calculate Average Daily Dose (ADD) and Lifetime Average Daily Dose (LADD)

**Exposure Pathway: Dermal Contact with Tarball/Weathered Oil**

$$ADD_{\text{product-oral}} = \frac{EPC_{\text{soil}} * DCR_{\text{soil}} * EF * ED * EP * RAF_{\text{dermal-nc}} * C1}{BW * AP_{\text{nc}}} \quad \text{Equation 1}$$

$$LADD_{\text{product-oral}} = \frac{EPC_{\text{soil}} * DCR_{\text{soil}} * EF * ED * EP * RAF_{\text{dermal-c}} * C1}{BW * AP_{\text{c}}} \quad \text{Equation 2}$$

Parameter	Definition	Units	Receptor Specific Values			Rationale/Reference
			Young Child Subchronic (ages 1<2 years)	Child Chronic (ages 1-8)	Child/Adult Lifetime (ages 1<31 years)	
ADD <sub>product-dermal</sub>	Average Daily Dose	mg/kg-day	Equation 1	Equation 1	NA	Calculated
LADD <sub>product-dermal</sub>	Lifetime Average Daily Dose	mg/kg-day	NA	NA	Equation 2	Calculated
EPC <sub>product</sub>	Exposure Point Concentration in Weathered oil	mg/kg	Table 6	Table 6	Table 6	Turner Ave sample
IR <sub>product</sub>	Dermal Contact Rate	mg/day	324	379	13.5	U.S.EPA 2004 - child/youth area of both hands. Approximate area of oiling on adult hand is 13.5 cm (distal pad of three fingers).
EF	Exposure Frequency	events/year	1	1	0.58	Contact only expected to occur once per year. Adults are less likely to encounter tarballs every year over a 30 year period. See text Section 3.3.5.2.
ED	Exposure Duration	days/event	1	1	1	MADEP, 1995
EP	Exposure Period	years	1	7	30	equals age interval
RAF <sub>oral</sub>	Relative Absorption Factor	unitless	constituent-specific	constituent-specific	constituent-specific	MADEP, 1995; MADEP, 1994; MADEP, 1992
C1	conversion factor for units	kg/mg	1.0E-06	1.0E-06	1.0E-06	Constant
BW	Body Weight of Receptor	kg	11.15	17.2	47.7	MADEP, 1995 (Table B-1); average for age range
AP <sub>nc</sub>	Averaging Period, non-cancer	days	365	2,555	NA	equals EP * 365 days/year
AP <sub>c</sub>	Averaging Period, cancer	days	NA	NA	27,375	equals average lifetime, 75 years * 365 days/year

**TABLE IV-2**  
**RESIDENT EXPOSURE PROFILE**  
 Barge B120 Oil Spill  
 Buzzards Bay, Massachusetts

Equations Used to Calculate Average Daily Dose (ADD) and Lifetime Average Daily Dose (LADD)

**Exposure Pathway: Incidental Ingestion of Weathered Oil**

$$ADD_{\text{product-oral}} = \frac{EPC_{\text{product}} * IR_{\text{product}} * EF * ED * EP * RAF_{\text{oral-nc}} * C1}{BW * AP_{\text{nc}}} \quad \text{Equation 3}$$

$$LADD_{\text{product-oral}} = \frac{EPC_{\text{product}} * IR_{\text{product}} * EF * ED * EP * RAF_{\text{oral-c}} * C1}{BW * AP_c} \quad \text{Equation 4}$$

Parameter	Definition	Units	Receptor Specific Values			Rationale/Reference
			Young Child Subchronic (ages 1<2 years)	Child Chronic (ages 1<8)	Child/Adult Lifetime (ages 1<31 years)	
ADD <sub>product-oral</sub>	Average Daily Dose	mg/kg-day	Equation 3	Equation 3	NA	Calculated
LADD <sub>product-oral</sub>	Lifetime Average Daily Dose	mg/kg-day	NA	NA	Equation 4	Calculated
EPC <sub>product</sub>	Exposure Point Concentration in Weathered Oil	mg/kg	TABLE F-7	TABLE F-7	TABLE F-7	TBD
IR <sub>product</sub>	Ingestion Rate	mg/day	100	89	60	MADEP, 1995. Soil ingestion rate used.
EF	Exposure Frequency	events/year	1	1	1	MADEP, 1995 equals EP * 365 days/year
ED	Exposure Duration	days/event	1	1	1	
EP	Exposure Period	years	1	7	30	
RAF <sub>oral</sub>	Relative Absorption Factor	unitless	constituent-specific	constituent-specific	constituent-specific	MADEP, 1995; MADEP, 1994; MADEP, 1992
C1	conversion factor for units	kg/mg	1.0E-06	1.0E-06	1.0E-06	Constant
BW	Body Weight of Receptor	kg	11.15	17.2	47.7	MADEP, 1995 (Table B-1); average for age range
AP <sub>nc</sub>	Averaging Period, non-cancer	days	365	2,555	NA	equals EP * 365 days/year
AP <sub>c</sub>	Averaging Period, cancer	days	NA	NA	27,375	equals average lifetime, 75 years * 365 days/year

**TABLE IV-3**  
**PRELIMINARY CALCULATION OF AVERAGE DAILY DOSES AND RISK ESTIMATES**  
**FOR DERMAL CONTACT WITH SEDIMENT**

Barge B120 Oil Spill  
Buzzards Bay, Massachusetts

RECEPTOR: Hypothetical Coastal Resident (Young Child, age 1<2)  
SUBCHRONIC NON-CANCER EFFECTS

See TABLE IV - 3 for Exposure Variables and Rationale	Dermal Contact with Sediment				
	$ADD_{\text{sed-dermal}} = \frac{EPC_{\text{sed}} * DCR_{\text{sed}} * EF * ED * EP * RAF_{\text{dermal-nc}} * C1}{BW * AP_{\text{nc}}}$ $HQ_{\text{sed-dermal}} = \frac{ADD_{\text{sed-dermal}}}{RfD} \qquad HI_{\text{sed-dermal}} = \sum HQ_{\text{sed-dermal}}$				
COC	EPC <sub>sed</sub> (mg/kg)	RAF <sub>dermal-nc</sub> (unitless)	ADD <sub>sed-dermal</sub> (mg/kg-day)	RfD Subchronic (mg/kg-day)	HQ <sub>sed-dermal</sub> (unitless)
2-Methylnaphthalene	1.9E-02	0.1	7.6E-08	4.0E-03	1.9E-05
Acenaphthene	1.3E-02	0.2	1.0E-07	6.0E-01	1.7E-07
Acenaphthylene	1.2E-02	0.18	8.7E-08	3.0E-01	2.9E-07
Anthracene	2.6E-02	0.29	3.1E-07	3.0E+00	1.0E-07
Benzo(a)Anthracene	1.9E-01	0.18	1.4E-06	3.0E-01	4.7E-06
Benzo(a)Pyrene	1.7E-01	0.18	1.3E-06	3.0E-01	4.2E-06
Benzo [e] Pyrene	NA	1	NC	NC	NC
Benzo(b)Fluoranthene	1.1E-01	0.18	8.1E-07	3.0E-01	2.7E-06
Benzo(g,h,i)Perylene	1.2E-01	0.18	8.8E-07	3.0E-01	2.9E-06
Benzo(k)Fluoranthene	9.5E-02	0.18	7.0E-07	3.0E-01	2.3E-06
Biphenyl	NA	0.08	NC	5.0E-02	NC
Carbazole	NA	1	NC	NC	NC
Chrysene	1.4E+00	0.18	1.1E-05	3.0E-01	3.6E-05
Dibenzo(a,h)anthracene	3.1E-02	0.08	1.0E-07	3.0E-01	3.4E-07
Dibenzofuran	NA	1	NC	NC	NC
Fluoranthene	3.1E-01	0.2	2.5E-06	4.0E-01	6.3E-06
Fluorene	1.1E-01	0.2	8.8E-07	4.0E-01	2.2E-06
Indeno(1,2,3-cd)Pyrene	9.7E-02	0.18	7.1E-07	3.0E-01	2.4E-06
Naphthalene	6.3E-02	0.1	2.6E-07	2.0E-02	1.3E-05
Perylene	NA	1	NC	NC	NC
Phenanthrene	1.1E+00	0.18	8.3E-06	3.0E-01	2.8E-05
Pyrene	1.2E+00	0.2	9.6E-06	3.0E-01	3.2E-05
C11-C22 Aromatic Fraction	7.3E+01	0.1	3.0E-04	3.0E-01	1.0E-03
C19-C36 Aliphatic Fraction	7.8E+01	0.1	3.2E-04	NC	NC
				HI <sub>dermal</sub> =	<b>1.2E-03</b>

Notes:

1. A default value of 1 is used when an RAF is otherwise unavailable.
2. COC = Constituent of Concern; EPC = Exposure Point Concentration; NA = Not Applicable/Not Available; NC = Not Calculated.
3. EPC is the maximum concentration of each PAH retained in dataset.
4. Rounding due to presentation of significant figures may result in slightly different results if reproduced manually.



**TABLE IV-3 (Continued)**

PRELIMINARY CALCULATION OF AVERAGE DAILY DOSES AND RISK ESTIMATES  
FOR DERMAL CONTACT WITH SEDIMENT

Barge B120 Oil Spill  
Buzzards Bay, Massachusetts

RECEPTOR: Hypothetical Coastal Resident (Child, age 1<8)  
CHRONIC NON-CANCER EFFECTS

COC	Dermal Contact with Sediment				
	EPC <sub>sed</sub> (mg/kg)	RAF <sub>dermal-nc</sub> (unitless)	ADD <sub>sed-dermal</sub> (mg/kg-day)	RfD Chronic (mg/kg-day)	HQ <sub>sed-dermal</sub> (unitless)
2-Methylnaphthalene	1.9E-02	0.1	6.3E-08	4.0E-03	1.6E-05
Acenaphthene	1.3E-02	0.2	8.6E-08	6.0E-02	1.4E-06
Acenaphthylene	1.2E-02	0.18	7.2E-08	3.0E-02	2.4E-06
Anthracene	2.6E-02	0.29	2.5E-07	3.0E-01	8.5E-07
Benzo(a)Anthracene	1.9E-01	0.18	1.2E-06	3.0E-02	3.9E-05
Benzo(a)Pyrene	1.7E-01	0.18	1.0E-06	3.0E-02	3.4E-05
Benzo [e] Pyrene	NA	1	NC	NC	NC
Benzo(b)Fluoranthene	1.1E-01	0.18	6.7E-07	3.0E-02	2.2E-05
Benzo(g,h,i)Perylene	1.2E-01	0.18	7.3E-07	3.0E-02	2.4E-05
Benzo(k)Fluoranthene	9.5E-02	0.18	5.8E-07	3.0E-02	1.9E-05
Biphenyl	NA	0.08	NC	5.0E-02	NC
Carbazole	NA	1	NC	NC	NC
Chrysene	1.4E+00	0.18	8.8E-06	3.0E-02	2.9E-04
Dibenzo(a,h)anthracene	3.1E-02	0.08	8.4E-08	3.0E-02	2.8E-06
Dibenzofuran	NA	1	NC	NC	NC
Fluoranthene	3.1E-01	0.2	2.1E-06	4.0E-02	5.2E-05
Fluorene	1.1E-01	0.2	7.3E-07	4.0E-02	1.8E-05
Indeno(1,2,3-cd)Pyrene	9.7E-02	0.18	5.9E-07	3.0E-02	2.0E-05
Naphthalene	6.3E-02	0.1	2.1E-07	2.0E-02	1.1E-05
Perylene	NA	1	NC	NC	NC
Phenanthrene	1.1E+00	0.18	6.8E-06	3.0E-02	2.3E-04
Pyrene	1.2E+00	0.2	7.9E-06	3.0E-02	2.6E-04
C11-C22 Aromatic Fraction	7.3E+01	0.1	2.5E-04	3.0E-02	8.2E-03
C19-C36 Aliphatic Fraction	7.8E+01	0.1	2.6E-04	NC	NC
				HI <sub>dermal</sub> =	<b>9.3E-03</b>

Notes:

1. A default value of 1 is used when an RAF is otherwise unavailable.
2. COC = Constituent of Concern; EPC = Exposure Point Concentration; NA = Not Applicable/Not Available; NC = Not Calculated.
3. EPC is the maximum concentration of each PAH retained in dataset.
4. Rounding due to presentation of significant figures may result in slightly different results if reproduced manually.

**TABLE IV-3 (Continued)**

PRELIMINARY CALCULATION OF LIFETIME AVERAGE DAILY DOSES AND RISK ESTIMATES  
FOR DERMAL CONTACT WITH SEDIMENT

Barge B120 Oil Spill  
Buzzards Bay, Massachusetts

RECEPTOR: Hypothetical Coastal Resident (Child/Adult, age 1<31)  
CANCER EFFECTS

See TABLE IV - 3 for Exposure Variables and Rationale	Dermal Contact with Sediment				
	$LADD_{sed-dermal} = \frac{EPC_{sed} * DCR_{sed} * EF * ED * EP * RAF_{dermal-c} * C1}{BW * AP_c}$ $ELCR_{sed-dermal} = LADD_{sed-dermal} * CSF \qquad \text{Total } ELCR_{sed-dermal} = \sum ELCR_{sed-dermal}$				
COC	EPC <sub>sed</sub>	RAF <sub>dermal-c</sub>	LADD <sub>sed-dermal</sub>	CSF	ELCR <sub>sed-dermal</sub>
	(mg/kg)	(unitless)	(mg/kg-day)	(mg/kg-day) <sup>-1</sup>	(unitless)
2-Methylnaphthalene	1.9E-02	1	1.8E-07	NC	NC
Acenaphthene	1.3E-02	1	1.3E-07	NC	NC
Acenaphthylene	1.2E-02	1	1.2E-07	NC	NC
Anthracene	2.6E-02	1	2.5E-07	NC	NC
Benzo(a)Anthracene	1.9E-01	0.2	3.8E-07	7.3E-01	2.8E-07
Benzo(a)Pyrene	1.7E-01	0.2	3.3E-07	7.3E+00	2.4E-06
Benzo [e] Pyrene	NA	1	NC	NC	NC
Benzo(b)Fluoranthene	1.1E-01	0.2	2.2E-07	7.3E-01	1.6E-07
Benzo(g,h,i)Perylene	1.2E-01	1	1.2E-06	NC	NC
Benzo(k)Fluoranthene	9.5E-02	0.2	1.9E-07	7.3E-02	1.4E-08
Biphenyl	NA	1	NC	NC	NC
Carbazole	NA	1	NC	2.0E-02	NC
Chrysene	1.4E+00	0.2	2.8E-06	7.3E-02	2.1E-07
Dibenzo(a,h)anthracene	3.1E-02	0.09	2.7E-08	7.3E+00	2.0E-07
Dibenzofuran	NA	1	NC	NC	NC
Fluoranthene	3.1E-01	1	3.0E-06	NC	NC
Fluorene	1.1E-01	1	1.1E-06	NC	NC
Indeno(1,2,3-cd)Pyrene	9.7E-02	0.2	1.9E-07	7.3E-01	1.4E-07
Naphthalene	6.3E-02	1	6.1E-07	NC	NC
Perylene	NA	1	NC	NC	NC
Phenanthrene	1.1E+00	1	1.1E-05	NC	NC
Pyrene	1.2E+00	1	1.2E-05	NC	NC
C11-C22 Aromatic Fraction	7.3E+01	1	7.2E-04	NC	NC
C19-C36 Aliphatic Fraction	7.8E+01	1	7.6E-04	NC	NC
				Total ELCR <sub>dermal</sub> :	<b>3.4E-06</b>

Notes:

1. A default value of 1 is used when an RAF is otherwise unavailable.
2. COC = Constituent of Concern; EPC = Exposure Point Concentration; NA = Not Applicable/Not Available; NC = Not Calculated.
3. EPC is the maximum concentration of each PAH retained in dataset.
4. Rounding due to presentation of significant figures may result in slightly different results if reproduced manually.

**TABLE IV-4**

PRELIMINARY CALCULATION OF AVERAGE DAILY DOSES AND RISK ESTIMATES  
FOR INCIDENTAL INGESTION OF SEDIMENT

Barge B120 Oil Spill  
Buzzards Bay, Massachusetts

RECEPTOR: Hypothetical Coastal Resident (Young Child, age 1<2)  
SUBCHRONIC NON-CANCER EFFECTS

See TABLE IV - 3 for Exposure Variables and Rationale	Incidental Ingestion of Sediment				
	$ADD_{sed-oral} = \frac{EPC_{sed} * IR_{sed} * EF * ED * EP * RAF_{oral-nc} * C1}{BW * AP_{nc}}$				
	$HQ_{sed-oral} = \frac{ADD_{sed-oral}}{RfD}$			$HI_{sed-oral} = \sum HQ_{sed-oral}$	
COC	EPC <sub>sed</sub>	RAF <sub>oral-nc</sub>	ADD <sub>sed-oral</sub>	RfD Subchronic	HQ <sub>sed-oral</sub>
	(mg/kg)	(unitless)	(mg/kg-day)	(mg/kg-day)	(unitless)
2-Methylnaphthalene	1.9E-02	1	4.0E-08	4.0E-03	1.0E-05
Acenaphthene	1.3E-02	1	2.7E-08	6.0E-01	4.5E-08
Acenaphthylene	1.2E-02	0.91	2.3E-08	3.0E-01	7.7E-08
Anthracene	2.6E-02	1	5.6E-08	3.0E+00	1.9E-08
Benzo(a)Anthracene	1.9E-01	0.91	3.7E-07	3.0E-01	1.2E-06
Benzo(a)Pyrene	1.7E-01	0.91	3.3E-07	3.0E-01	1.1E-06
Benzo [e] Pyrene	NA	1	NC	NC	NC
Benzo(b)Fluoranthene	1.1E-01	0.91	2.1E-07	3.0E-01	7.1E-07
Benzo(g,h,i)Perylene	1.2E-01	0.91	2.3E-07	3.0E-01	7.8E-07
Benzo(k)Fluoranthene	9.5E-02	0.91	1.8E-07	3.0E-01	6.2E-07
Biphenyl	NA	1	NC	5.0E-02	NC
Carbazole	NA	1	NC	NC	NC
Chrysene	1.4E+00	0.91	2.8E-06	3.0E-01	9.4E-06
Dibenzo(a,h)anthracene	3.1E-02	0.91	6.0E-08	3.0E-01	2.0E-07
Dibenzofuran	NA	1	NC	NC	NC
Fluoranthene	3.1E-01	1	6.6E-07	4.0E-01	1.7E-06
Fluorene	1.1E-01	1	2.3E-07	4.0E-01	5.8E-07
Indeno(1,2,3-cd)Pyrene	9.7E-02	0.91	1.9E-07	3.0E-01	6.3E-07
Naphthalene	6.3E-02	1	1.3E-07	2.0E-02	6.7E-06
Perylene	NA	1	NC	NC	NC
Phenanthrene	1.1E+00	0.91	2.2E-06	3.0E-01	7.3E-06
Pyrene	1.2E+00	1	2.5E-06	3.0E-01	8.4E-06
C11-C22 Aromatic Fraction	7.3E+01	0.36	5.6E-05	3.0E-01	1.9E-04
C19-C36 Aliphatic Fraction	7.8E+01	1	1.7E-04	NC	NC
				HI <sub>oral</sub> =	<b>2.4E-04</b>

Notes:

1. A default value of 1 is used when an RAF is otherwise unavailable.
2. COC = Constituent of Concern; EPC = Exposure Point Concentration; NA = Not Applicable/Not Available; NC = Not Calculated.
3. EPC is the maximum concentration of each PAH retained in dataset.
4. Rounding due to presentation of significant figures may result in slightly different results if reproduced manually.

**TABLE IV-4**

PRELIMINARY CALCULATION OF AVERAGE DAILY DOSES AND RISK ESTIMATES  
FOR INCIDENTAL INGESTION OF SEDIMENT

Barge B120 Oil Spill  
Buzzards Bay, Massachusetts

RECEPTOR: Hypothetical Coastal Resident (Child, age 1<8)  
CHRONIC NON-CANCER EFFECTS

See TABLE IV - 3 for Exposure Variables and Rationale	Incidental Ingestion of Sediment				
	$ADD_{sed-oral} = \frac{EPC_{sed} * IR_{sed} * EF * ED * EP * RAF_{oral-nc} * C1}{BW * AP_{nc}}$				
	$HQ_{sed-oral} = \frac{ADD_{sed-oral}}{RfD}$			$HI_{sed-oral} = \sum HQ_{sed-oral}$	
COC	EPC <sub>sed</sub>	RAF <sub>oral-nc</sub>	ADD <sub>sed-oral</sub>	RfD Chronic	HQ <sub>sed-oral</sub>
	(mg/kg)	(unitless)	(mg/kg-day)	(mg/kg-day)	(unitless)
2-Methylnaphthalene	1.9E-02	1	4.0E-08	4.0E-03	1.0E-05
Acenaphthene	1.3E-02	1	2.7E-08	6.0E-02	4.5E-07
Acenaphthylene	1.2E-02	0.91	2.3E-08	3.0E-02	7.7E-07
Anthracene	2.6E-02	1	5.6E-08	3.0E-01	1.9E-07
Benzo(a)Anthracene	1.9E-01	0.91	3.7E-07	3.0E-02	1.2E-05
Benzo(a)Pyrene	1.7E-01	0.91	3.3E-07	3.0E-02	1.1E-05
Benzo [e] Pyrene	NA	1	NC	NC	NC
Benzo(b)Fluoranthene	1.1E-01	0.91	2.1E-07	3.0E-02	7.1E-06
Benzo(g,h,i)Perylene	1.2E-01	0.91	2.3E-07	3.0E-02	7.8E-06
Benzo(k)Fluoranthene	9.5E-02	0.91	1.8E-07	3.0E-02	6.2E-06
Biphenyl	NA	1	NC	5.0E-02	NC
Chrysene	1.4E+00	0.91	2.8E-06	3.0E-02	9.4E-05
Dibenzo(a,h)anthracene	3.1E-02	0.91	6.0E-08	3.0E-02	2.0E-06
Dibenzofuran	NA	1	NC	NC	NC
Fluoranthene	3.1E-01	1	6.6E-07	4.0E-02	1.7E-05
Fluorene	1.1E-01	1	2.3E-07	4.0E-02	5.8E-06
Indeno(1,2,3-cd)Pyrene	9.7E-02	0.91	1.9E-07	3.0E-02	6.3E-06
Naphthalene	6.3E-02	1	1.3E-07	2.0E-02	6.7E-06
Perylene	NA	1	NC	NC	NC
Phenanthrene	1.1E+00	0.91	2.2E-06	3.0E-02	7.3E-05
Pyrene	1.2E+00	1	2.5E-06	3.0E-02	8.4E-05
C11-C22 Aromatic Fraction	7.3E+01	0.91	1.4E-04	3.0E-02	4.7E-03
C19-C36 Aliphatic Fraction	7.8E+01	1	1.7E-04	NC	NC
				HI <sub>oral</sub> =	<b>5.1E-03</b>

Notes:

1. A default value of 1 is used when an RAF is otherwise unavailable.
2. COC = Constituent of Concern; EPC = Exposure Point Concentration; NA = Not Applicable/Not Available; NC = Not Calculated.
3. EPC is the maximum concentration of each PAH retained in dataset.
4. Rounding due to presentation of significant figures may result in slightly different results if reproduced manually.

**TABLE IV-4 (Continued)**

PRELIMINARY CALCULATION OF LIFETIME AVERAGE DAILY DOSES AND RISK ESTIMATES  
FOR INCIDENTAL INGESTION OF SEDIMENT

Barge B120 Oil Spill  
Buzzards Bay, Massachusetts

RECEPTOR: Hypothetical Coastal Resident (Child/Adult, age 1<31)  
CANCER EFFECTS

See TABLE IV - 3 for Exposure Variables and Rationale	Incidental Ingestion of Sediment				
	$LADD_{sed-oral} = \frac{EPC_{sed} * IR_{sed} * EF * ED * EP * RAF_{oral-c} * C1}{BW * AP_c}$ $ELCR_{sed-oral} = LADD_{sed-oral} * CSF \qquad \text{Total ELCR}_{sed-oral} = \sum ELCR_{sed-oral}$				
COC	$EPC_{sed}$	$RAF_{oral-c}$	$LADD_{sed-oral}$	CSF	$ELCR_{sed-oral}$
	(mg/kg)	(unitless)	(mg/kg-day)	(mg/kg-day) <sup>-1</sup>	(unitless)
2-Methylnaphthalene	1.9E-02	1	2.2E-09	NC	NC
Acenaphthene	1.3E-02	1	1.5E-09	NC	NC
Acenaphthylene	1.2E-02	1	1.4E-09	NC	NC
Anthracene	2.6E-02	1	3.1E-09	NC	NC
Benzo(a)Anthracene	1.9E-01	1	2.3E-08	7.3E-01	1.69E-08
Benzo(a)Pyrene	1.7E-01	1	2.0E-08	7.3E+00	1.49E-07
Benzo [e] Pyrene	NA	1	NC	NC	NC
Benzo(b)Fluoranthene	1.1E-01	1	1.3E-08	7.3E-01	9.63E-09
Benzo(g,h,i)Perylene	1.2E-01	1	1.4E-08	NC	NC
Benzo(k)Fluoranthene	9.5E-02	1	1.1E-08	7.3E-02	8.32E-10
Biphenyl	NA	1	NC	NC	NC
Carbazole	NA	1	NC	2.0E-02	NC
Chrysene	1.4E+00	1	1.7E-07	7.3E-02	1.27E-08
Dibenzo(a,h)anthracene	3.1E-02	1	3.7E-09	7.3E+00	2.71E-08
Dibenzofuran	NA	1	NC	NC	NC
Fluoranthene	3.1E-01	1	3.7E-08	NC	NC
Fluorene	1.1E-01	1	1.3E-08	NC	NC
Indeno(1,2,3-cd)Pyrene	9.7E-02	1	1.2E-08	7.3E-01	8.49E-09
Naphthalene	6.3E-02	1	7.5E-09	NC	NC
Perylene	NA	1	NC	NC	NC
Phenanthrene	1.1E+00	1	1.4E-07	NC	NC
Pyrene	1.2E+00	1	1.4E-07	NC	NC
C11-C22 Aromatic Fraction	7.3E+01	1	8.8E-06	NC	NC
C19-C36 Aliphatic Fraction	7.8E+01	1	9.4E-06	NC	NC
				Total ELCR <sub>oral</sub> :	<b>2.2E-07</b>

Notes:

Notes:

1. A default value of 1 is used when an RAF is otherwise unavailable.
2. COC = Constituent of Concern; EPC = Exposure Point Concentration; NA = Not Applicable/Not Available; NC = Not Calculated.
3. EPC is the maximum concentration of each PAH retained in dataset.
4. Rounding due to presentation of significant figures may result in slightly different results if reproduced manually.

**TABLE IV-5**  
**PRELIMINARY CALCULATION OF AVERAGE DAILY DOSES AND RISK ESTIMATES**  
**FOR CONSUMPTION OF SHELLFISH**

Barge B120 Oil Spill  
Buzzards Bay, Massachusetts

RECEPTOR: Hypothetical Coastal Resident (Young Child, age 1<2)  
SUBCHRONIC NON-CANCER EFFECTS

See TABLE IV - 3 for Exposure Variables and Rationale	Consumption of Shellfish				
	$ADD_{fish} = \frac{EPC_{fish} * FI * EF * EP * RAF_{oral}}{BW * AP_{nc}}$				
	$HQ_{fish} = \frac{ADD_{fish}}{RfD}$		$HI_{fish} = \sum HQ_{fish}$		
COC	EPC <sub>fish</sub> (mg/kg)	RAF <sub>fish</sub> (unitless)	ADD <sub>fish</sub> (mg/kg-day)	RfD Subchronic (mg/kg-day)	HQ <sub>fish</sub> (unitless)
Acenaphthene	1.9E-03	1	9.2E-07	6.0E-01	1.5E-06
Acenaphthylene	6.0E-04	0.91	2.6E-07	3.0E-01	8.8E-07
Anthracene	1.3E-03	1	6.3E-07	3.0E+00	2.1E-07
Benzo(a)Anthracene	3.5E-03	0.91	1.5E-06	3.0E-01	5.1E-06
Benzo(a)Pyrene	1.3E-03	0.91	5.7E-07	3.0E-01	1.9E-06
Benzo(b)Fluoranthene	6.3E-03	0.91	2.8E-06	3.0E-01	9.3E-06
Benzo(g,h,i)Perylene	2.5E-03	0.91	1.1E-06	3.0E-01	3.7E-06
Benzo(k)Fluoranthene	2.5E-03	0.91	1.1E-06	3.0E-01	3.7E-06
Chrysene	1.2E-02	0.91	5.2E-06	3.0E-01	1.7E-05
Dibenzo(a,h)anthracene	2.0E-04	0.91	8.8E-08	3.0E-01	2.9E-07
Fluoranthene	1.2E-02	1	6.0E-06	4.0E-01	1.5E-05
Fluorene	9.0E-04	1	4.4E-07	4.0E-01	1.1E-06
Indeno(1,2,3-cd)Pyrene	1.6E-03	0.91	7.1E-07	3.0E-01	2.4E-06
Naphthalene	5.3E-03	1	2.6E-06	2.0E-02	1.3E-04
Phenanthrene	3.4E-03	0.91	1.5E-06	3.0E-01	5.0E-06
Pyrene	8.6E-03	1	4.2E-06	3.0E-01	1.4E-05
Total PAH evaluated as C11-C22 Aromatic Fraction	1.9E-01	1	9.0E-05	3.0E-01	3.0E-04
				HI <sub>fish</sub> =	<b>5.1E-04</b>

Notes:

1. A default value of 1 is used when an RAF is otherwise unavailable.
2. COC = Constituent of Concern; EPC = Exposure Point Concentration; NA = Not Applicable/Not Available; NC = Not Calculated.
3. EPC is the maximum concentration of each PAH retained in dataset.
4. Total PAH is the sum of maximum concentrations of individual compounds detected in the shellfish tissue dataset. Since there is limited toxicity info for those COCs, the RfD for C11-C22 aromatics is used as a surrogate.
5. Rounding due to presentation of significant figures may result in slightly different results if reproduced manually.

**TABLE IV-5 (Continued)**

PRELIMINARY CALCULATION OF AVERAGE DAILY DOSES AND RISK ESTIMATES  
FOR CONSUMPTION OF SHELLFISH

Barge B120 Oil Spill  
Buzzards Bay, Massachusetts

RECEPTOR: Hypothetical Coastal Resident (Child, age 1<8)  
CHRONIC NON-CANCER EFFECTS

See TABLE IV - 3 for Exposure Variables and Rationale	Consumption of Shellfish				
	$ADD_{fish} = \frac{EPC_{fish} * FI * EF * EP * RAF_{oral}}{BW * AP_{nc}}$				
	$HQ_{fish} = \frac{ADD_{fish}}{RfD}$		$HI_{fish} =$	$\sum HQ_{fish}$	
COC	EPC <sub>fish</sub> (mg/kg)	RAF <sub>fish</sub> (unitless)	ADD <sub>fish</sub> (mg/kg-day)	RfD Chronic (mg/kg-day)	HQ <sub>fish</sub> (unitless)
Acenaphthene	1.9E-03	1	6.0E-07	6.0E-02	1.0E-05
Acenaphthylene	6.0E-04	0.91	1.7E-07	3.0E-02	5.7E-06
Anthracene	1.3E-03	1	4.1E-07	3.0E-01	1.4E-06
Benzo(a)Anthracene	3.5E-03	0.91	1.0E-06	3.0E-02	3.3E-05
Benzo(a)Pyrene	1.3E-03	0.91	3.7E-07	3.0E-02	1.2E-05
Benzo(b)Fluoranthene	6.3E-03	0.91	1.8E-06	3.0E-02	6.0E-05
Benzo(g,h,i)Perylene	2.5E-03	0.91	7.1E-07	3.0E-02	2.4E-05
Benzo(k)Fluoranthene	2.5E-03	0.91	7.1E-07	3.0E-02	2.4E-05
Chrysene	1.2E-02	0.91	3.4E-06	3.0E-02	1.1E-04
Dibenzo(a,h)anthracene	2.0E-04	0.91	5.7E-08	3.0E-02	1.9E-06
Fluoranthene	1.2E-02	1	3.9E-06	4.0E-02	9.7E-05
Fluorene	9.0E-04	1	2.8E-07	4.0E-02	7.1E-06
Indeno(1,2,3-cd)Pyrene	1.6E-03	0.91	4.6E-07	3.0E-02	1.5E-05
Naphthalene	5.3E-03	1	1.7E-06	2.0E-02	8.3E-05
Phenanthrene	3.4E-03	0.91	9.7E-07	3.0E-02	3.2E-05
Pyrene	8.6E-03	1	2.7E-06	3.0E-02	9.0E-05
Total PAH evaluated as C11-C22 Aromatic Fraction	1.9E-01	1	5.9E-05	3.0E-02	2.0E-03
				HI <sub>fish</sub> =	<b>2.6E-03</b>

Notes:

1. A default value of 1 is used when an RAF is otherwise unavailable.
2. COC = Constituent of Concern; EPC = Exposure Point Concentration; NA = Not Applicable/Not Available; NC = Not Calculated.
3. EPC is the maximum concentration of each PAH retained in dataset.
4. Total PAH is the sum of maximum concentrations of individual compounds detected in the shellfish tissue dataset. Since there is limited toxicity info for those COCs, the RfD for C11-C22 aromatics is used as a surrogate.
5. Rounding due to presentation of significant figures may result in slightly different results if reproduced manually.

**TABLE IV-5 (Continued)**

PRELIMINARY CALCULATION OF LIFETIME AVERAGE DAILY DOSES AND RISK ESTIMATES  
FOR CONSUMPTION OF SHELLFISH

Barge B120 Oil Spill  
Buzzards Bay, Massachusetts

RECEPTOR: Hypothetical Coastal Resident (Child/Adult, age 1<31)  
CANCER EFFECTS

See TABLE IV - 3 for Exposure Variables and Rationale	Consumption of Shellfish				
	$LADD_{fish} = \frac{EPC_{fish} * FI * EF * EP * RAF_{oral}}{BW * AP_c}$				
	$ELCR_{fish} = LADD_{fish} * CSF$		$Total\ ELCR_{fish} = \sum ELCR_{fish}$		
COC	EPC <sub>fish</sub> MAX	RAF <sub>oral-c</sub>	LADD <sub>fish</sub>	CSF	ELCR <sub>fish</sub>
	(mg/kg)	(unitless)	(mg/kg-day)	(mg/kg-day) <sup>-1</sup>	(unitless)
Acenaphthene	1.9E-03	1	5.7E-09	NC	NC
Acenaphthylene	6.0E-04	1	1.8E-09	NC	NC
Anthracene	1.3E-03	1	3.9E-09	NC	NC
Benzo(a)Anthracene	3.5E-03	1	1.1E-08	7.3E-01	7.7E-09
Benzo(a)Pyrene	1.3E-03	1	3.9E-09	7.3E+00	2.9E-08
Benzo(b)Fluoranthene	6.3E-03	1	1.9E-08	7.3E-01	1.4E-08
Benzo(g,h,i)Perylene	2.5E-03	1	7.6E-09	NC	NC
Benzo(k)Fluoranthene	2.5E-03	1	7.6E-09	7.3E-02	5.5E-10
Chrysene	1.2E-02	1	3.6E-08	7.3E-02	2.6E-09
Dibenzo(a,h)anthracene	2.0E-04	1	6.0E-10	7.3E+00	4.4E-09
Fluoranthene	1.2E-02	1	3.7E-08	NC	NC
Fluorene	9.0E-04	1	2.7E-09	NC	NC
Indeno(1,2,3-cd)Pyrene	1.6E-03	1	4.8E-09	7.3E-01	3.5E-09
Naphthalene	5.3E-03	1	1.6E-08	NC	NC
Phenanthrene	3.4E-03	1	1.0E-08	NC	NC
Pyrene	8.6E-03	1	2.6E-08	NC	NC
Total PAH evaluated as C11-C22					
Aromatic Fraction	1.9E-01	1	5.6E-07	NC	NC
				Total ELCR <sub>dermal</sub>	<b>6.1E-08</b>

Notes:

1. A default value of 1 is used when an RAF is otherwise unavailable.
2. COC = Constituent of Concern; EPC = Exposure Point Concentration; NA = Not Applicable/Not Available; NC = Not Calculated.
3. EPC is the maximum concentration of each PAH retained in dataset.
4. Total PAH is the sum of maximum concentrations of individual compounds detected in the shellfish tissue dataset. Since there is limited toxicity info for those COCs, the RfD for C11-C22 aromatics is used as a surrogate.
5. Rounding due to presentation of significant figures may result in slightly different results if reproduced manually.



**TABLE IV-6**  
**PRELIMINARY CALCULATION OF AVERAGE DAILY DOSES AND RISK ESTIMATES**  
**FOR DERMAL CONTACT WITH PRODUCT**

Barge B120 Oil Spill  
Buzzards Bay, Massachusetts

RECEPTOR: Hypothetical Coastal Resident (Young Child, age 1<2)  
SUBCHRONIC NON-CANCER EFFECTS

COC	Dermal Contact with Product				
	EPC <sub>product</sub> (mg/kg)	RAF <sub>product-nc</sub> (unitless)	ADD <sub>product-dermal</sub> (mg/kg-day)	RfD Subchronic (mg/kg-day)	HQ <sub>product-dermal</sub> (unitless)
See TABLE IV - 3 for Exposure Variables and Rationale	$ADD_{product-dermal} = \frac{EPC_{product} * DCR_{product} * EF * ED * EP * RAF_{dermal-nc} * C1}{BW * AP_{nc}}$ $HQ_{product-dermal} = \frac{ADD_{product-dermal}}{RfD} \quad Hl_{product-dermal} = \sum HQ_{product-dermal}$				
1-Methylnaphthalene	1.8E+01	1	1.4E-06	4.0E-03	3.5E-04
2-Methylnaphthalene	5.5E+00	1	4.4E-07	4.0E-03	1.1E-04
Acenaphthene	6.0E+01	1	4.8E-06	6.0E-01	7.9E-06
Acenaphthylene	NA	1	NC	3.0E-01	NC
Anthracene	7.7E+01	1	6.1E-06	3.0E+00	2.0E-06
Benzo(a)Anthracene	4.5E+02	1	3.6E-05	3.0E-01	1.2E-04
Benzo(a)Pyrene	2.9E+02	1	2.3E-05	3.0E-01	7.6E-05
Benzo [e] Pyrene	1.3E+02	1	1.0E-05	NC	NC
Benzo(b)Fluoranthene	1.5E+02	1	1.2E-05	3.0E-01	4.1E-05
Benzo(g,h,i)Perylene	4.5E+01	1	3.6E-06	3.0E-01	1.2E-05
Benzo(k)Fluoranthene	2.8E+01	1	2.2E-06	3.0E-01	7.4E-06
Biphenyl	2.6E+00	1	2.1E-07	5.0E-02	4.1E-06
Carbazole	NA	1	NC	NC	NC
Chrysene	5.6E+02	1	4.5E-05	3.0E-01	1.5E-04
Dibenzo(a,h)anthracene	3.9E+01	1	3.1E-06	3.0E-01	1.0E-05
Dibenzofuran	1.2E+01	1	9.3E-07	NC	NC
Fluoranthene	9.1E+01	1	7.3E-06	4.0E-01	1.8E-05
Fluorene	4.9E+01	1	3.9E-06	4.0E-01	9.8E-06
Indeno(1,2,3-cd)Pyrene	2.3E+01	1	1.8E-06	3.0E-01	6.1E-06
Naphthalene	1.5E+00	1	1.2E-07	2.0E-02	6.0E-06
Perylene	8.8E+01	1	7.0E-06	NC	NC
Phenanthrene	2.7E+02	1	2.2E-05	3.0E-01	7.2E-05
Pyrene	4.1E+02	1	3.3E-05	3.0E-01	1.1E-04
Total PAH evaluated as C11-C22					
Aromatic Fraction	4.5E+04	1	3.6E-03	3.0E-01	1.2E-02
				Hl <sub>dermal</sub> =	<b>1.3E-02</b>

Notes:

1. A default value of 1 is used when an RAF is otherwise unavailable.
2. COC = Constituent of Concern; EPC = Exposure Point Concentration; NA = Not Applicable/Not Available; NC = Not Calculated.
3. EPC is the maximum concentration of each PAH retained in dataset.
4. Total PAH is the sum of detected concentrations of individual compounds detected in the weathered oil sample. Since there is limited toxicity info for those COCs, the RfD for C11-C22 aromatics is used as a surrogate.
5. Rounding due to presentation of significant figures may result in slightly different results if reproduced manually.

**TABLE IV-6 (Continued)**

PRELIMINARY CALCULATION OF AVERAGE DAILY DOSES AND RISK ESTIMATES  
FOR DERMAL CONTACT WITH PRODUCT

Barge B120 Oil Spill  
Buzzards Bay, Massachusetts

RECEPTOR: Hypothetical Coastal Resident (Child, age 1<8)  
CHRONIC NON-CANCER EFFECTS

See TABLE IV - 3 for Exposure Variables and Rationale	Dermal Contact with Product				
	$ADD_{\text{product-dermal}} = \frac{EPC_{\text{product}} * DCR_{\text{product}} * EF * ED * EP * RAF_{\text{dermal-nc}} * C1}{BW * AP_{\text{nc}}}$ $HQ_{\text{product-dermal}} = \frac{ADD_{\text{product-dermal}}}{RfD}$ $HI_{\text{product-dermal}} = \sum HQ_{\text{product-dermal}}$				
COC	EPC <sub>product</sub> (mg/kg)	RAF <sub>product-nc</sub> (unitless)	ADD <sub>product-dermal</sub> (mg/kg-day)	RfD Chronic (mg/kg-day)	HQ <sub>product-dermal</sub> (unitless)
1-Methylnaphthalene	1.8E+01	1	1.1E-06	4.0E-03	2.7E-04
2-Methylnaphthalene	5.5E+00	1	3.3E-07	4.0E-03	8.3E-05
Acenaphthene	6.0E+01	1	3.6E-06	6.0E-02	6.0E-05
Acenaphthylene	NA	1	NC	3.0E-02	NC
Anthracene	7.7E+01	1	4.6E-06	3.0E-01	1.5E-05
Benzo(a)Anthracene	4.5E+02	1	2.7E-05	3.0E-02	9.0E-04
Benzo(a)Pyrene	2.9E+02	1	1.7E-05	3.0E-02	5.8E-04
Benzo [e] Pyrene	1.3E+02	1	7.8E-06	NC	NC
Benzo(b)Fluoranthene	1.5E+02	1	9.3E-06	3.0E-02	3.1E-04
Benzo(g,h,i)Perylene	4.5E+01	1	2.7E-06	3.0E-02	9.0E-05
Benzo(k)Fluoranthene	2.8E+01	1	1.7E-06	3.0E-02	5.6E-05
Biphenyl	2.6E+00	1	1.6E-07	5.0E-02	3.1E-06
Carbazole	NA	1	NC	NC	NC
Chrysene	5.6E+02	1	3.4E-05	3.0E-02	1.1E-03
Dibenzo(a,h)anthracene	3.9E+01	1	2.4E-06	3.0E-02	7.9E-05
Dibenzofuran	1.2E+01	1	7.1E-07	NC	NC
Fluoranthene	9.1E+01	1	5.5E-06	4.0E-02	1.4E-04
Fluorene	4.9E+01	1	3.0E-06	4.0E-02	7.4E-05
Indeno(1,2,3-cd)Pyrene	2.3E+01	1	1.4E-06	3.0E-02	4.6E-05
Naphthalene	1.5E+00	1	9.1E-08	2.0E-02	4.5E-06
Perylene	8.8E+01	1	5.3E-06	NC	NC
Phenanthrene	2.7E+02	1	1.6E-05	3.0E-02	5.5E-04
Pyrene	4.1E+02	1	2.5E-05	3.0E-02	8.3E-04
Total PAH evaluated as C11-C22 Aromatic Fraction	4.5E+04	1	2.7E-03	3.0E-02	9.1E-02
				HI <sub>dermal</sub> =	<b>9.6E-02</b>

Notes:

1. A default value of 1 is used when an RAF is otherwise unavailable.
2. COC = Constituent of Concern; EPC = Exposure Point Concentration; NA = Not Applicable/Not Available; NC = Not Calculated.
3. EPC is the maximum concentration of each PAH retained in dataset.
4. Total PAH is the sum of detected concentrations of individual compounds detected in the weathered oil sample. Since there is limited toxicity info for those COCs, the RfD for C11-C22 aromatics is used as a surrogate.
5. Rounding due to presentation of significant figures may result in slightly different results if reproduced manually.

**TABLE IV-6 (Continued)**

PRELIMINARY CALCULATION OF AVERAGE DAILY DOSES AND RISK ESTIMATES  
FOR DERMAL CONTACT WITH PRODUCT

Barge B120 Oil Spill  
Buzzards Bay, Massachusetts

RECEPTOR: Hypothetical Coastal Resident (Child/Adult, age 1<31)  
CANCER EFFECTS

See TABLE IV - 3 for Exposure Variables and Rationale	Dermal Contact with Product				
	$LADD_{\text{product-dermal}} = \frac{EPC_{\text{product}} * DCR_{\text{product}} * EF * ED * EP * RAF_{\text{dermal-c}} * C1}{BW * AP_c}$				
	$ELCR_{\text{product-dermal}} = LADD_{\text{product-dermal}} * CSF \quad \text{Total } ELCR_{\text{product-dermal}} = \sum ELCR_{\text{product-dermal}}$				
COC	EPC <sub>product</sub>	RAF <sub>dermal product-c</sub>	LADD <sub>product-dermal</sub>	CSF	ELCR <sub>product-dermal</sub>
	(mg/kg)	(unitless)	(mg/kg-day)	(mg/kg-day) <sup>-1</sup>	(unitless)
1-Methylnaphthalene	1.8E+01	1	3.2E-09	NC	NC
2-Methylnaphthalene	5.5E+00	1	9.9E-10	NC	NC
Acenaphthene	6.0E+01	1	1.1E-08	NC	NC
Acenaphthylene	NA	1	NC	NC	NC
Anthracene	7.7E+01	1	1.4E-08	NC	NC
Benzo(a)Anthracene	4.5E+02	1	8.0E-08	7.3E-01	5.9E-08
Benzo(a)Pyrene	2.9E+02	1	5.2E-08	7.3E+00	3.8E-07
Benzo [e] Pyrene	1.3E+02	1	2.3E-08	NC	NC
Benzo(b)Fluoranthene	1.5E+02	1	2.8E-08	7.3E-01	2.0E-08
Benzo(g,h,i)Perylene	4.5E+01	1	8.1E-09	NC	NC
Benzo(k)Fluoranthene	2.8E+01	1	5.0E-09	7.3E-02	3.7E-10
Biphenyl	2.6E+00	1	4.7E-10	NC	NC
Carbazole	NA	1	NC	2.0E-02	NC
Chrysene	5.6E+02	1	1.0E-07	7.3E-02	7.4E-09
Dibenzo(a,h)anthracene	3.9E+01	1	7.1E-09	7.3E+00	5.1E-08
Dibenzofuran	1.2E+01	1	2.1E-09	NC	NC
Fluoranthene	9.1E+01	1	1.6E-08	NC	NC
Fluorene	4.9E+01	1	8.8E-09	NC	NC
Indeno(1,2,3-cd)Pyrene	2.3E+01	1	4.2E-09	7.3E-01	3.0E-09
Naphthalene	1.5E+00	1	2.7E-10	NC	NC
Perylene	8.8E+01	1	1.6E-08	NC	NC
Phenanthrene	2.7E+02	1	4.9E-08	NC	NC
Pyrene	4.1E+02	1	7.4E-08	NC	NC
Total PAH evaluated as C11-C22					
Aromatic Fraction	4.5E+04	1	8.2E-06	NA	NC
				Total ELCR <sub>dermal</sub>	<b>5.2E-07</b>

Notes:

1. A default value of 1 is used when an RAF is otherwise unavailable.
2. COC = Constituent of Concern; EPC = Exposure Point Concentration; NA = Not Applicable/Not Available; NC = Not Calculated.
3. EPC is the maximum concentration of each PAH retained in dataset.
4. Total PAH is the sum of detected concentrations of individual compounds detected in the weathered oil sample. Since there is limited toxicity info for those COCs, the RfD for C11-C22 aromatics is used as a surrogate.
5. Rounding due to presentation of significant figures may result in slightly different results if reproduced manually.

**TABLE IV-7**

PRELIMINARY CALCULATION OF AVERAGE DAILY DOSES AND RISK ESTIMATES  
FOR INCIDENTAL INGESTION OF PRODUCT

Barge B120 Oil Spill  
Buzzards Bay, Massachusetts

RECEPTOR: Hypothetical Coastal Resident (Young Child, age 1<2)  
SUBCHRONIC NON-CANCER EFFECTS

See TABLE IV - 3 for Exposure Variables and Rationale	Incidental Ingestion of Product				
	$ADD_{\text{product-oral}} = \frac{EPC_{\text{product}} * IR_{\text{product}} * EF * ED * EP * RAF_{\text{oral-nc}} * C1}{BW * AP_{\text{nc}}}$				
	$HQ_{\text{product-oral}} = \frac{ADD_{\text{product-oral}}}{RfD}$		$HI_{\text{product-oral}} = \sum HQ_{\text{product-oral}}$		
COC	EPC <sub>product</sub>	RAF <sub>oral-nc</sub>	ADD <sub>product-oral</sub>	RfD Subchronic	HQ <sub>product-oral</sub>
	(mg/kg)	(unitless)	(mg/kg-day)	(mg/kg-day)	(unitless)
1-Methylnaphthalene	1.8E+01	1	4.4E-07	4.0E-03	1.1E-04
2-Methylnaphthalene	5.5E+00	1	1.4E-07	4.0E-03	3.4E-05
Acenaphthene	6.0E+01	1	1.5E-06	6.0E-01	2.4E-06
Acenaphthylene	NA	1	NC	3.0E-01	NC
Anthracene	7.7E+01	1	1.9E-06	3.0E+00	6.3E-07
Benzo(a)Anthracene	4.5E+02	1	1.1E-05	3.0E-01	3.7E-05
Benzo(a)Pyrene	2.9E+02	1	7.1E-06	3.0E-01	2.4E-05
Benzo [e] Pyrene	1.3E+02	1	3.2E-06	NC	NC
Benzo(b)Fluoranthene	1.5E+02	1	3.8E-06	3.0E-01	1.3E-05
Benzo(g,h,i)Perylene	4.5E+01	1	1.1E-06	3.0E-01	3.7E-06
Benzo(k)Fluoranthene	2.8E+01	1	6.9E-07	3.0E-01	2.3E-06
Biphenyl	2.6E+00	1	6.4E-08	5.0E-02	1.3E-06
Carbazole	NA	1	NC	NC	NC
Chrysene	5.6E+02	1	1.4E-05	3.0E-01	4.6E-05
Dibenzo(a,h)anthracene	3.9E+01	1	9.6E-07	3.0E-01	3.2E-06
Dibenzofuran	1.2E+01	1	2.9E-07	NC	NC
Fluoranthene	9.1E+01	1	2.2E-06	4.0E-01	5.6E-06
Fluorene	4.9E+01	1	1.2E-06	4.0E-01	3.0E-06
Indeno(1,2,3-cd)Pyrene	2.3E+01	1	5.7E-07	3.0E-01	1.9E-06
Naphthalene	1.5E+00	1	3.7E-08	2.0E-02	1.8E-06
Perylene	8.8E+01	1	2.2E-06	NC	NC
Phenanthrene	2.7E+02	1	6.7E-06	3.0E-01	2.2E-05
Pyrene	4.1E+02	1	1.0E-05	3.0E-01	3.4E-05
Total PAH evaluated as C11-C22					
Aromatic Fraction	4.5E+04	1	1.1E-03	3.0E-01	3.7E-03
				HI <sub>oral</sub> =	<b>4.1E-03</b>

Notes:

1. A default value of 1 is used when an RAF is otherwise unavailable.
2. COC = Constituent of Concern; EPC = Exposure Point Concentration; NA = Not Applicable/Not Available; NC = Not Calculated.
3. EPC is the maximum concentration of each PAH retained in dataset.
4. Total PAH is the sum of detected concentrations of individual compounds detected in the weathered oil sample. Since there is limited toxicity info for those COCs, the RfD for C11-C22 aromatics is used as a surrogate.
5. Rounding due to presentation of significant figures may result in slightly different results if reproduced manually.

**TABLE IV-7 (Continued)**

PRELIMINARY CALCULATION OF AVERAGE DAILY DOSES AND RISK ESTIMATES  
FOR INCIDENTAL INGESTION OF PRODUCT

Barge B120 Oil Spill  
Buzzards Bay, Massachusetts

RECEPTOR: Hypothetical Coastal Resident (Child, age 1<8)  
CHRONIC NON-CANCER EFFECTS

See TABLE IV - 3 for Exposure Variables and Rationale	Incidental Ingestion of Product				
	$ADD_{\text{product-oral}} = \frac{EPC_{\text{product}} * IR_{\text{product}} * EF * ED * EP * RAF_{\text{oral-nc}} * C1}{BW * AP_{\text{nc}}}$				
	$HQ_{\text{product-oral}} = \frac{ADD_{\text{product-oral}}}{RfD}$		$HI_{\text{product-oral}} = \sum HQ_{\text{product-oral}}$		
COC	EPC <sub>product</sub>	RAF <sub>oral-nc</sub>	ADD <sub>product-oral</sub>	RfD Chronic	HQ <sub>product-oral</sub>
	(mg/kg)	(unitless)	(mg/kg-day)	(mg/kg-day)	(unitless)
1-Methylnaphthalene	1.8E+01	1	2.5E-07	4.0E-03	6.3E-05
2-Methylnaphthalene	5.5E+00	1	7.8E-08	4.0E-03	1.9E-05
Acenaphthene	6.0E+01	1	8.5E-07	6.0E-02	1.4E-05
Acenaphthylene	NA	1	NC	3.0E-02	NC
Anthracene	7.7E+01	1	1.1E-06	3.0E-01	3.6E-06
Benzo(a)Anthracene	4.5E+02	1	6.3E-06	3.0E-02	2.1E-04
Benzo(a)Pyrene	2.9E+02	1	4.1E-06	3.0E-02	1.4E-04
Benzo [e] Pyrene	1.3E+02	1	1.8E-06	NC	NC
Benzo(b)Fluoranthene	1.5E+02	1	2.2E-06	3.0E-02	7.3E-05
Benzo(g,h,i)Perylene	4.5E+01	1	6.4E-07	3.0E-02	2.1E-05
Benzo(k)Fluoranthene	2.8E+01	1	4.0E-07	3.0E-02	1.3E-05
Biphenyl	2.6E+00	1	3.7E-08	5.0E-02	7.4E-07
Carbazole	NA	1	NC	NC	NC
Chrysene	5.6E+02	1	7.9E-06	3.0E-02	2.6E-04
Dibenzo(a,h)anthracene	3.9E+01	1	5.6E-07	3.0E-02	1.9E-05
Dibenzofuran	1.2E+01	1	1.7E-07	NC	NC
Fluoranthene	9.1E+01	1	1.3E-06	4.0E-02	3.2E-05
Fluorene	4.9E+01	1	6.9E-07	4.0E-02	1.7E-05
Indeno(1,2,3-cd)Pyrene	2.3E+01	1	3.3E-07	3.0E-02	1.1E-05
Naphthalene	1.5E+00	1	2.1E-08	2.0E-02	1.1E-06
Perylene	8.8E+01	1	1.2E-06	NC	NC
Phenanthrene	2.7E+02	1	3.8E-06	3.0E-02	1.3E-04
Pyrene	4.1E+02	1	5.9E-06	3.0E-02	2.0E-04
Total PAH evaluated as C11-C22 Aromatic Fraction	4.5E+04	1	6.4E-04	3.0E-02	2.1E-02
				HI <sub>oral</sub> =	<b>2.3E-02</b>

Notes:

1. A default value of 1 is used when an RAF is otherwise unavailable.
2. COC = Constituent of Concern; EPC = Exposure Point Concentration; NA = Not Applicable/Not Available; NC = Not Calculated.
3. EPC is the maximum concentration of each PAH retained in dataset.
4. Total PAH is the sum of detected concentrations of individual compounds detected in the weathered oil sample. Since there is limited toxicity info for those COCs, the RfD for C11-C22 aromatics is used as a surrogate.
5. Rounding due to presentation of significant figures may result in slightly different results if reproduced manually.

**TABLE IV-7 (Continued)**

PRELIMINARY CALCULATION OF AVERAGE DAILY DOSES AND RISK ESTIMATES  
FOR INCIDENTAL INGESTION OF PRODUCT

Barge B120 Oil Spill  
Buzzards Bay, Massachusetts

RECEPTOR: Hypothetical Coastal Resident (Child/Adult, age 1<31)  
CANCER EFFECTS

See TABLE IV - 3 for Exposure Variables and Rationale	Incidental Ingestion of Product				
	$LADD_{\text{product-oral}} = \frac{EPC_{\text{product}} * IR_{\text{product}} * EF * ED * EP * RAF_{\text{oral-c}} * C1}{BW * AP_c}$ $ELCR_{\text{product-oral}} = LADD_{\text{product-oral}} * CSF \quad \text{Total ELCR}_{\text{product-oral}} = \sum ELCR_{\text{product-oral}}$				
COC	EPC <sub>product</sub>	RAF <sub>oral-c</sub>	LADD <sub>product-oral</sub>	CSF	ELCR <sub>product-oral</sub>
	(mg/kg)	(unitless)	(mg/kg-day)	(mg/kg-day) <sup>-1</sup>	(unitless)
1-Methylnaphthalene	1.8E+01	1	2.5E-08	NC	NC
2-Methylnaphthalene	5.5E+00	1	7.6E-09	NC	NC
Acenaphthene	6.0E+01	1	8.2E-08	NC	NC
Acenaphthylene	NA	1	NC	NC	NC
Anthracene	7.7E+01	1	1.1E-07	NC	NC
Benzo(a)Anthracene	4.5E+02	1	6.1E-07	7.3E-01	4.5E-07
Benzo(a)Pyrene	2.9E+02	1	4.0E-07	7.3E+00	2.9E-06
Benzo [e] Pyrene	1.3E+02	1	1.8E-07	NC	NC
Benzo(b)Fluoranthene	1.5E+02	1	2.1E-07	7.3E-01	1.5E-07
Benzo(g,h,i)Perylene	4.5E+01	1	6.2E-08	NC	NC
Benzo(k)Fluoranthene	2.8E+01	1	3.8E-08	7.3E-02	2.8E-09
Biphenyl	2.6E+00	1	3.6E-09	NC	NC
Carbazole	NA	0.96	NC	2.0E-02	NC
Chrysene	5.6E+02	1	7.7E-07	7.3E-02	5.6E-08
Dibenzo(a,h)anthracene	3.9E+01	1	5.4E-08	7.3E+00	3.9E-07
Dibenzofuran	1.2E+01	1	1.6E-08	NC	NC
Fluoranthene	9.1E+01	1	1.3E-07	NC	NC
Fluorene	4.9E+01	1	6.8E-08	NC	NC
Indeno(1,2,3-cd)Pyrene	2.3E+01	1	3.2E-08	7.3E-01	2.3E-08
Naphthalene	1.5E+00	1	2.1E-09	NC	NC
Perylene	8.8E+01	1	1.2E-07	NC	NC
Phenanthrene	2.7E+02	1	3.7E-07	NC	NC
Pyrene	4.1E+02	1	5.7E-07	NC	NC
Total PAH evaluated as C11-C22					
Aromatic Fraction	4.5E+04	1	6.2E-05	NA	NC
				Total ELCR <sub>oral</sub> :	<b>4.0E-06</b>

Notes:

1. A default value of 1 is used when an RAF is otherwise unavailable.
2. COC = Constituent of Concern; EPC = Exposure Point Concentration; NA = Not Applicable/Not Available; NC = Not Calculated.
3. EPC is the maximum concentration of each PAH retained in dataset.
4. Total PAH is the sum of detected concentrations of individual compounds detected in the weathered oil sample. Since there is limited toxicity info for those COCs, the RfD for C11-C22 aromatics is used as a surrogate.
5. Rounding due to presentation of significant figures may result in slightly different results if reproduced manually.