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**PHASE I  
INITIAL SITE INVESTIGATION  
AND  
CONCEPTUAL SITE MODEL**

**BARGE B120 SPILL  
BUZZARDS BAY, MASSACHUSETTS  
RTN 4-17786**

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## ACRONYM AND ABBREVIATION LIST

B&B	B&B Laboratories, Inc.
B10	Bouchard Barge No. 10
B120	Bouchard Barge No. 120
CMR	Code of Massachusetts Regulations
CSM	Conceptual Site Model
EPH	Extractable Petroleum Hydrocarbons
ERL	Effects Range - Low
ESI	Environmental Sensitivity Index
GIS	Geographic Information System
GPS	Global Positioning System
IRA	Immediate Response Action
IRAC	Immediate Response Action Clean up
JAT	Joint Assessment Team
LIT	Lower Intertidal Zone
MADEP	Massachusetts Department of Environmental Protection
MADMF	Massachusetts Division of Marine Fisheries
MADPH	Department of Public Health
MCP	Massachusetts Contingency Plan
MIT	Middle Intertidal Zone
MSRC	Marine Spill Response Corporation
NHESP	Natural Heritage and Endangered Species Program
NMFS	National Marine Fisheries Service
NOAA	National Oceanic and Atmospheric Administration
NRC	National Response Corporation
NRDA	Natural Resource Damage Assessment
OPA 90	The Oil Pollution Act of 1990
OSRV	Oil Spill Response Vessel
PAH	Polynuclear Aromatic Hydrocarbons
RIDEM	Rhode Island Department of Environmental Management
RP	Responsible Party
RPD	Relative Percent Difference
SCAT	Shoreline Clean up Assessment Team
SHC	Saturated Hydrocarbons
SQuiRT	Screening Quick Reference Table
SWA	Surface Washing Agents
TOC	Total Organic Carbon
TPH	Total Petroleum Hydrocarbons
UC	Unified Command
UIT	Upper Intertidal Zone
USCG	United States Coast Guard
USEPA	United States Environmental Protection Agency
USFWS	United States Fish and Wildlife Service
VPH	Volatile Petroleum Hydrocarbons
WHG	Woods Hole Group

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**1.0 INTRODUCTION**

GeoInsight, Inc. (GeoInsight)<sup>1</sup> and ENTRIX, Inc. (ENTRIX)<sup>2</sup> prepared this Phase I Initial Site Investigation (Phase I) and Conceptual Site Model (CSM), collectively the “Report,” for the release of oil from Bouchard Barge B120 that occurred on April 27, 2003 in Buzzards Bay (the “Site”). The Phase I summarizes response actions and data collected from the release, and the CSM presents information regarding the nature of the release, the physical characteristics and movement (fate and transport) of the spilled oil, the results of qualitative and quantitative surveys, affected media, and an evaluation of routes of exposure and their endpoint receptors. The Report was prepared in general accordance with the requirements of the Massachusetts Contingency Plan (MCP), 310 CMR 40.0000. This Phase I includes a complete description of initial site investigation activities for this site, along with detailed descriptions of the preliminary response actions undertaken to date.

The data and information presented in the Report were derived from comprehensive qualitative and quantitative assessments of the Site, spanning in time from immediately following the

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<sup>1</sup> GeoInsight was retained by Bouchard Transportation Co., Inc. (“Bouchard” or “RP”) to be the Licensed Site Professional (LSP)-of-record for the incident.

<sup>2</sup> ENTRIX are scientific consultants who were retained by Bouchard to advise on scientific issues during the clean up and removal stage and to advise on natural resource issues during the Natural Resource Damage Assessment (NRDA) conducted under the Oil Pollution Act of 1990 (OPA 90).

release, to ongoing surveys. The results of these assessments provide an account of where and how the spilled oil moved, and identify the nature, extent, and duration of impacts to resources. The information summarized and presented in the Report includes data collected from Shoreline Clean up Assessment Team (SCAT) survey records, Immediate Response Action Completion (IRAC) survey records, Immediate Response Action (IRA) survey records, and previous ENTRIX and GeoInsight reports.



## 2.0 INCIDENT OVERVIEW

On or about the afternoon of April 27, 2003, Barge B120, operated by Bouchard Transportation Company Inc., released approximately 22,000 to 55,000 gallons<sup>3</sup> of No. 6 fuel oil after entering the western approach of Buzzards Bay. The grounding location of the Barge B120 was estimated by the involved agencies to be within a ½-mile radius of Buoy G-1, offshore and to the south of Gooseberry Point. The RP notified the United States Coast Guard (USCG) of the release. A map of the project area and approximate grounding location of Barge B120 are depicted in Figures 1 and 2, respectively. The USCG notified federal and state response authorities and directed the tug and barge to proceed to Buoy 10 (Anchorage Lima) in Buzzards Bay, where it anchored and was boomed. After the remaining cargo and oily water was transferred from the ruptured tank on Barge B120 to Barge B10 and to other tanks on B120, both barges proceeded to the Mirant facility in Sandwich, Massachusetts.

The released oil was driven by winds and currents primarily to the north, northwest, and northeast in the days following the spill. The municipalities where released oil impacted the shoreline included Westport, Dartmouth, New Bedford, Fairhaven, Gosnold, Mattapoisett, Marion, Wareham, Bourne, and Falmouth. The dispersion of oil by wind and current resulted in varying degrees of shoreline oiling, ranging from trace amounts to relatively heavy. Shoreline oiling was unevenly distributed and generally concentrated at exposed points and peninsulas on the northern shore of Buzzards Bay. In addition, a few isolated areas of sporadic shoreline oiling were reported in parts of Rhode Island (e.g., Little Compton and Block Island) and the Elizabeth Islands. However, many shorelines in the spill area were unoiled or lightly oiled. In total, approximately 84 miles of shoreline were oiled to varying degrees, although most areas received only light oiling.

On the evening of April 27, 2003, federal and state response agencies arrived on site. The federal and state agencies included the USCG (Federal On-Scene Coordinator), the National Oceanic and Atmospheric Administration (NOAA), and the Massachusetts Department of

Environmental Protection (MADEP). Gallagher Marine Systems, Inc. (Gallagher), the firm retained by the RP to manage the emergency response on its behalf, arrived on scene and began to coordinate boom deployment and other immediate response activities to contain the spill and coordinate clean up. Over 1,500 feet of 16-inch containment boom was initially deployed that evening around the barge's stern to contain the released oil.

By the morning of April 28, 2003, the containment boom was deployed around the barge. The clean up contractors, Clean Harbors Environmental Services, Inc. (Clean Harbors), the National Response Corporation (NRC) and Marine Spill Response Corporation (MSRC), arrived on the scene with clean up crews, response equipment, and a fleet of vessels and initiated efforts to recover spilled oil and clean up oiled shorelines. Recovery and clean up operations included utilizing skimming boats, deployment of boom and sorbent material, power washing, and other manual techniques. A total of seven on-water recovery vessels were mobilized in response to the release. These vessels consisted of the OSRV MAINE RESPONDER operated by MSRC with two portable barge units equipped with skimmers and a towing vessel, the OSRV GURADIAN and BARGE RESOLUTE operated by NRC, and two self-propelled skimmer vessels operated by the State of Rhode Island.

The Unified Command, consisting of the USCG (as the federal on-scene coordinator), MADEP (the state on-scene coordinator), and the RP, was established to direct and oversee clean up operations. USCG also obtained input from NOAA representatives regarding clean up operations and strategies. The RP's environmental representative, ENTRIX, arrived on-scene and began to collect environmental data and information in conjunction with the natural resource trustees (Trustees). Trustee representatives include the National Oceanic and Atmospheric Administration (NOAA) as the lead administrative trustee, the U.S. Fish and Wildlife Service (USFWS), Massachusetts Executive Office of Environmental Affairs, the Rhode Island Department of Environmental Management (RIDEM), and the Wampanoag "Aquinnah" Tribe of Gay Head.

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<sup>3</sup> *Independent Marine Consulting, Ltd., 2003*

## 2.1 SHORELINE SEGMENTS

Unified Command initially divided the oiled areas of shoreline into 15 geographical zones; areas east of the Cape Cod Canal were labeled with an “E” prefix, and areas west of the Cape Cod Canal were labeled with a “W” prefix. The zones were subdivided into segments within the first month of the spill to direct and prioritize clean up and response efforts. For example, shoreline segment W1E-04 corresponds to Crescent Beach in Mattapoisett. The project area was divided into a total of 149 segments, as listed in Table 1 and shown on Figure 3.

Individual shoreline segments were classified according to shoreline type, which was determined by the substrate and public use. Unified Command classified the shoreline in the project area using the following scheme:

<b>Shoreline Classification</b>	<b>Shoreline Type</b>
1A	Heavily utilized, public recreational sand beaches
1B	Less utilized, semi-public and private sand beaches
1C	Mixed sand and gravel, gravel (pebble to boulder) and rip rap groins (jetties)
1D	Rip rap seawalls, bulkheads, piers, docks, and pilings
1E	Rocky shorelines
1F	Salt marshes
2	Roseate tern habitat (Ram Island, Bird Island, and Penikese Island, in particular)
3	Piping plover habitat

This site-specific classification was developed using the Environmental Sensitivity Index (ESI) codes, which were developed by NOAA (1999) in response to other oil spills in the context of evaluating shoreline habitat type. This approach for shoreline classification is accepted by the scientific community in assessing and responding to oil spills.

## 2.2 SENSITIVE RECEPTORS

Several sources of information were obtained and reviewed to evaluate potential sensitive receptors in the Buzzards Bay area. GeoInsight obtained information from the following sources: Natural Heritage & Endangered Species Program (NHESP) and Massachusetts Geographic Information Systems (MassGIS). The MassGIS information is summarized on the map identified as the DEP MCP 21E Buzzards Bay Map (MassGIS Map) attached in Appendix A. Potential sensitive receptors identified in the project area based on the information reviewed include water resources (aquifers, public and private water supply wells), critical habitats, threatened and endangered species, and humans.

Review of the MassGIS Map indicated that areas to the east and southeast of the Cape Cod Canal, as well as the Elizabeth Islands to the south, are within a Medium Yield Potentially Productive Aquifer and a USEPA-Designated Sole Source Aquifer. A High Yield Potentially Productive Aquifer is located near the Cape Cod Canal. Municipal public supply wells near the shoreline are located in Bourne, Falmouth, Fairhaven, Mattapoisett, and on Cuttyhunk Island (part of the Elizabeth Islands). Non-community public water supplies are located near the shoreline in Westport, Dartmouth, and Wareham.

The intertidal zone of the shoreline provides habitat for wildlife species, such as shorebirds and marine invertebrates. Information obtained from the NHESP indicated that several threatened or endangered species are present in certain areas of Buzzards Bay. For example, two bird species that utilize the intertidal zone of the shoreline for foraging habitat in this area include the roseate tern (*Sterna dougallii*), an endangered species under Massachusetts and Federal law, and the piping plover (*Charadrius melodus*), a threatened species under Massachusetts and Federal law. Several Buzzards Bay areas are designated as rare and critical habitats according to NHESP information. Naushon and Pasque Islands (Elizabeth Islands) are designated as areas that may contain rare wetland habitats. Areas west of the Cape Cod Canal may also contain rare wetland habitats as well as Protected Open Spaces. An area of Critical Environmental Concern is also present near Phinney's Harbor in Bourne. The NHESP maps are included in Appendix B.



Buzzards Bay is comprised of various shoreline types, including sand beaches, mixed sand/gravel beaches and rocky shorelines, some of which are privately owned. In general, public sand beaches are heavily utilized by visitors, local residents and fishermen, who are considered sensitive receptors. People use the shoreline primarily for seasonal recreational activities, such as swimming, fishing, or walking. Rocky shorelines are also used for recreational activities, but to a lesser extent.

## 3.0 OIL PROPERTIES AND DISTRIBUTION

### 3.1 OIL VOLUME

The USCG is investigating the available information on the volume of oil released, and has not yet released a final volume estimate. USCG's current maximum estimate is 55,000 gallons (with a range of 22,000 to 55,000 gallons) based on the estimates by Independent Marine Consulting (2003)<sup>4</sup>. The amount of oil released is also currently being evaluated as part of the NRDA aquatic assessment process. It is important to note that the volume estimate described above is based upon current knowledge and may be revised in the future based upon the NRDA technical evaluation and the USCG conclusions.

### 3.2 OIL PROPERTIES

The information on oil properties is based upon current knowledge of the B120 oil and general characteristics of No. 6 fuel oil. Some of this information is also being reviewed as part of the NRDA aquatic assessment process and may be revised in the future based upon the results of that evaluation.

The oil carried by the B120 barge at the time of the release was a blend of relatively light and relatively heavy No. 6 oil and it is unknown to what extent these two blends were mixed together in the barge. No. 6 oil, like other hydrocarbons, is created through distilling crude oil and is composed of thousands of individual hydrocarbons. The specific composition and characteristics of No. 6 fuel oil are variable and are a function of both the refining process used to distill the oil and the chemistry of the crude oil source. The specific characteristics of the individual blends carried by the B120 barge is unknown. The oil carried by the B120 barge was heated during transport (typically No. 6 oil is heated to above 130°F during transport), but the heating system was subsequently disabled by the grounding of the barge and the oil began to cool after the grounding. In general, No. 6 oil has a density similar to, or slightly less than, seawater, although whether oil floats on seawater is dependent upon a number of factors, including the oil

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<sup>4</sup> Although *Costas* (2004) reported that total volume estimates might have ranged from 14,400 to 98,000 gallons.

temperature and the seawater temperature and salinity. Typically, No. 6 oil floats on seawater, particularly when heated. It is difficult to accurately estimate the relative amounts of floating, suspended, or sinking oil, but in general the released oil had properties that would make it float upon release. The conclusion that most of the oil floated is consistent with aerial observations, where oil was observed floating on the water surface, and the shoreline reconnaissance activities that observed relatively large quantities of oil transported on the water surface onto the shoreline. Small tarballs may have become suspended in the water column or deposited on the bottom surface in the prevailing currents, but this is considered to be a relatively small fraction of the oil from the release. Underwater surveys, described in detail in Section 4.2, have been conducted and are currently being conducted to evaluate the possible presence of submerged oil, and the preliminary data from these investigations indicate that relatively little oil sank below the water surface.

As described above, the composition of No. 6 oil is variable, but typically polynuclear aromatic hydrocarbons (PAH) comprise a large fraction of No. 6 oil. Shortly after the release occurred, samples of the released No. 6 oil and the No. 6 oil remaining on the B120 Barge (“neat samples”) were collected and submitted to B&B Laboratories, Inc. (B&B) for laboratory analysis to characterize the relative distribution of hydrocarbons present in the B120 oil. Graphs showing the relative concentrations of the individual hydrocarbon fractions are included in Appendix C, along with copies of the laboratory analytical reports.

### **3.3 OBSERVATIONS**

During the first week after the release, daily overflights were conducted to prioritize clean up operations and track the movement of the oil. Overflights also provided an opportunity to document the extent of shoreline oiling and were used in conjunction with surveys to determine the extent of shoreline oiling and assess appropriate clean up techniques for each part of the shoreline visibly oiled.

The first overflight was conducted on April 27, 2003 following the release of spilled oil into Buzzards Bay. During this overflight, sheen was observed extending approximately ten miles

behind the path of the barge. The approximate sheen location is depicted in Figure 4. The sheen was observed south of Gooseberry Point in Westport and extended northeast into the Bay. The northeastern most extent of observed sheening was off of West Island in Fairhaven.

On April 28<sup>th</sup>, the sheen dispersed and visible oil slicks, tarballs and tar patties were observed on the water surface during the overflight. The initial oiling conditions observed on April 28<sup>th</sup> are presented in Figure 5. Isolated pockets of sheen and/or visible product were observed off Mishaum Point and Round Hill Point in Dartmouth and southwest of Sconticut Neck in Fairhaven. Onshore or nearshore oiling was observed immediately west of Barney's Joy Point and north of Barney's Joy Point on Demarest Lloyd State Park Beach, both in Dartmouth. Onshore oiling was also observed at Wilbur's Point on Sconticut Neck in Fairhaven. Additionally, Woods Hole Group (WHG) noted sheen and/or product west and east of Wilbur's Point in Fairhaven, southwest of Scraggy Neck in Falmouth and off the shoreline of Nashawena Island, part of the Elizabeth Island chain.

Based on the April 29<sup>th</sup> overflight, the oil sheen and floating oil had further dispersed and was primarily observed off Barney's Joy Point. The oil and sheen trajectory on April 29<sup>th</sup> is presented in Figure 6. Two pockets of sheen/product were observed southeast of West Island and south of Nye's Neck in Falmouth. Onshore/nearshore oiling was observed on shorelines that were reported as oiled during the April 28<sup>th</sup> overflight. Sheen/product was observed at Barney's Joy Point, Mishaum Point, and the southern tip of Sconticut Neck. Oiling was observed for the first time on the west side of Gooseberry Neck, on the south and western shorelines of West Island, the north eastern shore of Wings Neck in Bourne, and south of Nye's Neck. Additionally, surface observations reported sheen/product between Barney's Joy Point and Mishaum Point, between West Island and Ram Island, and between Peases Point and Butler Point.

By April 30<sup>th</sup>, sporadic oiling was observed from Warren Point (Rhode Island-Massachusetts state line) to Acoaxet in Marion. The oiling conditions for April 30<sup>th</sup> are presented in Figure 7. New oiling was reported in Mattapoisett and Wareham on the western shores of the Bay and on



the eastern shores in Bourne and Falmouth. Onshore oiling was observed on the northern shores of Naushon Island and Penikese Island, which are part of the Elizabeth Islands and which constitute the southern most extent of onshore oiling found in the Bay.

During subsequent overflights conducted May 1<sup>st</sup> through the 4<sup>th</sup>, only sporadic shoreline oiling was observed. The trajectory of oil/sheen observed during these overflights is depicted in Figures 8 to 11, respectively. The most affected areas were along the western shorelines of the Bay, from the Rhode Island state line to Great Neck in Wareham. Observed oiling on the eastern shore was mainly confined to the vicinity of Wings Neck, Scraggy Neck, Nye's Neck, and north of Quissett Harbor in Falmouth. Additionally, oil was observed along some of the Elizabeth Islands, specifically a portion of the northern shores of Naushon and Penikese Islands during this time. Overall, surface water sheen/product slicks were fragmented and dispersed, and by May 4<sup>th</sup> were primarily observed along the southwestern shorelines on the northern side of the Bay.

### **3.4 OIL WEATHERING**

Weathering of spilled oil is a natural process which includes physical, chemical, and biological processes which changes the oil composition and volume over time. These processes reduce the toxicity and concentration of the oil, and the rate of weathering is directly correlated to increased air and water temperatures, sunlight, and increased surface area of the oil. Thus, splatter on intertidal rocks weathers rapidly relative to floating or submerged tarballs. Weathering includes evaporation, dissolution, biodegradation, and photo-oxidation.

The volatile component of No. 6 fuel oil is variable (it is dependent upon the specific composition of the No. 6 oil), but is generally low, with only 5 to 10% expected to evaporate within the first few hours of a spill (NOAA Fact Sheet). The total volatile content of No. 6 oil is relatively low compared to other hydrocarbons. The soluble component of No. 6 oil is also variable and is also generally low compared to other lighter petroleum products. Many of the hydrocarbons present in No. 6 oil are essentially insoluble. Natural biodegradation of the heavy petroleum hydrocarbons present in No. 6 oil can begin within the first few days of the spill but is generally considered a longer-term process. Photo-oxidation is the natural breakdown of



hydrocarbon compounds upon exposure to air and sunlight. Like natural biodegradation, photo-oxidation is considered a long-term process but can also begin within the first few days of the spill.

## 4.0 INITIAL RESPONSE ACTIONS

The initial response efforts were conducted from April 28 through September 3, 2003 under the Unified Command. Response efforts involved containment, removal and clean up of spilled oil. On-water recovery efforts using skimming boats and deployment of boom and sorbent material were utilized to contain and recover spilled oil prior to stranding on the shoreline. Once oil was ashore, shoreline clean up activities included manual removal of oiled substrate and material (e.g., wrack), powerwashing, manual wiping, use of sorbents (e.g., snare) and substrate excavation. Emergency restoration, including replanting of salt marsh vegetation, was also conducted during this time at several isolated areas. A variety of data was collected during clean up operations to help document oiled shorelines and prioritize clean up of the oil.

### 4.1 OFFSHORE RESPONSE ACTIVITIES

On-water recovery efforts using skimming boats and deployment of boom and sorbent material were utilized to contain and recover spilled oil. The primary method for on-water recovery of oil was the use of boom and sorbent material. Three types of boom were used during clean up efforts: containment, sorbent, and snare. Containment boom was used as a physical barrier to prevent the spread of oil and was generally placed around the edge of the free product and the barge in order to prevent further spreading. Sorbent boom and pads were used to absorb spilled product and were placed along the shoreline to help collect oil that washed ashore. Additionally, in many towns, municipal oil spill coordinators deployed containment and sorbent boom at sensitive areas (e.g., mouths of waterbodies) in the early stages of the response as a preventative measure. Snare boom (also known as “pom pom”) consists of bundled, oil-absorbent material, tied to a rope and stretched across the impacted area. Snare was used to collect oil along shorelines and from rocks or interstitial spaces in groins and jetties. During the first week following the release, approximately 8,500 feet of containment boom and 100,000 feet of snare were deployed to aid in the collection of oil. On-water skimming operations collected approximately 3,500 gallons of oil by the eighth day of the response (May 5, 2003).

## 4.2 SUBMERGED OIL EVALUATION

The presence of submerged oil was assessed offshore of affected shorelines to determine the need for additional assessment or clean up efforts. Periodic re-oiling of some shorelines prompted initial efforts to determine whether submerged oil was present offshore of these beaches, but no source of submerged oil has been found and none is expected to be present based upon the current understanding of the release and subsequent transport of the oil onto shore. The Massachusetts Division of Marine Fisheries (MADMF) conducted initial lobster pot surveys on May 2 and May 14, 2003. Four lobster traps loaded with snare boom were deployed on the seabed just offshore of Barney's Joy Point and north of West Island and left there for 12 days. Upon retrieval, none of the snare was oiled. The traps were then re-deployed northeast of West Island for seven days. Upon retrieval one of the snares had several small spots of oil on it. Based upon the results of this survey, a joint team comprised of NOAA, MADMF and the RP agreed to conduct additional investigations for the potential subsurface oil, using the following three methods:

- Submerged lobster traps with snare;
- Submerged chain drags; and
- Absorbent pad swipes.

Lobster pot, chain drag and absorbent pad assessments were qualitative in nature. No samples were collected for analysis. The areas initially selected for conducting lobster trap and chain drag surveys were offshore of shorelines that received some of the heaviest oiling. These areas included:

- Barney's Joy Point;
- Northeast of West Island (between West Island and Ram Island); and
- Southwest Island SW (between Wilbur Point and West Island - east of Long Island).

Additional areas for conducting lobster pot and chain drag surveys were selected following initial efforts. Those areas included:

- Demarest Lloyd State Park (northeast of Barney's Joy Point);
- Black Rock (southwest of Barney's Joy Point); and
- Hen and Chickens Rock.

Absorbent pad surveys were conducted at shellfish sampling locations during the initial sample collection effort. The lobster pot, chain drag, and absorbent pad surveys found limited evidence of submerged oil and only at two locations (near Barney's Joy in Dartmouth and Hacker Street in Fairhaven).

#### **4.2.1 Lobster Pot Surveys**

The survey conducted by NOAA, MADMF and the RP focused on a total of six offshore areas adjacent to heavily oiled shorelines and locations between the approximate grounding location and the heaviest oiled shoreline (Barney's Joy). Lobster traps containing snare were submerged at each survey location (Figures 12 and 13). After two to nine days, the traps were recovered and examined for presence/absence of oil on the traps, snare and buoys. A total of 55 pots were deployed and retrieved between May 30 and June 13, 2003. The lobster pot assessments only reported oiling at one location (Barney's Joy Point) and it consisted of light staining on less than half of the pots deployed at that location. Results of the lobster pot surveys are summarized below.

### Summary of Lobster Pot Surveys

Area	Dates	Number Pots Deployed/Retrieved	Number Oiled Pots
Northeast of West Island	5/30/03	4	0
	6/2/03	4	0
	6/5/03	4	0
Southwest of West Island	6/2/03	4	0
	6/5/03	3	0
Northeast of Barney's Joy	6/11/03	3	0
Black Rock	6/11/03	3	0
Hen and Chickens Rock	6/11/03	3	0
Barney's Joy Point	5/30/03	4	2
	6/2/03	4	4
	6/5/03	4	1
	6/11/03	3	3
	6/13/03	12	1
<b>Total</b>		<b>55</b>	<b>11</b>

It is important to note that the snare in the oiled pots referenced above was only lightly stained with oil. Heavy staining that would be indicative of a pool of submerged oil was not observed on the recovered snare.

#### 4.2.2 Chain Drags

Chains (rigged with snare and weights) were pulled along the seabed in the vicinity of oiled beaches (Figures 14 and 15). Three to seven passes, with each pass approximately 100 meters in length, were conducted at each location. After each pass, the chain and snare were retrieved and examined for the presence of oil. A total of 33 chain drags were conducted between May 30 and June 13, 2003. Oil was only reported at one location (Barney's Joy Point) and it consisted of light oiling (minor spotting) on five of the 20 chain drags. Results of the chain drag assessments are summarized below.

### Summary of Chain Drag Surveys

Area	Date	Total Number of Chain Drags	Number of Oiled Drags
Northeast of West Island	6/2/03	3	0
Southwest of West Island	6/2/03	4	0
Northeast of Barney's Joy	6/5/03	3	0
Black Rock	6/5/03	3	0
Barney's Joy Point	5/30/03	4	3
	6/2/03	7	2
	6/5/03	3	0
	6/11/03	3	0
	6/13/03	3	0
<b>Total</b>		<b>33</b>	<b>5</b>

In April 2004, an additional chain drag survey was conducted to evaluate for the presence of submerged oil, near the presumed grounding locations to the east of Buoy G-1, which is one of two markers near the entrance to the shipping channel. The preliminary results of the survey indicate that submerged oil was not found. The results of the survey will be presented in the forthcoming status report on MCP IRA response actions.

#### 4.2.3 Absorbent Pad Swipes

Absorbent pad swipe surveys were conducted between May 5 and 7, 2003 at shellfish sampling stations during low tide (Figure 16). At each intertidal station, absorbent pads were swabbed along the exposed surface within an approximate 20-foot diameter area in the intertidal zone. Presence/absence of oiling on the pads was noted. At subtidal beds, absorbent pads were individually wrapped around the heads of clam rakes and secured with adhesive tape. The pads were then submerged and swabbed along the bottom in a 20-foot diameter area. The pads were brought to the surface and observations of oiling were recorded. The used absorbent pads were placed in labeled plastic bags for future reference. Oil (minor spotting) was observed on one absorbent pad collected at the Fairhaven Hacker Street shellfish sample location. No oil was observed on any of the other swipes. Results of the absorbent pad swipe surveys are summarized below.

### Absorbent Pad Swipe Summary

Survey Area	Date	Results
Long Beach Point	5/5/03	No oil observed
Meadow Island	5/6/03	No oil observed
Cherry Point	5/6/03	No oil observed
Ram Island	5/6/03	No oil observed
Great Island, SE	5/6/03	No oil observed
Brook, Great Island NE	5/6/03	No oil observed
RT88 Bridge, Westport Point	5/6/03	No oil observed
Mattapoissett Harbor	5/6/03	No oil observed
Eel Pond	5/6/03	No oil observed
Megansett Harbor Reference Site	5/6/03	No oil observed
Back River	5/6/03	No oil observed
West Falmouth Harbor	5/7/03	No oil observed
Fairhaven, Hacker St	5/7/03	The absorbent pad smelled of oil and contained oily spots.
Bass Creek	5/7/03	No oil observed
Mouth of Nakata Creek	5/7/03	No oil observed
Fairhaven Sandy Beach	5/7/03	No oil observed
Fairhaven Knolmere Beach	5/7/03	No oil observed
Fairhaven Inner Harbor, Nasketucket	5/7/03	No oil observed
Mattapoissett, Outer Nasketucket Bay	5/7/03	No oil observed

#### 4.2.4 Underwater Dive Surveys

The lobster pot and chain drag surveys described above did not find evidence of submerged oil at sampling locations other than off Barney's Joy Point. In the month after the release, fresh tarballs came ashore on occasion at Barney's Joy. This suggested that residual oil was either still present in the subtidal areas offshore of Barney's Joy, or that small amounts of oil were being remobilized from the intertidal zone and redeposited at Barney's Joy. By mid-summer there were few observations of tarballs at Barney's Joy.

Based on these observations, and at the RP's initiative, dive surveys were conducted between July 31 and August 4, 2003 by the RP to assess the potential presence of submerged oil, especially in the vicinity of Barney's Joy. Ocean Technology Foundation and Aquas, LLC conducted the dives at two locations along the path of the barge and four locations where submerged oil was most likely to be present based on proximity to heavily oiled shorelines, currents and bathymetry (e.g., Barney's Joy Point and West Island). Dive surveys included



visual assessment and collection of sediment samples. The dive survey locations are depicted in Figure 17.

There were no tarballs, oil pancakes, or other observations of spilled oil at any of the dive sites. In addition, there was no staining observed on any sampling gear, including gloves and air hoses (which were dragged along the seafloor). A total of 29 sediment samples were collected from several locations and analyzed for total petroleum hydrocarbons (TPH) and total organic carbon (TOC). Four of the 29 samples were not analyzed because samples consisted of rock, where sediment samples could not be collected. TOC was measured because petroleum tends to sorb to organic material, and increased TOC generally results in increased TPH. It is important to note that the TPH analysis is a relatively “broad” analysis that detects many hydrocarbons (including naturally-occurring hydrocarbons present as organic material), regardless of source. Therefore, sediments with increased TOC values will tend to have higher TPH values due to the presence of non-petroleum hydrocarbons from biogenic (vegetation) or pyrogenic (combustion) sources. The analytical results are presented in Table 2.

TPH concentrations in the sediment samples ranged from approximately 2.0 to 136 parts per million (ppm) and TPH concentrations increased directly with increasing TOC. In addition, evaluation of the gas chromatograms from the TPH analysis indicated the hydrocarbons in the sediments were dominated by biogenic and pyrogenic hydrocarbons. There was no evidence of B120 oil in the TPH concentrations or gas chromatograms. Copies of the laboratory analytical reports with the associated chromatograms are included as Appendix D.

#### **4.2.5 Summary of Submerged Oil Evaluation**

Minor amounts of oil spotting were observed on absorbent pads or snare at relatively few of the locations investigated for this assessment (primarily off Barney’s Joy Point). The oil observed on the sorbent material was generally minor, suggesting that although small amounts of oil may have been suspended in the water column or oiled subtidal sediments shortly following the release, large volumes or pools of submerged oil were not and are not present. Sediment analyses of samples collected during the dive survey near the presumed grounding location also

contained low concentrations of TPH, and these concentrations may be derived from organic material not associated with the release. Survey observations in July and August 2003 and April 2004 did not indicate the presence of submerged oil. These data are consistent with the current understanding of the oil behavior following the release, which is that the bulk of the oil was lighter than seawater and floated on the water surface until it was washed ashore by winds and currents.

### **4.3 ONSHORE RESPONSE ACTIVITIES**

Clean up and response efforts under the direction of Unified Command were conducted from April 28 through September 3, 2003. Shoreline clean up activities included manual removal of oiled substrate and material (e.g., wrack), powerwashing, manual wiping, use of sorbents (e.g., snare) and substrate excavation. According to USCG reports, approximately 160 personnel were initially involved with clean up activities during the first few days of the response. This number increased to a high of approximately 700 by the sixth day of the response. In early May over 1,000 workers were involved in clean up operations. This number includes only field workers and does not include those specifically involved in operations oversight as part of the Unified Command.

Initial response actions for oil on the shoreline are described in the May 23, 2003 Immediate Response Action: Treatment and Completion Guidelines Plan (IRATCGP) prepared by Unified Command. The objectives of the IRATCGP were primarily to remove visible oil on sandy beaches and mobile or “wipeable” oil from rocky areas. It is important to note that the IRATCGP objectives were to remove as much oil as possible on the shore; however, it was recognized that some residual oil may have been left in areas where it was not feasible to remove all oil (e.g., staining on rock surfaces). The rationale for leaving some residual oil on the shore was associated with access and safety constraints for clean up equipment and personnel, the inability to effectively remove minor oiling without removing substrate, and avoiding impacts to natural resources as a result of active, aggressive removal that could outweigh the benefits of oil removal. The IRATCGP objectives were designed to balance the needs of shoreline clean up for human use along with minimizing impacts to the marine ecosystem (and associated fishing and

shellfish industries) and non-marine species, such as shorebirds. Clean up endpoint criteria for completing immediate response actions for the individual shoreline types were developed as part of the IRATCGP. The clean up endpoint criteria for the individual shoreline types are listed below.

### SHORELINE CLASSIFICATION AND CLEAN UP ENDPOINT CRITERIA

Shoreline Classification	Shoreline Type	Clean up Endpoint Criteria
1A	Heavily utilized, public recreational sand beaches	No visible surface or subsurface oil (not detectable by sight, smell, feel), to the maximum extent possible, as rapidly as possible.
1B	Less utilized, semi-public and private sand beaches	No visible surface, subsurface oil to trace (discontinuous film or spots of oil, an odor, or tackiness), to the maximum extent possible.
1C	Mixed sand and gravel, gravel (pebble to boulder) and rip rap groins (jetties)	No sheen, surface soil does not come off on the finger when touched, subsurface oil to trace (discontinuous film or spots of oil, an odor, or tackiness).
1D	Rip rap seawalls, bulkheads, piers, docks, and pilings	No sheen, oil does not come off on the finger when touched.
1E	Rocky shorelines	No sheen, oil does not come off on the finger when touched.
1F	Salt marshes	No sheen.
2	Roseate tern habitat (Ram Island, Bird Island, and Penikese Island, in particular)	No sheen, residual surface oil on rocky surfaces exposed at low tide does not come off on the finger when touched, intertidal vegetation and associated sediments are free of mobile oil, and intertidal vegetation and associated sediments do not provide a ready source of oil contamination to birds.
3	Piping plover habitat	Case-by-case evaluation and decision points.

These recommendations were developed to provide an endpoint for the initial response actions under the IRATCGP. The immediate response actions were considered satisfied and emergency response shoreline clean up operations ceased on individual segments when Unified Command agreed that the endpoint criteria had been met or determined that achievement of the clean up criteria was infeasible based on IRAC survey findings.

### **4.3.1 Boom and Sorbent Material**

Absorbent boom and snare were used to recover oil present on rocks and sediment in the intertidal zone. Snare was typically stretched along the shoreline in the intertidal zone, where waves and tidal action helped move the snare strands over the oiled area and collect the released oil. The snare was periodically inspected by the clean up personnel and replaced when appropriate.

### **4.3.2 Manual Removal**

Oiled debris, wrack and stranded surface oil (e.g., mats, patties, and tarballs) were manually removed from the shoreline by clean up crews using shovels. Hand trowels, rakes and hoes were used to remove hardened oil deposits on cobble beaches and in marsh habitat. Small tarballs were removed (e.g., at Barney's Joy) by sifting the sand using pool skimmers and homemade sifting boxes made with window screen or wire-mesh hardware cloth. In a limited number of areas, shoreline rocks were manually wiped then tossed into the subtidal zone to be further cleaned by scouring tidal action and natural degradation.

### **4.3.3 Powerwashing**

Powerwashing using seawater was used upon approval of Unified Command at selected areas to clean man-made structures such as docks, seawalls, groins and riprap. The area being cleaned was surrounded by sorbent material and/or containment boom to collect oil washed from the structure.

High pressure-hot water washing (i.e., hotsy) was occasionally used on selected natural hard-surface substrates such as large cobbles, piles of large cobbles and/or boulders (e.g., rocks too large to move). Hotsy operations used seawater or freshwater; freshwater was preferred since the high-suspended solid load in the seawater clogged the equipment causing frequent breakdowns. Sorbent material (e.g., boom, snare and pads) was placed downgradient from hotsy operations to collect oil mobilized by the activity.

#### **4.3.4 Sediment Excavation and Replacement**

In a few heavily oiled areas, the above-referenced methods were not sufficient to reach the clean up goal. Therefore, oiled substrate was mechanically removed with heavy equipment and replaced with natural materials of similar shape, color, and size distribution. This technique was applied in areas of cobble beach where heavy oil coated the cobble surface and oil mixed with sand in the interstitial space to form hardened deposits. Sediment replacement was conducted in four areas, including the south side of Long Island Point (less than 0.7 acres), Brandt Beach /Howard's Beach (approximately 0.1 acre), Brandt Island (less than 0.5 acres) and Crescent Beach (less than 0.1 acre). Prior to initiating work, emergency authorizations/permits were obtained from the U.S. Army Corps of Engineers, MADEP and local conservation commissions. Pre-construction and post-construction elevation surveys were conducted to ensure that the beaches were graded appropriately.

#### **4.3.5 Replanting**

Emergency restoration of salt marsh was conducted in a few marsh areas where oiling and clean up actions removed substantial amounts of vegetation. In these areas, the marsh surface was characterized by dense, fibric vegetative root mat rather than loose sediments. Oil deposits up to several inches thick were manually removed from the marsh surface by scraping and/or raking from the surface using hand tools. The top layer of root mat, including the aboveground portion of some of the vegetation was removed in the process of removing the oil deposit. Native vegetation was replanted in these areas using bare-root seedlings of *Spartina alterniflora* obtained from a local nursery. Emergency restoration of marsh vegetation was performed at the southern tip of Long Island in Fairhaven and at Ram Island to supplement natural recovery/recolonization and to reduce potential for erosion and loss of habitat.

#### **4.3.6 Pilot Testing**

##### **4.3.6.1 High Temperature, Low Pressure Water Wash**

On May 15, 2003, a pilot test of a hot water, low pressure sea water wash of oil-impacted rocks was conducted on Long Island in Fairhaven. The pilot test was approved by the Unified

Command and conducted by representatives from Unified Command (Environmental Unit and Operations), MADEP, and USCG. The pilot test area was conducted in a roughly rectangular impacted area of rocky shoreline approximately 150 feet long and 50 feet wide in the intertidal zone. The pilot test cell was surrounded by containment boom, and snare was deployed at the downgradient edge of the test cell to capture mobilized oil. For the pilot test, approximately 10,000 gallons of seawater were heated to a temperature of about 120°F in a tank. The hot water was applied via gravity drainage to the impacted area through a T-shaped PVC pipe with a perforated section approximately 30 inches long. Cold seawater was then sprayed into the hot water application area using a firehose to attempt to flush the oil from the rocks and into the snare.

During the hot water wash, the hot water was observed to mobilize some of the oil off the rocks, but not a significant amount. At the completion of the pilot test, the rocks were still heavily stained with oil, and there was not a significant visible difference compared to this area before the test. The pilot test indicated that other technologies, such as hot water/high pressure washing (hotsy washing) would be more effective than this technology in removing oil from groins, jetties, seawalls, or rocky beaches.

As part of the pilot test, GeoInsight collected pre-test and post-test sediment samples from two locations downgradient from the pilot test cell to monitor the potential for hydrocarbons to be mobilized into the subtidal zone. The sediment samples were collected from two locations near the low tide mark from depressions where sandy sediment accumulated. The soil samples collected prior to the test were collected on May 15, 2003. The post-test samples were collected on May 16, 2003. Pre-test and post-test samples were analyzed for extractable petroleum hydrocarbons (EPH) with target analytes.

Low concentrations of EPH hydrocarbon fractions, ranging up to 47 milligrams per kilogram, were detected in the pre-test sediment samples. The detected concentrations of EPH hydrocarbon fractions in both the pre-test and post-test samples were significantly below the RCS-1 reportable concentrations, which range from 200 to 2,500 mg/kg. EPH hydrocarbon

fractions were not detected in the post-test sediment samples. EPH target analytes (PAHs) were not detected in the pre-test or post-test sediment samples above the laboratory reporting limit. Analytical results are summarized in Table 3 and a copy of the laboratory report is included in Appendix E.

#### **4.3.6.2 Surface Washing Agents**

Surface washing agents (SWAs) were also pilot tested to evaluate the removal of oil from areas of coarse sediment or relatively heavy oiling where rock removal and replacement operations could not be conducted due to access constraints or other limitations. An initial test to determine the utility of these products was conducted in small plastic pools on Saturday May 31, 2003. The test was performed and observed by representatives from ENTRIX, Gallagher, MADEP, and USCG. The following SWAs were included in the test:

- PES-51™
- COREXIT® EC9580A
- CytoSol

Each of these SWAs is currently listed on the National Contingency Plan (NCP) Product Schedule and have been used with varying degrees of success on similar shoreline types at other spill incidents<sup>5</sup>.

Three 5-gallon buckets of oiled cobbles, ranging in size from two to six inches in diameter, were collected from the shoreline at Brandt Beach. The cobbles were placed into three pools each labeled with the name of the product to be tested. Each product was applied to the oiled cobbles using a handheld tank sprayer. Application followed the manufacturers' instructions and product information. Each product was allowed to soak for the requisite period of time (soaking time varies by product and ranges from 5 to 60 minutes). The cobbles were then flushed for

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<sup>5</sup> Michel, J., A., Hayward Walker, D. Scholz, and J. Boyd. 2001. *Surface Washing Agents: Product Evaluations, Case Histories, and Guidelines for use in Marine and Freshwater Habitats. Proceedings, 2002 International Oil Spill Conference. American Petroleum Institute, Washington, DC. Pp 805-813.*

approximately 20 to 30 seconds with ambient seawater using a fire hose with an adjustable nozzle. The volume of oil removed was qualitatively evaluated and compared to the other products. Because the test team was familiar with the ineffectiveness of ambient seawater flushing alone, a control pool was not established. Sorbent pads and snare were set in the pools to ascertain the capability for recovery of released oil with sorbent materials.

Each of the products tested was effective in enhancing the removal of weathered oil from the surface of the cobbles; however, at each test location oil remained on the rocks and none of the tests achieved satisfactory results with respect to the endpoints identified in the IRATCGP. The CytoSol test appeared to be the most effective of the three products, and the test team conducted an additional evaluation using a combination of CytoSol and subsequent washing using high-pressure water at three temperatures: ambient temperature, 125°F , and 175°F. For this test, the same cobbles were separated into three piles, and the spray wand was fitted with a fan tip for the largest area coverage. Using the high pressure at 175°F proved the most effective. This procedure mobilized a similar quantity of oil when compared to the fire hose flushing yet still failed to achieve the endpoint criteria specified in the IRATCGP. Based upon the results of the pilot testing data, these alternative clean up strategies were not able to achieve the IRATCGP target criteria and were therefore not used as part of the clean up activities.

#### **4.3.7 Waste Removal and Disposal**

At the completion of the initial response actions overseen by Unified Command, a total of 5,341.19 tons of solid waste were generated and taken off-site for proper disposal at the following receiving facilities:



<b>Solid Waste Tonnage</b>	<b>Receiving Facility</b>
330.71 tons	ESMI
215.82 tons	Aggregate Recycling
1,829.08 tons	Aggregate Industries
2,965.58 tons	Semass

Refer to the status reports prepared by GeoInsight for the Unified Command initial response actions for additional information regarding waste removal and disposal.

#### **4.4 SHORELINE CLEAN UP ASSESSMENT TEAM**

SCAT surveys were conducted under the response effort from April 28 until June 6, 2003, and the teams were comprised of representatives from the USCG, ENTRIX (on behalf of the RP), MADEP, and occasionally USFWS, MADMF, NOAA, Clean Harbors, and municipalities. The purpose of the surveys was to document the extent, magnitude and type of shoreline oiling conditions throughout the spill area. Additionally, SCAT data were used to direct clean up efforts and determine the appropriate clean up technique for oiled shorelines. The specific goals of the SCAT program included the following:

- Document the location, amount and type of oil on the shoreline;
- Provide the planning and operations sections with accurate shoreline oiling information to aid in clean up operations; and
- Formulate recommendations for appropriate clean up methods, priorities and constraints.

The data collected during SCAT surveys was used to determine the degree of oiling within each segment. The degree of oiling was measured by the following parameters:

- Width and length of the oiled area (oil band);
- Oil distribution (percent cover of observed oil); and
- Average oil thickness.

These field measurements were used to categorize the degree and magnitude of oiling including: very light, light, moderate, and heavy. Specifically, oiling categories were determined for each segment as identified in the matrix listed below. In general, approximately 2/3 of the oiled shoreline in Massachusetts was categorized as light or very light oiling. The maximum extent and degree of oiling is presented in Figures 18 to 20. Additional information for each oiling category is provided below:

**Oiling Category Matrix**

Oil Distribution (%)	Width of Oiled Band (ft)			
	≤ 3 ft	3 < ft ≤ 6	6 < ft ≤ 9	> 9 ft
0 < % ≤ 1	Very Light	Very Light	Very Light	Light
1 < % ≤ 10	Light	Light	Moderate	Moderate
10 < % ≤ 50	Moderate	Moderate	Moderate	Heavy
50 < % ≤ 90	Moderate	Heavy	Heavy	Heavy
90 < % ≤ 100	Heavy	Heavy	Heavy	Heavy

SCAT data revealed that approximately 84 miles of shoreline in Massachusetts were oiled to varying degrees. Initial visual assessments of oiling conditions revealed that the upper intertidal zone was the most affected portion of the shoreline. Oil was primarily surficial and observed in the upper intertidal zone, just below the wrack line. Additionally, the width of shoreline oiling and the distribution and thickness of oil varied over the affected areas. Representative oiling conditions within each oiling category are discussed below.

#### **4.4.1 Very Light Oiling**

Very light oiling generally consisted of staining, isolated tarballs, or splatter that covered less than one percent of the upper intertidal zone as an oil band that averaged 2.8 feet wide. Over 40 percent of the oiled shoreline was categorized as very lightly oiled. However, this category only represented approximately 15 percent of the oiled shoreline area due to the relatively narrow

width of the shoreline oiling. Based on shoreline length, mean oiling width, and percent cover, this category comprised less than 1 percent of the oil that came ashore.

#### **4.4.2 Light Oiling**

Light oiling generally consisted of sporadic oil splatter on cobbles and boulders in the upper intertidal zone and/or splatter on jetties, riprap, seawalls, and piers. Oiled wrack patties and tarballs were observed below or in the wrack line. Light oiling ranged from one to ten percent cover with an average oiling width of 10.9 feet. Approximately 1/4 of the length of the oiled shoreline was categorized as lightly oiled. This category comprised over 1/3 of the oiled area, but only 6 percent of the oil that came ashore based on shoreline length, mean oiling width, and percent cover.

#### **4.4.3 Moderate Oiling**

Oil on moderate shorelines was largely confined to the upper intertidal zone and generally consisted of oiled wrack patties, oiled shells and tarballs. Moderately oiled shorelines ranged from 11 to 50 percent cover with an average oiling width of 6.2 feet. Moderate oiling comprised approximately 20 percent of the oiled shoreline length and oiled area. Moderately oiled segments represented approximately 17 percent of the oil deposited on the shorelines based on shoreline length, mean oiling width, and percent cover.

#### **4.4.4 Heavy Oiling**

Heavy oiling was observed primarily in the upper and middle intertidal zone and the banding of oil ranged from continuous to broken distribution. Conditions of heavily oiled segments consisted of pooling or cover of oil on cobbles, boulders, shells, sand and man-made hard structures such as jetties, piers, or riprap. Tarballs and oiled wrack patties were also observed and at times buried oil and oiled organic debris were documented. Additionally, small flecks of product on sediments and sheen on water were observed in the lower intertidal zone.

Generally, oil distribution in heavily oiled areas ranged from 51 to 100 percent cover of the intertidal shoreline with an average oiling width of 26.9 feet. Approximately 8.0 miles of shoreline in Massachusetts was categorized as heavily oiled. Heavily oiled shorelines represented less than 10 percent of the oiled shoreline length, but about 1/3 of the total oiled area as a result of the greater width of heavy oiling relative to other oiling categories. As a result, approximately 75 percent of the oil that reached the shoreline was along heavily oiled shoreline based on shoreline length, mean width, and percent cover of heavily oiled shorelines.

#### 4.4.5 Overall Oil Distribution

A summary of the metrics calculated within each oiling category are presented in the table below.

**Average Oiled Width, Percent of Total Oiled Area, and Estimated Amount of Oil**

<b>Oiling Category</b>	<b>Length of Oiled Shoreline (miles)</b>	<b>Average Width of Oiled Shoreline (ft.)</b>	<b>Percent Cover Midpoint</b>	<b>Percent of the Total Oiled Area</b>	<b>Estimated Amount of Oil (%)</b>
<b>Very Light</b>	35.7	2.8	0.5	15	<1
<b>Light</b>	21.9	10.9	5.5	36	6
<b>Moderate</b>	18.8	6.2	30.5	17	17
<b>Heavy</b>	8.0	26.9	75.5	32	76

#### 4.5 IRAC EVALUATION

On June 10, 2003, SCAT inspections were replaced by IRAC inspections, which focused on whether individual shoreline segments met the clean up endpoint criteria specified in the IRATCGP. Surveys involved visual inspection and test-pit trenching of shoreline segments. The purpose of the surveys was to determine if individual segments met clean up criteria for the specific substrate type, determine if additional clean up was warranted and document the remaining oiling conditions. IRAC teams were composed of representatives from USCG, MADEP, and the RP. Other parties, such as representatives from the affected municipalities, GeoInsight personnel, or USFWS personnel accompanied some of the IRAC inspections.

After each segment underwent IRAC inspection, visual observations were recorded on datasheets and the survey teams determined the status of the segment based on the clean up criteria. Therefore, status of the segment was reported as either:

1. The segment met IRAC endpoints;
2. The segment does not meet IRAC endpoints, and further treatment is not feasible; or
3. The segment does not meet IRAC endpoints and further treatment is feasible.

The determination as to whether further treatment was feasible or not feasible was a joint decision made in the field by the representatives of Unified Command. The decision was based upon several factors, including accessibility of the shoreline for clean up crews and equipment, the potential for the residual oil to naturally degrade over time, and the environmental damage that could be caused by the clean up operations. In general, the segments that did not meet IRAC and further treatment was not feasible were segments with small areas of residual oil on rocks that came off to the touch, but this oil was present in a small, localized area and the benefits for clean up were outweighed by the environmental damage that would be caused.

Unoiled segments not inspected by the IRAC teams were evaluated by environmental unit personnel from ENTRIX or RAM Environmental and Engineering Services, Inc. in August 2003, and these inspections indicated that 29 of the 149 segments were unoiled. At the completion of IRAC inspections on September 3, 2003, the status of the oiled segments were as follows:

<b>Category</b>	<b>Number of Segments</b>
Meeting IRAC endpoints:	91
Did not meet IRAC endpoints and further treatment was not feasible or not required:	10
Did not meet IRAC endpoints and further treatment was feasible:	5
Not IRAC inspected	14

Table 4 includes a list of the 149 shoreline segments and the status of these segments as of September 3, 2003. Shoreline Inspection forms completed by the IRAC teams were included in previous GeoInsight submittals, including the September 12, 2003 *First Status Report on Response Actions* and the November 10, 2003 *Second Status Report and Completion Report on Response Actions*.

#### **4.6 INITIAL RESPONSE ACTIONS SUMMARY**

The initial response actions removed the large majority of oil, both floating on the water surface and stranded ashore. At some locations, Unified Command chose not to remediate small volumes of oil, particularly on rock surfaces where the effective clean up technologies (hotsy washing or rock removal) would result in substantial environmental damage to the surrounding ecosystem. At the completion of initial response actions, 91 of the 120 oiled segments met the endpoint clean up criteria, indicating oil was not visible at sandy beaches and did not come off to the touch in rocky areas. A total of 15 segments did not pass the IRAC inspections, and generally did not pass because of the presence of relatively small amounts of oil on limited rock surfaces that came off to the touch. Ten of these did not pass the IRAC inspection and further clean up was not feasible because although the IRAC team recognized that although relatively small amounts of oil were available to the touch, additional clean up activities would likely result in significant damage to the environment.

## **5.0 NATURAL RESOURCE DAMAGE ASSESSMENT ACTIVITIES**

The Joint Assessment Team (JAT) comprised of representatives from NOAA, USFWS, MADEP, RIDEM, and the Wampanoag “Aquinnah” Tribe of Gay Head and the RP identified potential resources at risk. To address these resources of concern, the Trustees and the RP jointly coordinated and conducted sampling efforts and field surveys to document and characterize potential ecological impacts to natural resources as a result of the spill. The JAT identified the following potential resources of concern:

- Birds (including the Roseate tern and the Piping plover);
- Marine Mammals;
- Beetles; and
- Terrapins.

### **5.1 WILDLIFE COLLECTION AND RECONNAISSANCE**

#### **5.1.1 Birds**

On April 28 and 29, 2003, Buzzards Bay residents and emergency responders collected 29 birds in the spill area. Local veterinary personnel from Buttonwood Park Zoo in New Bedford initially treated live birds at the zoo prior to the establishment of a treatment center. Tri-State Bird Rescue and Response, Inc. arrived on scene on April 28, 2003 and started coordinating bird collection and rehabilitation efforts. A Bird Rehabilitation and Treatment Center was established on April 30, 2003 at the New Bedford Wastewater Facility. On this same day, USFWS Special Agents began cataloging the bird carcasses, which were brought to the treatment facility. A total of 500 live and dead birds were collected and logged in the months following the spill. Two hotline numbers were established to allow citizens to report observations of oiled wildlife.

Three types of assessments were conducted during the response phase to collect data on birds: aerial survey data, live and dead bird collection data, and ground surveys of non-capturable, oiled and unoiled live birds.

The aerial survey was conducted by Dr. Jeremy Hatch on May 2, 2003. It included a complete survey of the Buzzards Bay shoreline, a portion of Vineyard Sound, and a grid of survey transects covering the offshore portions of Buzzards Bay. During the flight, data were gathered that provided information on the relative species concentrations and the general locations.

ENTRIX and USFWS personnel conducted live and dead bird transect searches during the response phase of the spill. Bird transects were conducted daily until May 16, 2003 and a less frequent transect survey program continued into June 2003. The teams repeatedly searched beach transects which were chosen in a systematic manner. Marsh areas were surveyed, though less frequently than beach transects. A log of over 200 dead bird searches and a log of live bird surveys were recorded during this survey effort. Additional live and dead bird collection data obtained from SCAT and IRAC surveys were also compiled with the results of the bird transect surveys.

In an attempt to reduce the incidence of oiling among adult roseate terns beginning to arrive on Ram Island, hazing and the use of air cannons were initiated. Hazing efforts on Ram Island began on May 3, 2003 and ceased May 30, 2003 after the island was cleaned and the risk of oiling was significantly reduced. Some birds were observed nesting during these hazing efforts. Additional birds were observed nesting after hazing efforts ended, but significant bird re-oiling was not observed on Ram Island after hazing ended.

### **5.1.2 Marine Mammals**

Between April 27 and June 15, 2003, 16 marine mammals (12 pinnipeds and 4 cetaceans) were found dead at the shoreline in Buzzards Bay. The potential presence of external oil was noted in four cases. Sample collection protocols were instituted by the Cape Cod Stranding Network and the National Marine Fisheries Service (NMFS) Law Enforcement for all individuals with potential external oil and in two apparently unoiled cases. Results of laboratory analysis were sent directly to NMFS Special Agent Joe Green and to date have not been made available.



### 5.1.3 Beetles

Two beetle species identified as resources of potential concern were the American burying beetle (*Nicrophorus americanus*) and the Northeastern beach tiger beetle (*Cicindela dorsalis dorsalis*). Both of these species are on the federal endangered species list; the tiger beetle is listed as threatened, while the burying beetle is endangered. SCAT, wildlife reconnaissance and IRAC data were reviewed to provide additional information on potential injury to the beetles as a result of the spill. Beetles typically emerge from dormancy in mid-summer and are usually active in the supratidal zone, although the tiger beetle may also utilize the intertidal zone. The release occurred, and clean up operations were mostly completed, prior to the beetles emerging. The cleanup operations removed most or all of the oil in the beetle habitat areas, and the small amounts of remaining oil, if present, are not expected to adversely impact the beetles. In addition, the oil primarily impacted the intertidal zone, not the supratidal zone. Due to the timing of the release and the location inhabited by these species, a pathway of exposure is very unlikely.

### 5.1.4 Terrapins

The northern diamondback terrapins (*Malaclemys terrapin*), listed as threatened under the Massachusetts Endangered Species Act, were identified as a resource of potential concern. On May 11, 2003, Massachusetts Audubon, MADMF, and ENTRIX conducted a boat reconnaissance of known and potential terrapin habitat that may have been oiled including Sippican Harbor, Aucoot Cove, and West Island. During the survey, there were no observations of terrapins and no evidence of terrapin occurrence or activity.

ENTRIX also surveyed Allens Pond, Little River, and the Mattapoisett River mouth. During this survey, there were no observations of any terrapins and/or evidence of occurrence or activity. The only oil observed in nesting or nearby marsh habitat was located in the Mattapoisett River mouth. In this location “a few tarballs in the strand line (less than 20 feet) and a small area of oiled cobble (<3 feet in diameter)” were observed.

## 5.2 SHELLFISH EVALUATION

Immediately following the release, MADMF announced the closure of state shellfish areas BB-1 through BB-58 (within Buzzards Bay) and E-1 through E-14 (adjacent to the Elizabeth Islands) on April 28, 2003 and April 30, 2003. Most acreage (approximately 151,000 acres) was closed on April 28, 2003 with additional acreage (approximately 26,000 acres) closed on April 30, 2003. MADMF reported in closure announcements that Buzzards Bay was comprised of approximately 180,000 acres of shellfish areas. The acreage is approximate and represents the entirety of the shellfish areas as indicated by MADMF announcements. Portions of the 177,000 acres were already closed or closed around the time of the incident for reasons other than the release including approximately 7,500 acres closed due to conditional (e.g., seasonal, poor water quality) or permanent closures. No formal federal or state criteria were immediately available for reopening shellfish beds.

MADMF representatives identified five bivalve species to sample based on their recreational and commercial importance and abundance: blue mussels (*Mytilus edulis*), oysters (*Crassostrea virginica*), quahogs (*Mercenaria mercenaria*), scallops (*Argopecten irradians*) and softshell clams (*Mya arenaria*). Using SCAT maps, MADMF and Town Shellfish Constables selected sampling locations (shellfish beds) that were in the vicinity of oiled beaches and where recreational shellfishing commonly occurred. Shellfish sampling locations are shown in Figures 21 through 24.

Composite samples of target species (quahog, softshell clams, blue mussels, scallops and oysters) were collected at each location where they were present. Additional samples of surf clams were collected at some locations. Three random locations within a shellfish bed were sampled using a quahog sampler/rake. A total of 12 to 15 specimens of each available species were collected, yielding one composite sample per species at each station. The shells of each specimen were cleared of debris, sediment or visible oil using bay water.

An initial sampling effort was conducted between May 5 and May 7, 2003 followed by five comprehensive sample collection efforts, as summarized below.

### Shellfish Sampling Summary

<b>Sampling Event</b>	<b>Collection Dates</b>	<b>Total Number of Samples</b>	<b>Total Number of Areas Sampled</b>
1	May 5, 2003 to May 7, 2003	49	17
2	May 19, 2003 to May 21, 2003	37	19
3	June 9, 2003 and June 10, 2003	18	10
4	July 8, 2003 to July 10, 2003	28	14
5	August 27, 2003 and August 28, 2003	13	8
6	October 23, 2003 and October 24, 2003	6	4

After technical review of the initial tissue analyses, and discussions between the Massachusetts Department of Public Health (MADPH) and MADMF, 33 shellfish areas were re-opened on May 22, 2003, subject to local rules and regulations. This action resulted in opening approximately 91,000 acres of state shellfish areas, or over half of the total area closed due to the spill, including 28 Buzzards Bay areas and five areas adjacent to the Elizabeth Islands.

Subsequent to the May 22 re-opening, MADPH continued to evaluate results of additional tissue sample surveys as they became available and advised MADMF on the opening of additional shellfish areas. Shellfish locations with elevated concentrations were re-sampled until concentrations decreased to acceptable concentrations according to MADPH.

Between May 5 and October 24, 2003, a total of 151 composite shellfish tissue samples were collected from areas identified within the intertidal and subtidal areas along unoiled and oiled beaches. These surveys found that shellfish tissue concentrations were highly variable ranging from approximately 0.2 ppm at background locations up to almost 60 ppm (within ten days of the release). The results of shellfish sampling are summarized in Table 5 and copies of the analytical reports are included in Appendix F.

On October 13, 2003, MADMF re-opened approximately 58,000 additional acres of shellfish areas, subject to local rules and regulations. By October 2003, all shellfish samples were within the range of background concentrations documented in May 2003 except for one sample from Long Island (Shellfish Bed BB-17). Shellfish tissue sampling at Long Island is expected to continue until concentrations satisfy MADPH criteria.

On November 12, 2003, approximately 25,000 acres of additional shellfish areas were opened by MADMF, subject to the local rules and regulations. The re-opening letters issued by MADMF are provided in Appendix G. As of November 12, 2003, one full shellfish area representing approximately 600 acres remained closed due to the elevated tissue concentrations. In addition, 12 partial shellfish areas (acreage unavailable) remained closed due to clean up efforts and potential residual oiling on adjacent shorelines. A summary of the chronology of shellfish area closings and openings is provided in Table 6.

### **5.2.1 Recreational Areas**

Currently, there are no official closures of recreational areas other than shellfish beds in response to the spill. No town or state beaches were officially closed; however, residents were encouraged to avoid using beaches near active cleaning operations. The MADPH in Massachusetts and Rhode Island Board of Health Department did not issue health advisories against swimming in Buzzards Bay (<http://www.buzzardsbay.org>). Gross oil was largely removed from beach areas within a month of the spill.

## **5.3 INITIAL WATER COLUMN AND SEDIMENT SAMPLING**

### **5.3.1 Water Column Sampling**

Within 48 hours of the spill, water column analyses were initiated and within two weeks, sediment analyses were conducted. The purpose of these analyses was to document the presence of oil in these media and, if present, evaluate whether the oil concentrations posed a risk to resources. A total of 51 water column samples were collected on five occasions from April 29 through May 12, 2003. Samples were collected at nine stations in the spill area and two reference stations. Sample locations were established offshore of oiled shorelines, and under and near slicks or tar mats in open water. GPS coordinates were recorded for each sample location and subsequent samples were collected at the same approximate sampling locations for consistency. The locations of water samples are depicted in Figure 25. The need for additional collection of water samples ended on May 12 because there were no observations of visible product slicks and tar mats in the offshore portions of Buzzards Bay.

Water column samples were sent to WHG for analysis of PAH, EPH, and volatile petroleum hydrocarbons (VPH). Results of water column sampling are summarized in Table 7. Analytical results documented all water column samples were below 1 ppb total PAH, with one exception, which was the sample collected within 48 hours of the spill from Barney's Joy (2.7 ppb). EPH and VPH analytical results revealed that all water column samples were below the detection limit. Additionally, water column samples were screened using the NOAA Criteria Maximum Concentration (CMC) for marine values. There were no criteria exceedences for any water column samples collected throughout the sampling effort. The results of the water sample screening are summarized in Table 7 and a copy of the laboratory analytical report is included in Appendix H.

### **5.3.2 Subtidal Sediment Sampling**

Subtidal sediment samples were collected at four locations in the spill area and one reference location on May 13, 2003. The subtidal sediment sample locations are presented in Figure 26. Each location consisted of three stations, located approximately 50 meters apart and running parallel to the shoreline. Stations were located between approximately 190 and 2600 feet offshore. At each station, three aliquots of sediment were collected at a water depth of eight to 12 feet and homogenized. The three sediment samples were analyzed for PAH, saturated hydrocarbons (SHC), TPH, and TOC. Analytical results are summarized in Table 8 and a copy of the laboratory analytical report is included as Appendix I.

Analytical results indicated the average concentration of total PAH in sediments in the subtidal zone was less than 0.1 ppm. There were no discernible signatures suggesting the presence of the source oil in the sediments, and the concentrations from impacted areas were within the range of background concentrations. Sediment samples were screened using the NOAA Effects Range-Low (ERL) total PAH benchmark of 4.0 ppm for marine sediments and MCP Method 1 risk characterization standards (S-1 and GW-3) for individual PAHs. There were no MCP Method 1 risk characterization or ERL criteria exceedences for the subtidal sediment samples collected throughout the sampling effort.

### 5.3.3 Intertidal Sediment Sampling

Between May 7 and May 9, 2003, intertidal sediment samples were collected at 10 locations in the spill area and one reference location depicted in Figure 27. Samples were collected at oiled beaches and locations where weathered oil samples were collected. Each location consisted of two stations, one in the upper intertidal zone and one in the lower intertidal zone. At each station, one three-point composite sample was collected to a depth of five centimeters below ground surface. The three aliquots from each station were composited and analyzed for PAH, SHC, TPH, and TOC. Visible oil was present at some of the sediment sampling locations at the time of sampling; photographs of selected sampling locations are included in Appendix J.

Results of the intertidal surface sediment samples are summarized in Table 9 and copies of the laboratory analytical reports are attached as Appendix K. Mean total PAH concentrations in the upper intertidal zone within approximately two weeks of the release were approximately 10.0 ppm, and seven of the ten samples had concentrations below NOAA's ERL benchmark of 4.0 ppm total PAH. The mean total PAH in the lower intertidal zone was approximately 1.8 ppm. Eight of the ten lower intertidal sediment samples had concentrations below the ERL benchmark. Upper and lower intertidal sediment samples were also screened against the MCP risk characterization standards for individual PAHs. None of these samples exceeded MCP standards. Additional information on sediment concentrations relative to human or ecological exposure is provided in Section 8.0 of this report and the Partial RAO report.

## 6.0 MCP IRA ACTIVITIES

On September 15, 2003, GeoInsight submitted an Immediate Response Action (IRA) Plan to MADEP to bridge the transition period from the end of the IRATCGP activities on September 3, 2003 and the performance of post-IRA response actions conducted under the MCP, 310 CMR 40.0000 and the Oil Pollution Act of 1990 (OPA 90). The IRA Plan was prepared in response to a September 8, 2003 *Request for IRA With Interim Deadline* letter from the MADEP. Several modifications were made to the September 15, 2003 IRA Plan in consultation with MADEP, NOAA, and USCG. These modifications to the IRA Plan were summarized in a September 29, 2003 Errata Sheet.

The objectives of the IRA Plan are to address potential Imminent Hazards (as defined in the MCP), if present, and to respond to time-critical conditions that necessitate immediate response actions. These objectives were developed to meet the applicable General Provisions for Immediate Response Actions listed in 310 CMR 40.0411(1), which are to assess the release, threat of release, or site conditions and, where appropriate, contain, isolate, remove or secure a release or threat of release of oil in order to:

- (a) abate, prevent or eliminate any imminent hazard to health, safety, public welfare or the environment; and/or
- (b) respond to any other time-critical release, threat of release and/or site conditions.

The IRA response action strategies include:

1. Removing potentially mobile oil (oil that has the potential to mobilize and impact other areas); and
2. Addressing potential imminent hazards to human health, public welfare, safety, and the environment, as listed in 310 CMR 40.0321.

IRA activities, including reconnaissance and remedial actions are currently being conducted at the Site.

## 6.1 RECONNAISSANCE ACTIVITIES SUMMARY

Field assessments were conducted to evaluate whether IRA criteria were satisfied in segments that had not passed IRAC criteria, assess the presence of buried oil, and to respond to public concerns. The assessment specifically focused on the potential for oil to mobilize and exacerbate current environmental conditions if not removed immediately. An example of a condition that could warrant accelerated response actions under this IRA includes buried oil that is exposed by storm erosion that could migrate to other areas causing new oiling of that area or unoiled areas in the immediate area. If potentially mobile oil was discovered, the oil would be removed, if feasible, using techniques outlined in the IRA Plan.

Oil on rock surfaces in areas such as rocky shorelines, groins, jetties, etc. that contain “wipeable” oil as defined in the Unified Command's IRATCGP document was not removed if the oil could not remobilize and did not pose an imminent hazard. Tarballs and oil patties discovered during inspections were removed, where feasible. It is expected that natural attenuation and scouring during the fall and winter storm season reduced or eliminated this condition and these areas will be re-inspected during post-IRA assessments during the summer of 2004.

Buried oil surveys were conducted through the fall and winter to assess the presence of subsurface oil. Buried oil inspections entailed digging trenches in the intertidal zone of sandy or sand/gravel beaches. Trenches were dug approximately six to eight inches below grade, and visually inspected for the presence of product or sheen. Product and/or sheening was observed at one segment. Small pinhead flecks of product and rainbow sheen was observed in October 2003 at Barney's Joy. Buried oil was not encountered at other segments that were inspected as part of this evaluation. Exposed oil was observed during some of the reconnaissances on the shoreline surface at the Leisure Shores Beach area in Mattapoisett, which is a portion of the Brandt Island West segment (W1F-02). Clean up activities, described below, were conducted at this location in response to the observed oil.



## **6.2 REMEDIAL ACTION SUMMARY**

Small-scale clean up operations, consisting of removing isolated tarballs or wrack patties, wiping tacky oil from rocks using rags or other sorbent material, and removing small rocks with oil that could not be effectively wiped or cleaned, were conducted by the reconnaissance teams at several locations during the inspections in October and November 2003. At two locations, Brandt Island West in Mattapoisett and Naushon Island, the reconnaissance teams found that they could not effectively clean up the exposed oil, so Fleet Environmental Services, Inc. (Fleet) was contacted to assist in clean up operations. Refer to the February 10, 2004 *Immediate Response Action Status Report* for additional information regarding clean up operations conducted by Fleet.

## **6.3 MCP IRA ACTIVITIES SUMMARY**

The reconnaissance activities conducted as part of the MCP IRA activities found that imminent hazard conditions did not exist at these segments. Small-scale clean up operations were conducted to remove tarballs encountered during the inspections, but most of the released oil had been effectively removed during the initial response actions described in Section 4.0. MCP IRA activities are currently on-going, primarily to periodically check for the presence of potentially buried oil at several locations and to evaluate the feasibility of additional clean up activities, primarily at locations that did not pass the IRAC inspections.

## **7.0 PHASE I CHARACTERIZATION**

The Phase I characterization was a sampling program with the objective of evaluating sediment quality at selected segments, primarily segments that were lightly or very lightly oiled. A subset of samples was also collected from marsh segments and segments that were moderately or heavily oiled to provide a general understanding of the degree of oil impacts to sediment in these areas where the degree of oiling was relatively heavier. The sediment samples were submitted for laboratory analysis to evaluate the potential risk to human health and ecological receptors associated with exposure to B120 oil in the project area. Based on the existing information on initial oiling, current environmental conditions, and natural attenuation, exposure risk would be primarily dependent on the current magnitude and toxicity of remaining oil associated with specific habitat/substrate types along the shorelines of Buzzards Bay.

### **7.1 SEGMENT RANKING AND GROUPING**

For the purposes of developing a sampling approach to characterize segments for this Phase I, the segments were grouped by maximum degree of initial oiling and ranked by a numerical oiling score based upon the distribution of observed oil. For example, if a segment was mostly lightly oiled, but there was a small portion that was heavily oiled, then this segment was considered to be heavily oiled for this grouping. The oiling categories used in this report were based upon the distribution of oil as well as the width of the area of oiling on the shoreline described in Section 4.4.

After the degree of maximum oiling was identified, each segment was ranked based on the degree of oiling over the entire segment. Heavily oiled was assigned a value of 4, moderately oiled a value of 3, lightly oiled a value of 2, and very lightly oiled a value of 1. The segment oiling was calculated by weighting the proportion of each segment length based on the oiling category and summing across oiling categories. For example, the entire shoreline of Ram Island was considered to be heavily oiled, so this segment has a ranking of 4. In contrast, Mishaum Point East is also considered to be heavily oiled, but the oiling at Mishaum Point East, 97% of the segment was mostly very light, with only a small area near the tip of Mishaum Point with 3%

heavy oiling of the segment; therefore the ranking for Mishaum Point East is much lower  $[(1 \times 97\%) + (4 \times 3\%) = 1.09]$ . The shoreline segments were categorized by degree of oiling (e.g., very light, light), sorted by the numerical oiling score. The degree of oiling for the impacted segments along with the numerical ranking value are presented in Table 10.

## 7.2 SEDIMENT SAMPLING

In January and March 2004, GeoInsight and ENTRIX field personnel collected sediment samples from the intertidal zone from selected shoreline segments to evaluate petroleum concentrations in sediment. A conservative representative cross section of the oiled segments was selected for sampling, with samples collected from segments with the highest oiling scores in each of the oiling categories. To be conservative, the samples were collected from the areas within the segments that received relatively greater degrees of oiling. The samples were collected from segments where sand substrates (shoreline type 1A, 1B, or 1C) and marsh habitats were identified. In addition, the sample locations were structured so that at least one segment from each affected municipality was selected for sampling. A total of 27 segments were selected for sampling; the selected segments are listed in Table 11 and depicted in Figure 28.

At each segment selected for sampling, sediment samples were collected from three to four locations to evaluate oil distribution at the segment. At each location, samples were collected from the upper portion of the intertidal zone (labeled with the prefix “UIT”) and also from the lower portion of the intertidal zone (labeled with the prefix “LIT”). Sediment samples were also collected from the middle portion of the intertidal zone (labeled with the prefix “MIT”) at a subset of locations. Samples collected from marsh areas were labeled with a “M” prefix. Samples for a particular tidal zone were collected at three separate sampling points parallel to the shoreline, located approximately 10 meters apart. The sediment samples were collected from the top five centimeters of surface sand and placed in four- or eight-ounce jars. The sample aliquots for the specific intertidal zone at a location were composited together by the laboratory. The latitude and longitude coordinates of each sampling location was recorded at the center of each sampling area using a hand-held GPS unit. A schematic of the sampling points at a typical sampling location is attached as Figure 29.

At the completion of each sampling day, the samples were hand-delivered by the field teams to Groundwater Analytical, Inc. of Buzzards Bay for analysis. The samples were analyzed for EPH using MADEP Methodology and PAH using USEPA method 8270 with selected ion monitoring (SIM) to achieve low-level detection limits.

The sampling locations at each of the selected segments are shown on the maps included in Appendix L. Copies of the laboratory analytical reports are included in Appendix M. Analytical results were compared to Method 1 S-1/GW-1, S-2/GW-2, and S-3/GW-3 Risk Characterization Standards to make a preliminary evaluation of potential risk to human health. To evaluate potential risks to marine organisms, the analytical data were compared to NOAA's Effects Range-Low (ERL) values for marine sediment.

EPH hydrocarbon fractions were generally not detected in the samples collected for this assessment, with detectable concentrations in only two of the samples collected (samples E107-UIT-02 and W2A13-M-02). PAH were detected at relatively low concentrations in the sediment samples, at concentrations below the applicable Method 1 Risk Characterization Standards. PAH concentrations detected in the sediment samples were below the NOAA ERLs, with the exception of two samples. Reported concentrations of fluorene, phenanthrene, fluoranthene, and benzo(a)anthracene exceeded the ERLs in one of the six samples collected from Town Beach in Mattapoisett (sample W1E06-UIT-03). Concentrations of PAH in the other samples collected from this segment were below the ERLs for total PAH and the ERLs for individual PAHs. Reported concentrations of several PAH in one of the six samples collected from Pope's Beach in Fairhaven (sample W2A03-UIT-02) also exceeded applicable ERLs. Concentrations of PAH were below ERLs in the other samples collected from this segment. The maximum degree of oiling at both of these segments was identified as "moderate".

It is important to note that some PAH can be derived from combustion products (i.e., pyrogenic) and may not be necessarily associated with the release of No. 6 fuel oil (i.e., petrogenic). PAH derived from coal, coal ash, or wood ash (excluding wood ash from treated wood) are

specifically exempt from notification under the MCP. Therefore, some PAH may be from sources not associated with the release that do not require response actions. An evaluation of the petrogenic PAH fraction relative to the pyrogenic PAH fraction will be conducted as part of comprehensive response actions.

### **7.3 QUALITY ASSURANCE/QUALITY CONTROL**

ENTRIX performed an independent quality assessment and validation of all analytical data using quality control criteria established by the analytical methods and U.S. Environmental Protection Agency (EPA) National Functional Guidelines for the Contract Laboratory Program. The results of these reviews were summarized in data validation reports prepared for each set of sample results.

A “Level II” validation was conducted for analyses of EPH and PAH in sediments collected as part of the initial MCP assessment. The MCP sediment samples were analyzed by Groundwater Analytical, Inc. in accordance with MADEP methodology for EPH and USEPA SW-846 methodology for PAHs: measurement of EPH by MADEP-EPH-98-1 and PAH by 8270C. The data validation found that the samples were extracted and analyzed within the required holding times, that the laboratory quality control surrogate compounds were within acceptable limits, and that the quality assurance/quality control procedures and standards required for the method were substantially achieved. The results of the quality assessment and validation indicated that the laboratory parameters were within acceptable limits and that the data are suitable for the intended use.

Field duplicate samples, labeled DDD-01 and DDD-02, were collected from Town Beach (W1E-04) and Peases Point (W1D-04) in Mattapoisett, respectively. The duplicate samples were collected from sample location 3 at both segments and submitted for laboratory analysis of the same parameters to evaluate analytical precision. The precision between the two samples is reported as the Relative Percent Difference (RPD), which is calculated using the equation:

$$\text{RPD} = \frac{(\text{Sample Concentration} - \text{Duplicate Concentration})}{(\text{Sample Concentration} + \text{Duplicate Concentration}) / 2}$$

The estimated RPDs for the individual analytes of the duplicate samples are presented in Table 13 and these RPD values ranged from 0% (the analyte concentrations were the same in both samples) to 86%, with most of the RPD values between 30% and 50%. In general, RPD values of less than 50% are considered to be acceptable under USEPA data validation guidelines, although it is noted that the precision of testing results decreases as the analyte concentrations approach the laboratory reporting limits. The general rule to properly apply the RPD criteria is that the analyte concentrations should be at least 10X the reporting limit. Because the detected concentrations in the duplicate samples were well below 10X the reporting limit, the RPD values should be used with caution.

## 8.0 CONCEPTUAL SITE MODEL

The CSM was developed to summarize the movement and distribution of the released oil and also to evaluate potential exposure pathways to human and environmental receptors. The objective of the CSM is to provide a framework for evaluating media where oil could be present and develop an assessment program to characterize oil impacts to these identified media. The CSM is also used to identify data gaps for future assessments and to assist in identifying remedial alternatives. The CSM presented in this report is supported by the data collected during the initial assessment and response actions that are described in previous sections and is based upon current knowledge of the release and Site conditions.

### 8.1 OIL TRANSPORT AND DISTRIBUTION

As described in Section 3.0, the released oil had properties that would likely have caused most of the oil to float on the surface, with relatively little suspended in the water column or sinking. The released oil was subsequently transported by winds and currents towards the shore, where the oil stranded in the intertidal zone. The greatest degree of impacts was expected to be in the upper intertidal zone, which is the area where high tides and surf action would deposit the oil. Surface water analytical results collected shortly after the release occurred indicated that dissolved concentrations of PAH, the predominant soluble component of No. 6 oil, were relatively low, below applicable CMC standards. Assessment activities conducted to evaluate the presence of submerged oil did not encounter appreciable amounts of oil.

The majority of oil stranded ashore was removed during the initial clean up effort. At the completion of these initial response actions, 91 of the 120 oiled segments passed the IRAC criteria, indicating that the clean up criteria endpoints had been met. Additional inspections and evaluations were conducted as part of the MCP IRA activities to evaluate the whether IRA criteria was satisfied for those segments that did not pass IRAC criteria. Based on the results of these surveys, additional small-scale clean up was conducted in some areas. At some locations, particularly on rock surfaces, residual oil was not remediated because the benefits of remediation were outweighed by the potential damage remediation would cause to the environment. In

general, the remaining weathered oil is visible on exposed rock surfaces, and is expected to experience the greatest amount of natural degradation. Through weathering processes such as photo-oxidation, remaining oil on the shoreline is expected to degrade naturally over time. Oil in the intertidal zone is exposed to wave and surf action, and also to ice scouring during the winter months.

## **8.2 POTENTIAL EXPOSURE PATHWAYS AND EXPOSURE POINTS**

Potential exposure pathways include human exposure (including potential risks to public welfare and safety) and ecological exposure. The existing information was used to identify media with potential human health and ecological exposure risks associated with the released oil. The risk to public welfare is assessed as it relates to the potential that publicly-accessible shorelines may have residual oil that could create a nuisance condition such as rubbing off on skin when touched to the degree that limits public or community use (active or passive) of the shoreline segment. The potential risk to safety is based primarily upon the threat of physical harm or bodily injury from slip and fall hazards due to the presence of oil on rock surfaces. Potential exposure pathways to human and ecological receptors associated with intertidal shoreline types are illustrated in Table 14 and discussed below.

As identified in Section 2.1, the shoreline was classified into six shoreline types based primarily on substrate and human or ecological utilization:

- Public sand beaches;
- Semi-public and private sand beaches;
- Mixed sand/gravel beaches and riprap groins;
- Riprap seawalls, bulkheads, and piers;
- Rocky shores; and
- Marsh.

Based on these shoreline classifications the following media were also considered to be potentially impacted by the release:



- Subtidal surface/sediment;
- Surface water;
- Ground water; and
- Air.

The potential exposure pathways for these media are described in further detail in the sections below.

### **8.2.1 Public Sand Beaches (1A) and Semi-Public and Private Sand Beaches (1B)**

Sand beaches within the project area are primarily comprised of fine to coarse grain sand substrate. Public beaches may be heavily utilized by adults and children for recreational purposes including walking, jogging, fishing, boating, and wildlife viewing. The frequency of use at semi-public and private beaches is typically much less than compared to public beaches. The frequency of recreational use of public sand beaches is largely seasonal and tourist-based, and typically these beaches are less frequently utilized during the colder months.

The potential routes of human exposure at sand beaches include inhalation, ingestion, dermal absorption, and public welfare. An inhalation exposure could be present as a result of a child or adult inhaling particulates from sand (fugitive dust) when walking or playing on the beach. An ingestion exposure may be the result of accidental sediment ingestion by children playing in affected sand. Additionally, nuisance oil staining on hands and feet resulting from stepping or touching oiled sand, and subsequent hand-to-mouth contact, could result in incidental soil ingestion. For the purposes of human health risk characterization via food consumption, potentially-impacted media (e.g., shellfish) is also included in this exposure pathway. Dermal exposure could occur through the physical contact with oiled media by a part of the body. Children and adults could come in contact with oiled sand through walking or sitting on the beach. There would be minimal public safety concerns along sand beaches because rocky substrates are not present and there is no remaining slip or fall hazard associated with residual oil.

Potential risks to public welfare are present at public beaches but are not present at private beaches due to lack of public access. Significant amounts of oiled sand or wrack could limit the use of the beach by the community and present a risk to public welfare.

Ecological routes of exposure pathways associated with this shoreline type could theoretically occur via the food web (intertidal benthic invertebrates or shellfish) and include secondary consumers such as birds and other terrestrial animals.

### **8.2.2 Mixed Sand/Gravel Beaches and Riprap Groins (Jetties)**

Within the project area, this type of beach is a combination of fine to coarse grain sand and gravel, and may include artificial hard structures such as riprap groins/jetties. Additionally, these beaches can be both public or private and the frequency of use is seasonally-based. Recreational activities within this substrate class may include walking, jogging, fishing, boating, or wildlife viewing. The types of potential exposure pathways to humans include inhalation, ingestion, dermal contact, public welfare and safety.

Ecological exposure pathways on mixed sand/gravel beaches would be comparable to sand beaches, although the rock substrate may provide habitat for some different species (e.g. mussels) than present at sandy beaches. Other secondary consumers, such as birds and other terrestrial animals, are also considered.

### **8.2.3 Riprap Seawalls, Bulkheads, Piers**

This type of shoreline consists of man-made hard structures such as riprap, stone, concrete, or wood. Recreational activities primarily entail fishing and possibly wildlife viewing, and are seasonally influenced. However, the limited extent of this shoreline type, and difficult access generally limit the frequency and intensity of human use.

The potential human routes of exposure specific to the shoreline type include ingestion (primarily through hand-to-mouth contact with oil), dermal absorption, public welfare, and safety. The magnitude of these exposure pathways would be comparable to riprap groins as

discussed above. There would be no inhalation pathway associated with this media because there is little or no fine sediment in this shoreline type. These artificial substrates may be utilized by birds and invertebrate species typically associated with rocky shorelines, such as cormorants or mussels.

#### **8.2.4 Rocky Shores**

This shoreline type consists of boulder or bedrock outcroppings. The number of children and adults utilizing this type of shoreline would be relatively low given the fact that it is not generally conducive to recreational activities. However, recreational uses may include walking, fishing and wildlife viewing.

Potential human exposure pathways and the magnitude of potential exposure would be comparable to other shorelines composed of hard structure. Exposure pathways to ecological receptors are theoretically present associated with the food web; however, like riprap, seawalls and piers, the degree of exposure is relatively low due to the highly weathered nature of minimal residual oil splatter.

#### **8.2.5 Salt Marshes**

This substrate class includes vegetated areas with organic sediments that are tidally influenced. Human use of marsh areas is limited but recreational activities may include boating, walking, and wildlife viewing.

Potential human routes of exposure include ingestion and dermal absorption. Oiled sediment could potentially be ingested by children and adults and incidental sediment ingestion may result from dermal contact with sediments or vegetation. A potential public welfare condition could be present if the degree of residual oiling limits the public use of this area. Ecological exposure pathways could occur via direct contact to oiled sediments (e.g., benthic invertebrates) or through food web transfers.

### **8.2.6 Subtidal Surface/Sediment**

This media includes hard substrate and sediment present on the seafloor in the subtidal zone. The potential for human contact with this media is expected to be limited but there may be limited contact with subtidal sediment during recreational activities (such as swimming) and commercial activities (such as shellfishing). Potential human exposure to impacted subtidal sediment is expected to be via ingestion (particulates and hand-to-mouth contact) and dermal absorption. Potential ecological exposure pathways include benthic organisms (such as shellfish) and plants (e.g., eelgrass).

### **8.2.7 Surface Water**

The potential impacts to surface water are expected to be limited due to the relatively low solubility of most of the hydrocarbons present in No. 6 fuel oil. However, potential human exposure to surface water includes accidental ingestion and dermal contact during recreational activities (e.g., swimming) or commercial activities (e.g., fishing). Potential ecological exposure routes to surface water include fish and terrestrial organisms (e.g., shorebirds).

### **8.2.8 Ground Water**

The potential impacts to ground water are expected to be even less than the impacts to surface water because: 1) the release occurred at sea and the bulk of the soluble fraction of the oil is expected to have dissolved into seawater, 2) onshore oil is exposed to wave and tidal action and residual soluble components are expected to dissolve into seawater, not ground water, and 3) ground water below the intertidal zone (which is the location of terrestrial impacts) is expected to flow towards the ocean, not toward potential inland receptors. However, it is recognized that although the likelihood of impacts to ground water are low, this pathway should be considered as a potential exposure route in the absence of other data. The only potential human exposure routes to ground water are by ingestion and dermal contact. Ground water is not expected to present an ecological exposure route.

### **8.2.9 Air**

The likelihood of impacts to air is anticipated to be low because No. 6 oil typically has a relatively low volatile fraction. Potential human exposure to air is via inhalation; other exposure routes are not anticipated to be present.

## **8.3 CONCEPTUAL SITE MODEL CONCLUSIONS**

In summary, the released oil mostly floated on the water surface and was transported to the shoreline by winds and currents. The oil impacts were variable, and generally the areas of relatively heavy oil impacts were southwest-facing shorelines and headlands. Stranded oil was deposited primarily in the intertidal zone, with the majority of impacts expected to be in the upper intertidal zone.

The majority of oil impacts were removed by the initial clean up operations conducted by Unified Command. Additional clean up was conducted at some segments as part of on-going MCP IRA activities. Small amounts of residual oil were left behind at some locations where the potential benefit of additional clean up was outweighed by the potential damage to the environment. The small amounts of remaining oil are present primarily in the intertidal zone and are expected to degrade naturally over time as exposed to coastal processes.

The conceptual site model identifies potentially affected media, and human and ecological routes of exposure based on the existing site history, the contaminant source, and the fate and transport of the contaminant. The potential exposure routes identified for the different media will be evaluated as part of on-going and comprehensive response actions. The specific mechanisms for evaluating these potential exposure pathways (e.g., via sampling, observations, or qualitative risk characterization) will be described in the Phase II Conceptual Scope of Work, which is submitted under separate cover.

## **9.0 NUMERICAL RANKING SCORESHEET**

A Numerical Ranking System (NRS) Scoresheet pursuant to 310 CMR 40.1511 was completed based upon information gathered during the Phase I Initial Site Investigation. Completion of the NRS Scoresheet indicated a Disposal Site Score of 660 points. The completed NRS Scoresheet is attached in Appendix N. Based upon current knowledge of the disposal site and the NRS Disposal Site Score, the disposal site is classified as Tier IA.

## 10.0 SUMMARY AND CONCLUSIONS

1. On April 27, 2003, between approximately 22,000 to 55,000 gallons of No. 6 oil were released from Bouchard Barge B120 near the western approach to Buzzards Bay. The released oil floated on the water surface until winds and currents pushed the oil ashore. Containment boom and skimming operations recovered approximately 3,500 gallons of product oil on the water surface.
2. The oil distribution on the shoreline ranged from trace amounts to heavy, with the large majority of shorelines in the spill area either unoiled or lightly oiled. The oil reached sediments and rocks in the intertidal zone, which was the most affected portion of the shoreline, via winds and tidal activity. Oil stranded on the shoreline is subject to natural weathering processes, including photo-oxidation and biodegradation.
3. Initial response actions were directed by Unified Command, which was composed of the USCG (as the federal on-scene coordinator), MADEP (as the state on-scene coordinator), and Bouchard as the RP. The initial response actions focused primarily on gross oil containment and clean up. Clean up activities consisted of manual removal of oil, hot water, high pressure (hotsy) washing, sorbent use, and rock excavation/replacement. SCAT reconnaissances were conducted until June 6, 2003 to evaluate the shoreline oiling and guide clean up efforts.
4. The large majority of the released oil was removed by the clean up operations overseen by Unified Command. IRAC inspections were conducted from June 10 to September 3, 2003 to evaluate the effectiveness of clean up operations relative to the target criteria established by Unified Command. A total of 91 segments met IRAC endpoint criteria, 10 segments did not meet the IRAC endpoint criteria, but further action was not considered to be feasible or required, and 5 segments did not meet IRAC endpoint criteria where further action was considered to be feasible. The residual oil remaining at the segments that did not pass IRAC was generally present in relatively small areas, and is typically on

- rock surfaces, which are difficult to clean without damaging the ecosystem and are also exposed to the greatest degree of natural weathering.
5. Assessment activities were conducted during the initial clean up operations to aid in assessing damages under the NRDA process. These activities included shellfish tissue sampling and sampling of sediment and surface water.
  6. In September 2003 the Unified Command post was deactivated and ongoing response actions were transitioned to GeoInsight as the LSP to conduct response actions in accordance with the MCP. An IRA Plan was initiated to address potential imminent hazards, if present, and to conduct remedial actions at time-critical locations. Field reconnaissances were conducted and remedial actions were implemented to address oil encountered by the reconnaissance teams. Imminent hazards were not encountered at these locations inspected as part of the IRA, including for those segments that did not meet IRAC endpoints and further treatment was feasible. The IRA activities are currently on-going.
  7. In January and March 2004, GeoInsight and ENTRIX field personnel collected samples at 27 segments to characterize EPH and PAH concentrations in intertidal sediment. EPH hydrocarbon fractions were generally not reported in the samples. PAH concentrations reported in the samples were below applicable Method 1 Risk Characterization Standards. PAH concentrations were also below the NOAA ERLs, except in two samples where some of the reported PAH concentrations were above the ERLs. Concentrations of PAH in the other samples collected from these same segments were below ERLs.
  8. Additional characterization will be conducted at some segments, primarily the segments that were relatively moderately or heavily oiled, as part of comprehensive response actions.





9. Based upon the data collected for this report and the Numerical Site Ranking completed for this release, the disposal site is a Tier 1A disposal site.



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## 11.0 PUBLIC INVOLVEMENT

Notification of submittal of the Phase I, CSM, and Tier Classification was provided to the affected municipalities and copies of the letter to municipal officials are attached in Appendix O. Additionally, this Phase I and CSM, like many of the documents produced by the technical professionals to date, will be available on the [buzzardsbay.org](http://buzzardsbay.org) website.



**TABLE 1  
SHORELINE SEGMENT SUMMARY  
B120 RELEASE  
BUZZARDS BAY, MASSACHUSETTS**

Segment	Segment Name	Town
E1-01	Grey Gables-Gilder Road Beach	Bourne
E1-02	Mashnee/Hog Islands North	Bourne
E1-03	Mashnee Island	Bourne
E1-04	Mashnee/Hog Islands South	Bourne
E1-05	Monument Beach	Bourne
E1-06	Phinney's Harbor South	Falmouth
E1-07	Wings Neck	Falmouth
E1-08	Barlow's Landing	Bourne
E1-09	Patuisset	Bourne
E1-10	Scraggy Neck North	Bourne
E1-11	Scraggy Neck South	Bourne
E1-12	Megansett Beach	Falmouth
E1-13	Nye's Neck	Falmouth
E1-14	New Silver Beach (Wild Harbor)	Falmouth
E1-15	Crow Point	Falmouth
E1-16	Old Silver Beach	Falmouth
E2-01	Falmouth Cliffs	Falmouth
E2-02	West Falmouth Harbor	Falmouth
E2-03	Chappaquoit Beach	Falmouth
E2-04	Black Beach	Falmouth
E2-05	Saconneset Beach	Falmouth
E2-06	Hamlin's Point Beach	Falmouth
E2-07	Wood Neck Beach	Falmouth
E2-08	Racing Beach	Falmouth
E2-09	Quissett Harbor	Falmouth
E2-10	Long Neck to Gansett Point	Woods Hole
E2-11	Penzance Island	Woods Hole
E3-01	Penikese Island	Gosnold
E3-02	Cuttyhunk Island	Gosnold
E3-03	Nashaweena Island	Gosnold
E3-04	Pasque Island	Gosnold
E3-05	Naushon Island	Gosnold
E3-06	Uncatena Island	Gosnold
E3-07	Weepecket Islands	Gosnold
W1B-01	Taylor Point Canal	Buzzards Bay
W1B-02	Taylor Point North	Buzzards Bay
W1B-03	Butler Cove	Wareham
W1B-04	Jacob's Neck	Wareham
W1B-05	Pleasant Harbor	Wareham
W1B-06	Broad Cove (+seg 6.5)	Wareham
W1B-07	Stony Point Dike	Wareham
W1B-08	Temples Knob	Wareham
W1B-09	Little Harbor Beach	Wareham
W1B-10	Little Harbor	Wareham
W1B-11	Bourne Cove	Wareham
W1B-12	Warren Point (MA)	Wareham
W1B-13	Indian Neck	Wareham
W1B-14	Long Beach	Wareham
W1B-15	Wareham River East Shore	Wareham
W1B-16	Minot Forest Beach	Wareham
W1B-17	Wareham Neck North	Wareham
W1B-18	Pinehurst Beach	Wareham
W1B-19	Broad Marsh River East	Wareham
W1B-20	Broad Marsh River West	Wareham
W1B-21	Swift's Neck Beach	Wareham
W1B-22	Swift's Beach	Wareham
W1B-23	Mark's Cove	Wareham
W1B-24	Nobska Beach	Wareham
W1B-25	Cromeset Beach	Wareham
W1B-26	Briarwood Beach	Wareham

**TABLE 1  
SHORELINE SEGMENT SUMMARY  
B120 RELEASE  
BUZZARDS BAY, MASSACHUSETTS**

Segment	Segment Name	Town
W1B-27	Rose Point	Wareham
W1B-28	Weweantic River West Shore	Marion
W1B-29	Delano Road North	Marion
W1B-30	Delano Road South	Marion
W1B-31	Great Hill Point	Marion
W1B-32	Piney Point Beach	Marion
W1B-33	Piney Point South	Marion
W1C-00	Bird Island	Marion
W1C-01	Butler's Point	Marion
W1C-02	Planting Island Causeway	Marion
W1C-03	Planting Island Cove	Marion
W1C-04	Blankinship Cove	Marion
W1C-05	Sippican Harbor East	Marion
W1C-06	Hammet's Cove Beach	Marion
W1C-07	Little Neck	Marion
W1C-08	Tabor Academy Beach	Marion
W1C-09	Marion Town Beach	Marion
W1C-10	Silvershell Beach	Marion
W1C-11	Sippican Harbor West	Marion
W1C-12	Converse Point East	Marion
W1C-13	Little Ram Island	Marion
W1D-01	Aucoot Cove	Mattapoisett
W1D-02	Harbor Beach	Mattapoisett
W1D-03	Holly Woods / Hiller Cove	Mattapoisett
W1D-04	Holly Woods / Peases Point	Mattapoisett
W1D-05	Point Connett Beach	Mattapoisett
W1E-01	Nye Cove / Strawberry Cove	Mattapoisett
W1E-02	Strawberry Cove	Mattapoisett
W1E-03	Strawberry Point West	Mattapoisett
W1E-04	Crescent Beach	Mattapoisett
W1E-05	Mattapoisett Harbor East	Mattapoisett
W1E-06	Mattapoisett Town Beach	Mattapoisett
W1F-01	Brandt Beach	Mattapoisett
W1F-02	Brandt Island West	Mattapoisett
W1F-03	Brandt Island East	Mattapoisett
W1F-04	Brandt Island Cove	Mattapoisett
W1F-05	Mattapoisett Neck West	Mattapoisett
W1F-06	Mattapoisett Neck South	Mattapoisett
W1F-07	Mattapoisett Shores	Mattapoisett
W1F-08	Mattapoisett Neck East	Mattapoisett
W1F-09	Mattapoisett Harbor North	Mattapoisett
W1G-00	Ram Island	Mattapoisett
W2A-01	Fort Phoenix	Fairhaven
W2A-02	Harbor View	Fairhaven
W2A-03	Pope's Beach	Fairhaven
W2A-04	Manhattan Ave	Fairhaven
W2A-05	Sunset Beach	Fairhaven
W2A-06	Silver Shell Beach	Fairhaven
W2A-07	Scotcut Neck West	Fairhaven
W2A-08	Wilbur Point	Fairhaven
W2A-09	Scotcut Neck East	Fairhaven
W2A-10	Long Island and Causeway South	Fairhaven
W2A-11	West Island West	Fairhaven
W2A-12	Rocky Point to East Cove	Fairhaven
W2A-13	East Cove	Fairhaven
W2A-14	Pine Creek to North Point	Fairhaven
W2A-15	West Island North	Fairhaven
W2A-16	Long Island and Causeway North	Fairhaven
W2A-17	Scotcut Neck Northeast (Marsh)	Fairhaven
W2A-18	Little Bay (Marsh)	Fairhaven

**TABLE 1  
SHORELINE SEGMENT SUMMARY  
B120 RELEASE  
BUZZARDS BAY, MASSACHUSETTS**

<b>Segment</b>	<b>Segment Name</b>	<b>Town</b>
W2A-19	Shaw Cove	Fairhaven
W2B-01	Round Hill to Barekneed Rocks	Dartmouth
W2B-02	Padanaram Harbor	Dartmouth
W2B-03	Clarke's Cove West	Dartmouth/New Bedford
W2B-04	Clarke's Cove East	New Bedford
W2B-05	Fort Taber	New Bedford
W2B-06	Clarke's Point East	New Bedford
W2B-09	New Bedford Harbor (inner)	New Bedford
W3A-01	Mishaum Point East	Dartmouth
W3A-02	Salters Point West	Dartmouth
W3A-03	Pier Beach (Salter's Point)	Dartmouth
W3A-04	Salters Point East	Dartmouth
W3A-05	Round Hill Beach West	Dartmouth
W3A-06	Round Hill Beach East	Dartmouth
W3B-01	Slocum's River	Dartmouth
W3B-02	Mishaum Point West	Dartmouth
W3C-01	East Beach (Westport)	Westport
W3C-02	Little Beach	Dartmouth
W3C-03	Barney's Joy (W of barbed)	Dartmouth
W3C-04	Barney's Joy (E of barbed)	Dartmouth
W3C-05	Demarest Lloyd State Park Beach	Dartmouth
W3C-06	Demarest Lloyd State Park Marsh	Dartmouth
W3D-01	Quicksand Point	Westport
W3D-02	Cockeast Pond Beach	Westport
W3D-03	Elephant Rock Beach	Westport
W3D-04	Horseneck Beach West	Westport
W3D-05	Horseneck Beach East	Westport
W3D-06	Gooseberry Neck East	Westport
W3D-07	Gooseberry Neck West	Westport

**TABLE 2  
DIVE SURVEY ANALYTICAL RESULTS  
BARGE B120 SPILL  
BUZZARDS BAY, MASSACHUSETTS**

Site	Sample ID	TPH (ppm)	TOC (%)	Substrate
1	1C	93	1.66	Sediment
	1E	81	1.59	Sediment
	1N	86	1.56	Sediment
	1S	81	1.41	Sediment
	1W	89	1.64	Sediment
2	2	-	-	Rock <sup>a</sup>
	2C	47	0.42	Sediment
	2E	9	0.08	Sediment
	2N	20	0.20	Sediment
	2S	19	0.23	Sediment
	2W	-	-	Rock <sup>a</sup>
3	3C	17	0.30	Sediment
	3E	42	0.47	Sediment
	3N	100	1.42	Sediment
	3S	22	0.38	Sediment
	3W	136	2.25	Sediment
4	4C	103	1.97	Sediment
	4E	90	1.82	Sediment
	4N	78	1.78	Sediment
	4S	85	1.82	Sediment
	4W	79	1.80	Sediment
5	5E3	79	0.63	Sediment
	5E3	-	-	Rock <sup>a</sup>
	5E4	39	0.51	Sediment
	5W1	40	0.44	Sediment
	5W1	-	-	Rock <sup>a</sup>
	5W2	27	0.61	Sediment
6	6C	2.1	0.04	Sediment
	6E	20	0.33	Sediment
	6N	7	0.18	Sediment
	6S	15	0.18	Sediment
	6W	8	0.04	Sediment

<sup>a</sup> sample matrix is rock, therefore, TPH concentration and TOC analysis not feasible

**TABLE 3**  
**PILOT TEST SEDIMENT SAMPLING ANALYTICAL RESULTS**  
**BARGE B120 SPILL**  
**BUZZARDS BAY, MASSACHUSETTS**

Sample ID	Geo Pretest-1	Geo-Pretest-2	Geo-Post Test-1	Geo-Post Test-2
Date	05/15/03	05/15/03	05/16/03	05/16/03
<b>Extractable Petroleum Hydrocarbons</b>				
C <sub>9</sub> -C <sub>18</sub> Aliphatics	ND(38)	ND(38)	ND(37)	ND(38)
C <sub>19</sub> -C <sub>36</sub> Aliphatics	ND(38)	<b>38</b>	ND(37)	ND(38)
C <sub>11</sub> -C <sub>22</sub> Aromatics	<b>38</b>	<b>47</b>	ND(37)	ND(38)
Acenaphthene	ND(0.63)	ND(0.64)	ND(0.61)	ND(0.64)
Acenaphthylene	ND(0.63)	ND(0.64)	ND(0.61)	ND(0.64)
Anthracene	ND(0.63)	ND(0.64)	ND(0.61)	ND(0.64)
Benzo(a)anthracene	ND(0.63)	ND(0.64)	ND(0.61)	ND(0.64)
Benzo(b)fluoranthene	ND(0.63)	ND(0.64)	ND(0.61)	ND(0.64)
Benzo(k)fluoranthene	ND(0.63)	ND(0.64)	ND(0.61)	ND(0.64)
Benzo(g,h,i)perylene	ND(0.63)	ND(0.64)	ND(0.61)	ND(0.64)
Benzo(a)pyrene	ND(0.63)	ND(0.64)	ND(0.61)	ND(0.64)
Chrysene	ND(0.63)	ND(0.64)	ND(0.61)	ND(0.64)
Dibenzo(a,h)anthracene	ND(0.63)	ND(0.64)	ND(0.61)	ND(0.64)
Fluoranthene	ND(0.63)	ND(0.64)	ND(0.61)	ND(0.64)
Fluorene	ND(0.63)	ND(0.64)	ND(0.61)	ND(0.64)
Indeno(1,2,3-cd)pyrene	ND(0.63)	ND(0.64)	ND(0.61)	ND(0.64)
2-Methylnaphthalene	ND(0.63)	ND(0.64)	ND(0.61)	ND(0.64)
Naphthalene	ND(0.63)	ND(0.64)	ND(0.61)	ND(0.64)
Phenanthrene	ND(0.63)	ND(0.64)	ND(0.61)	ND(0.64)
Pyrene	ND(0.63)	ND(0.64)	ND(0.61)	ND(0.64)

Notes:

1. All values in milligrams per kilogram (mg/kg).
2. ND(x) = constituent not detected at practical quantitation limits noted in parentheses.
3. BOLD exceeds laboratory detection limits.
4. Samples collected from Long Island, Fairhaven, Massachusetts.



**TABLE 4**  
**SHORELINE SEGMENT STATUS - SEPTEMBER 3, 2003**  
**BARGE B120 SPILL**  
**BUZZARDS BAY, MASSACHUSETTS**

Segment	Segment Name	IRAC Status (as of September 3, 2003)
E1-01	Grey Gables-Gilder Road Beach	Pass
E1-02	Mashnee/Hog Islands North	Pass
E1-03	Mashnee Island	Pass
E1-04	Mashnee/Hog Islands South	Unoiled
E1-05	Monument Beach	Unoiled
E1-06	Phinney's Harbor South	Unoiled
E1-07	Wings Neck	Pass
E1-08	Barlow's Landing	Pass
E1-09	Patuisset	Pass
E1-10	Scraggy Neck North	Pass
E1-11	Scraggy Neck South	Fail - FTF
E1-12	Megansett Beach	Pass
E1-13	Nye's Neck	Fail - FTF
E1-14	New Silver Beach (Wild Harbor)	Pass
E1-15	Crow Point	Pass
E1-16	Old Silver Beach	Unoiled
E2-01	Falmouth Cliffs	Not Inspected
E2-02	West Falmouth Harbor	Not Inspected
E2-03	Chappaquoit Beach	Unoiled
E2-04	Black Beach	Unoiled
E2-05	Saconneset Beach	Pass
E2-06	Hamlin's Point Beach	Pass
E2-07	Wood Neck Beach	Pass
E2-08	Racing Beach	Pass
E2-09	Quissett Harbor	Pass
E2-10	Long Neck to Gansett Point	Pass
E2-11	Penzance Island	Pass
E3-01	Penikese Island	Not Inspected
E3-02	Cuttyhunk Island	Not Inspected
E3-03	Nashaweena Island	Not Inspected
E3-04	Pasque Island	Not Inspected
E3-05	Naushon Island	Not Inspected
E3-06	Uncatena Island	Not Inspected
E3-07	Weepecket Islands	Not Inspected
W1B-01	Taylor Point Canal	Unoiled
W1B-02	Taylor Point North	Unoiled
W1B-03	Butler Cove	Unoiled
W1B-04	Jacob's Neck	Unoiled
W1B-05	Pleasant Harbor	Unoiled
W1B-06	Broad Cove (+seg 6.5)	Unoiled
W1B-07	Stony Point Dike	Pass
W1B-08	Temples Knob	Pass
W1B-09	Little Harbor Beach	Unoiled
W1B-10	Little Harbor	Unoiled
W1B-11	Bourne Cove	Unoiled

**TABLE 4**  
**SHORELINE SEGMENT STATUS - SEPTEMBER 3, 2003**  
**BARGE B120 SPILL**  
**BUZZARDS BAY, MASSACHUSETTS**

Segment	Segment Name	IRAC Status (as of September 3, 2003)
W1B-12	Warren Point (MA)	Pass
W1B-13	Indian Neck	Pass
W1B-14	Long Beach	Pass
W1B-15	Wareham River East Shore	Pass
W1B-16	Minot Forest Beach	Pass
W1B-17	Wareham Neck North	Pass
W1B-18	Pinehurst Beach	Unoiled
W1B-19	Broad Marsh River East	Unoiled
W1B-20	Broad Marsh River West	Unoiled
W1B-21	Swift's Neck Beach	Pass
W1B-22	Swift's Beach	Pass
W1B-23	Mark's Cove	Pass
W1B-24	Nobska Beach	Pass
W1B-25	Cromeset Beach	Unoiled
W1B-26	Briarwood Beach	Unoiled
W1B-27	Rose Point	Unoiled
W1B-28	Weweantic River West Shore	Pass
W1B-29	Delano Road North	Unoiled
W1B-30	Delano Road South	Unoiled
W1B-31	Great Hill Point	Pass
W1B-32	Piney Point Beach	Pass
W1B-33	Piney Point South	Pass
W1C-00	Bird Island	Not Inspected
W1C-01	Butler's Point	Fail - FTF
W1C-02	Planting Island Causeway	Not Inspected
W1C-03	Planting Island Cove	Unoiled
W1C-04	Blankinship Cove	Pass
W1C-05	Sippican Harbor East	Pass
W1C-06	Hammet's Cove Beach	Unoiled
W1C-07	Little Neck	Unoiled
W1C-08	Tabor Academy Beach	Unoiled
W1C-09	Marion Town Beach	Unoiled
W1C-10	Silvershell Beach	Fail - NFA
W1C-11	Sippican Harbor West	Pass
W1C-12	Converse Point East	Fail - NFA
W1C-13	Little Ram Island	Not Inspected
W1D-01	Aucoot Cove	Pass
W1D-02	Harbor Beach	Pass
W1D-03	Holly Woods / Hiller Cove	Pass
W1D-04	Holly Woods / Peases Point	Pass
W1D-05	Point Connett Beach	Pass
W1E-01	Nye Cove / Strawberry Cove	Pass
W1E-02	Strawberry Cove	Fail - NFA
W1E-03	Strawberry Point West	Fail - FTF
W1E-04	Crescent Beach	Pass

**TABLE 4**  
**SHORELINE SEGMENT STATUS - SEPTEMBER 3, 2003**  
**BARGE B120 SPILL**  
**BUZZARDS BAY, MASSACHUSETTS**

Segment	Segment Name	IRAC Status (as of September 3, 2003)
W1E-05	Mattapoissett Harbor East	Pass
W1E-06	Mattapoissett Town Beach	Pass
W1F-01	Brandt Beach	Pass
W1F-02	Brandt Island West	Fail - NFA
W1F-03	Brandt Island East	Fail - NFA
W1F-04	Brandt Island Cove	Pass
W1F-05	Mattapoissett Neck West	Pass
W1F-06	Mattapoissett Neck South	Fail - NFA
W1F-07	Mattapoissett Shores	Pass
W1F-08	Mattapoissett Neck East	Pass
W1F-09	Mattapoissett Harbor North	Pass
W1G-00	Ram Island	Pass
W2A-01	Fort Phoenix	Pass
W2A-02	Harbor View	Pass
W2A-03	Pope's Beach	Pass
W2A-04	Manhattan Ave	Pass
W2A-05	Sunset Beach	Fail - NFA
W2A-06	Silver Shell Beach	Fail - NFA
W2A-07	Sconticut Neck West	Pass
W2A-08	Wilbur Point	Pass
W2A-09	Sconticut Neck East	Pass
W2A-10	Long Island and Causeway South	Fail - NFA
W2A-11	West Island West	Pass
W2A-12	Rocky Point to East Cove	Pass
W2A-13	East Cove	Pass
W2A-14	Pine Creek to North Point	Pass
W2A-15	West Island North	Pass
W2A-16	Long Island and Causeway North	Pass
W2A-17	Sconticut Neck Northeast (Marsh)	Pass
W2A-18	Little Bay (Marsh)	Pass
W2A-19	Shaw Cove	Pass
W2B-01	Round Hill to Barekneed Rocks	Pass
W2B-02	Padanaram Harbor	Pass
W2B-03	Clarke's Cove West	Pass
W2B-04	Clarke's Cove East	Pass
W2B-05	Fort Taber	Fail - FTF
W2B-06	Clarke's Point East	Pass
W2B-99	New Bedford Harbor (inner)	Unoiiled
W3A-01	Mishaum Point East	Pass
W3A-02	Salters Point West	Pass
W3A-03	Pier Beach (Salter's Point)	Pass
W3A-04	Salters Point East	Pass
W3A-05	Round Hill Beach West	Pass
W3A-06	Round Hill Beach East	Fail - NFA
W3B-01	Slocum's River	Pass

**TABLE 4**  
**SHORELINE SEGMENT STATUS - SEPTEMBER 3, 2003**  
**BARGE B120 SPILL**  
**BUZZARDS BAY, MASSACHUSETTS**

Segment	Segment Name	IRAC Status (as of September 3, 2003)
W3B-02	Mishaum Point West	Not Inspected
W3C-01	East Beach (Westport)	Pass
W3C-02	Little Beach	Pass
W3C-03	Barney's Joy (W of barbed)	Pass
W3C-04	Barney's Joy (E of barbed)	Not Inspected
W3C-05	Demarest Lloyd State Park Beach	Pass
W3C-06	Demarest Lloyd State Park Marsh	Pass
W3D-01	Quicksand Point	Pass
W3D-02	Cockeast Pond Beach	Pass
W3D-03	Elephant Rock Beach	Pass
W3D-04	Horseneck Beach West	Pass
W3D-05	Horseneck Beach East	Pass
W3D-06	Gooseberry Neck East	Pass
W3D-07	Gooseberry Neck West	Pass

Notes:

Fail - NFA

Fail - FTF

Failed IRAC, Further Action Not Feasible

Failed IRAC, Further Treatment Feasible

**TABLE 5**  
**SHELLFISH TISSUE ANALYTICAL RESULTS**  
**BARGE B120 SPILL**  
**BUZZARDS BAY, MASSACHUSETTS**

Shellfish Area	Species	Sample ID	2003 Collection Dates/Total PAH (ppb)					
			May 5 - May 7	May 19 - May 21	June 9 - June 10	July 8 - July 10	Aug. 27 - Aug. 28	Oct. 23 - Oct. 24
BB-5	Bay Scallop	BJB-SC	59.63	--	--	0.26	--	--
BB-7	Quahog	COWY-QH	2.24	--	0.41	0.069	--	--
		MPDA-QH	--	1.37	0.38	0.104	--	--
BB-10		No Data	--	--	--	--	--	--
BB-15	Oyster	FHHS-OY-1	12.00	--	--	2.2	0.61	--
	Quahog	SNNW-QH-1	--	4.30	--	--	--	--
		FHHS-QH-1	8.10	--	--	0.38	0.17	--
		FTPH-QH-1C	0.10	1.40	--	--	--	--
		NBOHFR-QH-2	--	0.24	--	0.07	--	--
		WCSN-QH-1	--	2.10	--	0.10	--	--
	Soft-shell Clam	FHHS-SS-1	15.00	--	--	0.82	0.28	--
SNNW-SS-1		--	5.80	--	--	--	--	
	WCSN-SS-2	--	2.70	--	0.19	--	--	
BB-17	Soft-shell Clam	MNHH-SS-1	21.54	--	--	--	0.26	--
	Quahog	SWLI-QH-1	--	8.51	--	2.88	1.18	0.46
		SWLI-QH-1 (Duplicate)	--	8.23	--	--	--	--
		MNHH-QH-1	7.63	--	--	0.32	0.14	--
BB-20	Bay Scallop	MONB-SP-1	1.87	--	--	0.60	0.08	--
BB-21	Quahog	NRCV-QH-1	--	0.20	--	--	--	--
		SHCV-QH-1	--	0.84	0.18	--	--	--
	Oyster	NRCV-OY-1	--	0.20	--	--	--	--
	Soft-shell Clam	SHCV-SS-1	--	3.46	0.29	0.74	--	--
BB-25	Oyster	EEHH-OY-1	3.67	--	0.81	0.28	0.19	0.12
		EEHH-OY-1 (DUP)	3.85	--	--	--	--	--
	Quahog	MHHH-QH-1	0.56	--	0.13	--	--	--
	Soft-shell Clam	MEHH-SS-1	1.31	--	--	0.15	--	--
BB-32	Oyster	MDWI-OY-1	0.87	--	0.12	--	--	--
	Quahog	BVMA-QH-1	--	<0.06	--	--	--	--
		MDWI-QH-1	1.0	--	0.07	--	--	--
		MDWI-QH-1 (DUP)	0.89	--	--	--	--	--
	Bay Scallop	MONB-SP-1	1.90	--	--	0.60	0.08	--
	Soft-shell Clam	MOMA-SS-1	--	0.26	--	--	--	--
		MDWI-SS-1	2.50	--	0.09	--	--	--
BB-50	Soft-shell Clam	MHRS-SS-1	0.10	--	--	--	--	--
		MHRS-SS-1(DUP)	0.09	--	--	--	--	--
	Quahog	MHRS-QH-1	0.05	--	--	--	--	--
	Oyster	MHRS-OY-1	0.10	--	--	--	--	--

**TABLE 6  
SHELLFISH AREA CHRONOLOGY  
BARGE B120 SPILL  
BUZZARDS BAY, MASSACHUSETTS**

Shellfish Area	Location	Status				
		4/28/2003	4/30/2003	5/22/2003	10/13/2003	11/12/2003
BB-1	Westport South Coastal	closed	closed	closed	open	open
BB-3	West Branch Westport River	closed	closed	Open	open	open
BB-4	East Branch Westport River	closed	closed	Open	open	open
BB-5	Little Beach Coastal	closed	closed	closed	open*	open*
BB-7	Dartmouth Center Coastal	closed	closed	closed	open*	open*
BB-8	Slocums River	closed	closed	closed	open	open
BB-9	Little River	closed	closed	closed	open	open
BB-10	Smith Neck South Coastal	closed	closed	closed	open*	open*
BB-11	Dartmouth East Coastal	closed	closed	closed	closed	open
BB-12	Apponagansett Bay	closed	closed	open	open	open
BB-13	Clark Cove	closed	closed	open	open	open
BB-14	New Bedford East Coastal	closed	closed	open	open	open
BB-15	New Bedford/ Fairhaven Harbor	closed	closed	closed	open*	open**
BB-16	Fairhaven South Coastal	closed	closed	closed	closed	open
BB-17	West Island South	closed	closed	closed	closed	closed
BB-18	West Island North	closed	closed	closed	open	open
BB-19	West Island East Coastal	closed	closed	closed	open	open
BB-20	Fairhaven East Coastal	closed	closed	closed	open*	open*
BB-21	Nasketucket Bay	closed	closed	closed	open*	open**
BB-22	Little Bay	closed	closed	closed	open	open
BB-23	Brandt Island Cove	closed	closed	closed	open	open
BB-24	Mattapoissett South Coastal	closed	closed	closed	closed	open
BB-25	Mattapoissett Harbor	closed	closed	closed	open*	open**
BB-26	Mattapoissett River	closed	closed	closed	closed	open
BB-27	Eel Pond	closed	closed	closed	closed	open
BB-28	North Buzzards Bay	open	closed	closed	closed	open
BB-29	Point Connett	open	closed	closed	closed	open
BB-30	Hiller Cove	open	closed	closed	closed	open
BB-31	Aucoot Cove	open	closed	closed	closed	open
BB-32	Sippican Harbor	open	closed	closed	closed	open*
BB-33	Stony Point Dike	open	closed	open	open	open

**TABLE 6**  
**SHELLFISH AREA CHRONOLOGY**  
**BARGE B120 SPILL**  
**BUZZARDS BAY, MASSACHUSETTS**

Shellfish Area	Location	Status				
		4/28/2003	4/30/2003	5/22/2003	10/13/2003	11/12/2003
BB-34	Wings Cove	open	closed	open	open	open
BB-35	Weweantic River	open	closed	open	open	open
BB-36	Wareham River	open	closed	closed	closed	open
BB-37	Little Harbor/ Bourne Cove	open	closed	open	open	open
BB-38	Wings Neck North	open	closed	open	open	open
BB-39	Widow Cove	open	closed	open	open	open
BB-40	Onset Bay	open	closed	open	open	open
BB-41	Sunset Cove	open	closed	open	open	open
BB-42	East River System	open	closed	open	open	open
BB-43	Fisherman Cove	open	closed	open	open	open
BB-44	Buttermilk Bay	open	closed	open	open	open
BB-46	Phinneys Harbor	open	closed	open	open	open
BB-47	Back River/Eel Pond	open	closed	open	open	open
BB-48	Pocasset River	open	closed	open	open	open
BB-49	Pocasset And Red Brook Harbors	open	closed	open	open	open
BB-50	Megansett Harbor	open	closed	open*	open*	open**
BB-51	North Falmouth Outer Harbor	closed	closed	open	open	open
BB-52	Wild Harbor/ Wild Harbor River	closed	closed	closed	open	open
BB-53	Herring Brook	closed	closed	open	open	open
BB-54	West Falmouth Harbor	closed	closed	open	open	open
BB-55	Falmouth West Coastal	closed	closed	open	open	open
BB-56	Great Sippiwisset Marsh	closed	closed	open	open	open
BB-57	Little Sippiwisset Marsh	closed	closed	open	open	open
BB-58	Quissett Harbor	closed	closed	open	open	open
E-1	Naushon Island West Coastal	closed	closed	open*	open*	open*
E-2	Hadleys Harbor	closed	closed	open	open	open
E-3	Northwest Gutter	closed	closed	open	open	open
E-4	Gosnold West Coastal	closed	closed	open*	open*	open**
E-10	Westend Pond	closed	closed	open	open	open

\*A portion of this area was re-opened as defined in the May 21, October 13 and November 10, 2003 re-opening notices; however, some portion still remains closed.

\*\*An additional portion of this area was re-opened defined in the November 10, 2003 re-opening notice; however, some portion still remains closed.

**TABLE 7  
WATER COLUMN ANALYTICAL RESULTS  
BARGE B120 SPILL  
BUZZARDS BAY, MASSACHUSETTS**

ANALYTE	SWAP-1: Near inlet of Allen's Pond					SWBJP-1: North end of Barney's Joy Point					NOAA SQUIRT
	4/29/2003	4/30/2003	5/1/2003	5/5/2003	5/12/2003	4/29/2003	4/30/2003	5/1/2003	5/5/2003	5/12/2003	Marine Surface Water Quality
Sampling Date:	4/29/2003	4/30/2003	5/1/2003	5/5/2003	5/12/2003	4/29/2003	4/30/2003	5/1/2003	5/5/2003	5/12/2003	Criteria Maximum Concentration
Napthalene	ND (<0.0094) U	<b>0.012</b>	ND (<0.0095) U	<b>0.011</b>	ND (<0.013) U	<b>0.085</b>	ND (<0.0097) U	ND (<0.01) U	ND (<0.011) U	ND (<0.014) U	<b>2,350</b>
Methylnapthalene, 2-	<b>0.019</b>	<b>0.030</b>	<b>0.022</b>	<b>0.024</b>	<b>0.021</b>	<b>0.28</b>	<b>0.019</b>	<b>0.025</b>	<b>0.025</b>	ND (<0.014) U	<b>300</b>
Acenaphthylene	ND (<0.0094) U	ND (<0.0094) U	ND (<0.0095) U	ND (<0.011) U	ND (<0.013) U	ND (<0.0093) U	ND (<0.0097) U	ND (<0.01) U	ND (<0.011) U	ND (<0.014) U	<b>300</b>
Acenaphthene	ND (<0.0094) U	ND (<0.0094) U	ND (<0.0095) U	ND (<0.011) U	ND (<0.013) U	<b>0.020</b>	ND (<0.0097) U	ND (<0.01) U	ND (<0.011) U	ND (<0.014) U	<b>970</b>
Fluorene	ND (<0.0094) U	ND (<0.0094) U	ND (<0.0095) U	ND (<0.011) U	ND (<0.013) U	<b>0.024</b>	ND (<0.0097) U	ND (<0.01) U	ND (<0.011) U	ND (<0.014) U	<b>300</b>
Phenanthrene	ND (<0.0094) U	<b>0.012</b>	<b>0.012</b>	ND (<0.011) U	ND (<0.013) U	<b>0.076</b>	ND (<0.0097) U	<b>0.014</b>	<b>0.014</b>	ND (<0.014) U	<b>7.7</b>
Anthracene	ND (<0.0094) U	ND (<0.0094) U	ND (<0.0095) U	ND (<0.011) U	ND (<0.013) U	ND (<0.0093) U	ND (<0.0097) U	ND (<0.01) U	ND (<0.011) U	ND (<0.014) U	<b>300</b>
Fluoranthene	ND (<0.0094) U	ND (<0.0094) U	ND (<0.0095) U	ND (<0.011) U	ND (<0.013) U	ND (<0.0093) U	ND (<0.0097) U	ND (<0.01) U	ND (<0.011) U	ND (<0.014) U	<b>40</b>
Pyrene	ND (<0.0094) U	ND (<0.0094) U	ND (<0.0095) U	ND (<0.011) U	ND (<0.013) U	<b>0.024</b>	ND (<0.0097) U	ND (<0.01) U	ND (<0.011) U	ND (<0.014) U	<b>300</b>
Benzo[a]anthracene	ND (<0.0094) U	ND (<0.0094) U	ND (<0.0095) U	ND (<0.011) U	ND (<0.013) U	<b>0.010</b>	ND (<0.0097) U	ND (<0.01) U	ND (<0.011) U	ND (<0.014) U	<b>300</b>
Chrysene	ND (<0.0094) U	ND (<0.0094) U	ND (<0.0095) U	ND (<0.011) U	<b>0.026</b>	<b>0.030</b>	ND (<0.0097) U	ND (<0.01) U	ND (<0.011) U	ND (<0.014) U	<b>300</b>
Benzo[b]fluoranthene	ND (<0.0094) U	ND (<0.0094) U	ND (<0.0095) U	ND (<0.011) U	<b>0.033</b>	ND (<0.0093) U	ND (<0.0097) U	ND (<0.01) U	ND (<0.011) U	ND (<0.014) U	<b>300</b>
Benzo[k]fluoranthene	ND (<0.0094) U	ND (<0.0094) U	ND (<0.0095) U	ND (<0.011) U	ND (<0.013) U	ND (<0.0093) U	ND (<0.0097) U	ND (<0.01) U	ND (<0.011) U	ND (<0.014) U	<b>300</b>
Benzo[a]pyrene	ND (<0.0094) U	ND (<0.0094) U	ND (<0.0095) U	ND (<0.011) U	ND (<0.013) U	ND (<0.0093) U	ND (<0.0097) U	ND (<0.01) U	ND (<0.011) U	ND (<0.014) U	<b>300</b>
Indeno[1,2,3-cd]pyrene	ND (<0.0094) U	ND (<0.0094) U	ND (<0.0095) U	ND (<0.011) U	ND (<0.013) U	ND (<0.0093) U	ND (<0.0097) U	ND (<0.01) U	ND (<0.011) U	ND (<0.014) U	<b>300</b>
Dibenzo[a,h]anthracene	ND (<0.0094) U	ND (<0.0094) U	ND (<0.0095) U	ND (<0.011) U	ND (<0.013) U	ND (<0.0093) U	ND (<0.0097) U	ND (<0.01) U	ND (<0.011) U	ND (<0.014) U	<b>300</b>
Benzo[g,h,i]perylene	ND (<0.0094) U	ND (<0.0094) U	ND (<0.0095) U	ND (<0.011) U	ND (<0.013) U	ND (<0.0093) U	ND (<0.0097) U	ND (<0.01) U	ND (<0.011) U	ND (<0.014) U	<b>300</b>
Other PAH	<b>0.078</b>	<b>0.126</b>	<b>0.116</b>	<b>0.175</b>	<b>0.160</b>	<b>2.151</b>	<b>0.067</b>	<b>0.121</b>	<b>0.131</b>	<b>0.015</b>	NA
Total PAH	<b>0.097</b>	<b>0.180</b>	<b>0.150</b>	<b>0.210</b>	<b>0.240</b>	<b>2.700</b>	<b>0.086</b>	<b>0.160</b>	<b>0.170</b>	<b>0.015</b>	<b>300</b>

Notes:

1. All concentrations in ug/l (equivalent to parts per billion).
2. C1-Napthalene reported value was used as a substitute for 2-Methylnapthalene.
3. ND( ) = constituent not detected at practical quantitation limit noted in parentheses.

Notes from lab's validation report:

4. Samples with undetected PAHs can be considered as undetected ("U" qualifier) above the reporting method detection limit.
5. Concentrations with positive results below target reporting method detection limit can be considered as estimated ("J" qualifier).
6. "Other PAH" is the sum of other PAH (excluding those listed above) detected in the laboratory analysis.
7. "Total PAH" is the sum of all PAH detected in the laboratory analysis.



**TABLE 7  
WATER COLUMN ANALYTICAL RESULTS  
BARGE B120 SPILL  
BUZZARDS BAY, MASSACHUSETTS**

ANALYTE	SWCC-1: Near Entrance of Clark's Cove					SWWP-1: Southwest of Wilbur's Point					NOAA SQUIRT
	4/29/2003	4/30/2003	5/1/2003	5/5/2003	5/12/2003	4/29/2003	4/30/2003	5/1/2003	5/5/2003	5/12/2003	Marine Surface Water Quality
Sampling Date:	4/29/2003	4/30/2003	5/1/2003	5/5/2003	5/12/2003	4/29/2003	4/30/2003	5/1/2003	5/5/2003	5/12/2003	Criteria Maximum Concentration
Napthalene	ND (<0.0089) U	ND (<0.0092) U	ND (<0.011) U	ND (<0.01) U	ND (<0.014) U	<b>0.018</b>	ND (<0.011) U	ND (<0.01) U	<b>0.013</b>	ND (<0.013) U	<b>2,350</b>
Methylnapthalene, 2-	ND (<0.0089) U	ND (<0.0092) U	ND (<0.011) U	<b>0.011</b>	ND (<0.014) U	ND (<0.0093) U	ND (<0.011) U	<b>0.011</b>	<b>0.015</b>	ND (<0.013) U	<b>300</b>
Acenaphthylene	ND (<0.0089) U	ND (<0.0092) U	ND (<0.011) U	ND (<0.01) U	ND (<0.014) U	ND (<0.0093) U	ND (<0.011) U	ND (<0.01) U	ND (<0.0099) U	ND (<0.013) U	<b>300</b>
Acenaphthene	ND (<0.0089) U	ND (<0.0092) U	ND (<0.011) U	ND (<0.01) U	ND (<0.014) U	ND (<0.0093) U	ND (<0.011) U	ND (<0.01) U	ND (<0.0099) U	ND (<0.013) U	<b>970</b>
Fluorene	ND (<0.0089) U	ND (<0.0092) U	ND (<0.011) U	ND (<0.01) U	ND (<0.014) U	ND (<0.0093) U	ND (<0.011) U	ND (<0.01) U	ND (<0.0099) U	ND (<0.013) U	<b>300</b>
Phenanthrene	ND (<0.0089) U	ND (<0.0092) U	ND (<0.011) U	ND (<0.01) U	ND (<0.014) U	<b>0.010</b>	ND (<0.011) U	<b>0.014</b>	<b>0.011</b>	ND (<0.013) U	<b>7.7</b>
Anthracene	ND (<0.0089) U	ND (<0.0092) U	ND (<0.011) U	ND (<0.01) U	ND (<0.014) U	ND (<0.0093) U	ND (<0.011) U	ND (<0.01) U	ND (<0.0099) U	ND (<0.013) U	<b>300</b>
Fluoranthene	ND (<0.0089) U	ND (<0.0092) U	ND (<0.011) U	ND (<0.01) U	ND (<0.014) U	ND (<0.0093) U	ND (<0.011) U	ND (<0.01) U	ND (<0.0099) U	ND (<0.013) U	<b>40</b>
Pyrene	ND (<0.0089) U	ND (<0.0092) U	ND (<0.011) U	ND (<0.01) U	ND (<0.014) U	ND (<0.0093) U	ND (<0.011) U	ND (<0.01) U	ND (<0.0099) U	ND (<0.013) U	<b>300</b>
Benzo[a]anthracene	ND (<0.0089) U	ND (<0.0092) U	ND (<0.011) U	ND (<0.01) U	ND (<0.014) U	ND (<0.0093) U	ND (<0.011) U	ND (<0.01) U	ND (<0.0099) U	ND (<0.013) U	<b>300</b>
Chrysene	ND (<0.0089) U	ND (<0.0092) U	ND (<0.011) U	ND (<0.01) U	ND (<0.014) U	ND (<0.0093) U	ND (<0.011) U	ND (<0.01) U	ND (<0.0099) U	ND (<0.013) U	<b>300</b>
Benzo[b]fluoranthene	ND (<0.0089) U	ND (<0.0092) U	ND (<0.011) U	ND (<0.01) U	ND (<0.014) U	ND (<0.0093) U	ND (<0.011) U	ND (<0.01) U	ND (<0.0099) U	ND (<0.013) U	<b>300</b>
Benzo[k]fluoranthene	ND (<0.0089) U	ND (<0.0092) U	ND (<0.011) U	ND (<0.01) U	ND (<0.014) U	ND (<0.0093) U	ND (<0.011) U	ND (<0.01) U	ND (<0.0099) U	ND (<0.013) U	<b>300</b>
Benzo[a]pyrene	ND (<0.0089) U	ND (<0.0092) U	ND (<0.011) U	ND (<0.01) U	ND (<0.014) U	ND (<0.0093) U	ND (<0.011) U	ND (<0.01) U	ND (<0.0099) U	ND (<0.013) U	<b>300</b>
Indeno[1,2,3-cd]pyrene	ND (<0.0089) U	ND (<0.0092) U	ND (<0.011) U	ND (<0.01) U	ND (<0.014) U	<b>0.011</b>	ND (<0.011) U	ND (<0.01) U	ND (<0.0099) U	ND (<0.013) U	<b>300</b>
Dibenzo[a,h]anthracene	ND (<0.0089) U	ND (<0.0092) U	ND (<0.011) U	ND (<0.01) U	ND (<0.014) U	ND (<0.0093) U	ND (<0.011) U	ND (<0.01) U	ND (<0.0099) U	ND (<0.013) U	<b>300</b>
Benzo[g,h,i]perylene	ND (<0.0089) U	ND (<0.0092) U	ND (<0.011) U	ND (<0.01) U	ND (<0.014) U	ND (<0.0093) U	ND (<0.011) U	ND (<0.01) U	ND (<0.0099) U	ND (<0.013) U	<b>300</b>
Other PAH	<b>0.009</b>	<b>0.011</b>	ND	<b>0.012</b>	ND	<b>0.071</b>	<b>0.014</b>	<b>0.435</b>	<b>0.061</b>	<b>0.028</b>	NA
Total PAH	<b>0.009</b>	<b>0.011</b>	ND	<b>0.023</b>	ND	<b>0.110</b>	<b>0.014</b>	<b>0.460</b>	<b>0.1</b>	<b>0.028</b>	<b>300</b>

Notes:

1. All concentrations in ug/l (equivalent to parts per billion).
2. C1-Napthalene reported value was used as a substitute for 2-Methylnapthalene.
3. ND( ) = constituent not detected at practical quantitation limit noted in parentheses.

Notes from lab's validation report:

4. Samples with undetected PAHs can be considered as undetected ("U" qualifier) above the reporting method detection limit.
5. Concentrations with positive results below target reporting method detection limit can be considered as estimated ("J" qualifier).
6. "Other PAH" is the sum of other PAH (excluding those listed above) detected in the laboratory analysis.
7. "Total PAH" is the sum of all PAH detected in the laboratory analysis.

**TABLE 7  
WATER COLUMN ANALYTICAL RESULTS  
BARGE B120 SPILL  
BUZZARDS BAY, MASSACHUSETTS**

ANALYTE	SWWI-1: One and a Half Miles South of West Island					SWWI-2: North of West Island					NOAA SQUIRT
	4/29/2003	4/30/2003	5/1/2003	5/5/2003	5/12/2003	4/29/2003	4/30/2003	5/1/2003	5/5/2003	5/12/2003	Marine Surface Water Quality
Sampling Date:	4/29/2003	4/30/2003	5/1/2003	5/5/2003	5/12/2003	4/29/2003	4/30/2003	5/1/2003	5/5/2003	5/12/2003	Criteria Maximum Concentration
Napthalene	ND (<0.0094) U	ND (<0.0094) U	ND (<0.018) U	ND (<0.01) U	ND (<0.013) U	ND (<0.0095) U	<b>0.013</b>	ND (<0.011) U	ND (<0.011) U	ND (<0.012) U	<b>2,350</b>
Methylnapthalene, 2-	<b>0.027</b>	<b>0.028</b>	<b>0.029</b>	ND (<0.01) U	ND (<0.013) U	<b>0.0097</b>	<b>0.047</b>	<b>0.024</b>	<b>0.014</b>	<b>0.014</b>	<b>300</b>
Acenaphthylene	ND (<0.0094) U	ND (<0.0094) U	ND (<0.018) U	ND (<0.01) U	ND (<0.013) U	ND (<0.0095) U	ND (<0.0092) U	ND (<0.011) U	ND (<0.011) U	ND (<0.012) U	<b>300</b>
Acenaphthene	ND (<0.0094) U	ND (<0.0094) U	ND (<0.018) U	ND (<0.01) U	ND (<0.013) U	ND (<0.0095) U	ND (<0.0092) U	ND (<0.011) U	ND (<0.011) U	ND (<0.012) U	<b>970</b>
Fluorene	ND (<0.0094) U	ND (<0.0094) U	ND (<0.018) U	ND (<0.01) U	ND (<0.013) U	ND (<0.0095) U	ND (<0.0092) U	ND (<0.011) U	ND (<0.011) U	ND (<0.012) U	<b>300</b>
Phenanthrene	<b>0.025</b>	<b>0.015</b>	<b>0.012</b>	ND (<0.01) U	ND (<0.013) U	ND (<0.0095) U	<b>0.027</b>	<b>0.016</b>	ND (<0.011) U	ND (<0.012) U	<b>7.7</b>
Anthracene	ND (<0.0094) U	ND (<0.0094) U	ND (<0.018) U	ND (<0.01) U	ND (<0.013) U	ND (<0.0095) U	ND (<0.0092) U	ND (<0.011) U	ND (<0.011) U	ND (<0.012) U	<b>300</b>
Fluoranthene	ND (<0.0094) U	ND (<0.0094) U	ND (<0.018) U	ND (<0.01) U	ND (<0.013) U	ND (<0.0095) U	ND (<0.0092) U	ND (<0.011) U	ND (<0.011) U	ND (<0.012) U	<b>40</b>
Pyrene	<b>0.014</b>	ND (<0.0094) U	ND (<0.018) U	ND (<0.01) U	ND (<0.013) U	ND (<0.0095) U	ND (<0.0092) U	ND (<0.011) U	ND (<0.011) U	ND (<0.012) U	<b>300</b>
Benzo[a]anthracene	ND (<0.0094) U	ND (<0.0094) U	ND (<0.018) U	ND (<0.01) U	ND (<0.013) U	ND (<0.0095) U	ND (<0.0092) U	ND (<0.011) U	ND (<0.011) U	ND (<0.012) U	<b>300</b>
Chrysene	<b>0.013</b>	ND (<0.0094) U	ND (<0.018) U	ND (<0.01) U	ND (<0.013) U	ND (<0.0095) U	ND (<0.0092) U	ND (<0.011) U	ND (<0.011) U	ND (<0.012) U	<b>300</b>
Benzo[b]fluoranthene	ND (<0.0094) U	ND (<0.0094) U	ND (<0.018) U	ND (<0.01) U	ND (<0.013) U	ND (<0.0095) U	ND (<0.0092) U	ND (<0.011) U	ND (<0.011) U	ND (<0.012) U	<b>300</b>
Benzo[k]fluoranthene	ND (<0.0094) U	ND (<0.0094) U	ND (<0.018) U	ND (<0.01) U	ND (<0.013) U	ND (<0.0095) U	ND (<0.0092) U	ND (<0.011) U	ND (<0.011) U	ND (<0.012) U	<b>300</b>
Benzo[a]pyrene	ND (<0.0094) U	ND (<0.0094) U	ND (<0.018) U	ND (<0.01) U	ND (<0.013) U	ND (<0.0095) U	ND (<0.0092) U	ND (<0.011) U	ND (<0.011) U	ND (<0.012) U	<b>300</b>
Indeno[1,2,3-cd]pyrene	ND (<0.0094) U	ND (<0.0094) U	ND (<0.018) U	ND (<0.01) U	ND (<0.013) U	ND (<0.0095) U	ND (<0.0092) U	ND (<0.011) U	ND (<0.011) U	ND (<0.012) U	<b>300</b>
Dibenzo[a,h]anthracene	ND (<0.0094) U	ND (<0.0094) U	ND (<0.018) U	ND (<0.01) U	ND (<0.013) U	ND (<0.0095) U	ND (<0.0092) U	ND (<0.011) U	ND (<0.011) U	ND (<0.012) U	<b>300</b>
Benzo[g,h,i]perylene	ND (<0.0094) U	ND (<0.0094) U	ND (<0.018) U	ND (<0.01) U	ND (<0.013) U	ND (<0.0095) U	ND (<0.0092) U	ND (<0.011) U	ND (<0.011) U	ND (<0.012) U	<b>300</b>
Other PAH	<b>0.771</b>	<b>0.227</b>	<b>0.079</b>	<b>0.039</b>	<b>0.014</b>	<b>0.047</b>	<b>0.553</b>	<b>0.250</b>	<b>0.065</b>	<b>0.049</b>	NA
Total PAH	<b>0.850</b>	<b>0.270</b>	<b>0.120</b>	<b>0.039</b>	<b>0.014</b>	<b>0.057</b>	<b>0.640</b>	<b>0.290</b>	<b>0.079</b>	<b>0.063</b>	<b>300</b>

Notes:

1. All concentrations in ug/l (equivalent to parts per billion).
2. C1-Napthalene reported value was used as a substitute for 2-Methylnapthalene.
3. ND( ) = constituent not detected at practical quantitation limit noted in parentheses.

Notes from lab's validation report:

4. Samples with undetected PAHs can be considered as undetected ("U" qualifier) above the reporting method detection limit.
5. Concentrations with positive results below target reporting method detection limit can be considered as estimated ("J" qualifier).
6. "Other PAH" is the sum of other PAH (excluding those listed above) detected in the laboratory analysis.
7. "Total PAH" is the sum of all PAH detected in the laboratory analysis.

**TABLE 7  
WATER COLUMN ANALYTICAL RESULTS  
BARGE B120 SPILL  
BUZZARDS BAY, MASSACHUSETTS**

ANALYTE	SWCL-1: Cleveland Ledge Lighthouse					SWCL-2: Three Mile South of Cleveland Ledge Lighthouse					NOAA SQUIRT Marine Surface Water Quality
	Sampling Date:	4/29/2003	4/30/2003	5/1/2003	5/5/2003	5/12/2003	4/29/2003	4/30/2003	5/1/2003	5/5/2003	5/12/2003
Napthalene	ND (<0.011) U	<b>0.016</b>	ND (<0.0091) U	<b>0.015</b>	ND (<0.012) U	ND (<0.0095) U	ND (<0.0094) U	ND (<0.0093) U	ND (<0.01) U	ND (<0.013) U	<b>2,350</b>
Methylnapthalene, 2-	ND (<0.011) U	<b>0.036</b>	<b>0.011</b>	ND (<0.01) U	ND (<0.012) U	ND (<0.0095) U	<b>0.015</b>	<b>0.016</b>	ND (<0.01) U	ND (<0.013) U	<b>300</b>
Acenaphthylene	ND (<0.011) U	ND (<0.0097) U	ND (<0.0091) U	ND (<0.01) U	ND (<0.012) U	ND (<0.0095) U	ND (<0.0094) U	ND (<0.0093) U	ND (<0.01) U	ND (<0.013) U	<b>300</b>
Acenaphthene	ND (<0.011) U	ND (<0.0097) U	ND (<0.0091) U	ND (<0.01) U	ND (<0.012) U	ND (<0.0095) U	ND (<0.0094) U	ND (<0.0093) U	ND (<0.01) U	ND (<0.013) U	<b>970</b>
Fluorene	ND (<0.011) U	ND (<0.0097) U	ND (<0.0091) U	ND (<0.01) U	ND (<0.012) U	ND (<0.0095) U	ND (<0.0094) U	ND (<0.0093) U	ND (<0.01) U	ND (<0.013) U	<b>300</b>
Phenanthrene	ND (<0.011) U	<b>0.020</b>	<b>0.0095</b>	ND (<0.01) U	ND (<0.012) U	<b>0.017</b>	<b>0.014</b>	<b>0.012</b>	ND (<0.01) U	ND (<0.013) U	<b>7.7</b>
Anthracene	ND (<0.011) U	ND (<0.0097) U	ND (<0.0091) U	ND (<0.01) U	ND (<0.012) U	ND (<0.0095) U	ND (<0.0094) U	ND (<0.0093) U	ND (<0.01) U	ND (<0.013) U	<b>300</b>
Fluoranthene	ND (<0.011) U	ND (<0.0097) U	ND (<0.0091) U	ND (<0.01) U	ND (<0.012) U	ND (<0.0095) U	ND (<0.0094) U	ND (<0.0093) U	ND (<0.01) U	ND (<0.013) U	<b>40</b>
Pyrene	ND (<0.011) U	ND (<0.0097) U	ND (<0.0091) U	ND (<0.01) U	ND (<0.012) U	<b>0.013</b>	ND (<0.0094) U	ND (<0.0093) U	ND (<0.01) U	ND (<0.013) U	<b>300</b>
Benzo[a]anthracene	ND (<0.011) U	ND (<0.0097) U	ND (<0.0091) U	ND (<0.01) U	ND (<0.012) U	ND (<0.0095) U	ND (<0.0094) U	ND (<0.0093) U	ND (<0.01) U	ND (<0.013) U	<b>300</b>
Chrysene	ND (<0.011) U	ND (<0.0097) U	ND (<0.0091) U	ND (<0.01) U	ND (<0.012) U	<b>0.013</b>	ND (<0.0094) U	ND (<0.0093) U	ND (<0.01) U	ND (<0.013) U	<b>300</b>
Benzo[b]fluoranthene	ND (<0.011) U	ND (<0.0097) U	ND (<0.0091) U	ND (<0.01) U	ND (<0.012) U	ND (<0.0095) U	ND (<0.0094) U	ND (<0.0093) U	ND (<0.01) U	ND (<0.013) U	<b>300</b>
Benzo[k]fluoranthene	ND (<0.011) U	ND (<0.0097) U	ND (<0.0091) U	ND (<0.01) U	ND (<0.012) U	ND (<0.0095) U	ND (<0.0094) U	ND (<0.0093) U	ND (<0.01) U	ND (<0.013) U	<b>300</b>
Benzo[a]pyrene	ND (<0.011) U	ND (<0.0097) U	ND (<0.0091) U	ND (<0.01) U	ND (<0.012) U	ND (<0.0095) U	ND (<0.0094) U	ND (<0.0093) U	ND (<0.01) U	ND (<0.013) U	<b>300</b>
Indeno[1,2,3-cd]pyrene	ND (<0.011) U	ND (<0.0097) U	ND (<0.0091) U	ND (<0.01) U	ND (<0.012) U	ND (<0.0095) U	ND (<0.0094) U	ND (<0.0093) U	ND (<0.01) U	ND (<0.013) U	<b>300</b>
Dibenzo[a,h]anthracene	ND (<0.011) U	ND (<0.0097) U	ND (<0.0091) U	ND (<0.01) U	ND (<0.012) U	ND (<0.0095) U	ND (<0.0094) U	ND (<0.0093) U	ND (<0.01) U	ND (<0.013) U	<b>300</b>
Benzo[g,h,i]perylene	ND (<0.011) U	ND (<0.0097) U	ND (<0.0091) U	ND (<0.01) U	ND (<0.012) U	ND (<0.0095) U	ND (<0.0094) U	ND (<0.0093) U	ND (<0.01) U	ND (<0.013) U	<b>300</b>
Other PAH	ND	<b>0.378</b>	<b>0.060</b>	<b>0.065</b>	ND	<b>0.667</b>	<b>0.131</b>	<b>0.102</b>	<b>0.130</b>	ND	<b>NA</b>
Total PAH	ND	<b>0.450</b>	<b>0.080</b>	<b>0.080</b>	ND	<b>0.710</b>	<b>0.160</b>	<b>0.130</b>	<b>0.130</b>	ND	<b>300</b>

Notes:

1. All concentrations in ug/l (equivalent to parts per billion).
2. C1-Napthalene reported value was used as a substitute for 2-Methylnapthalene.
3. ND( ) = constituent not detected at practical quantitation limit noted in parentheses.

Notes from lab's validation report:

4. Samples with undetected PAHs can be considered as undetected ("U" qualifier) above the reporting method detection limit.
5. Concentrations with positive results below target reporting method detection limit can be considered as estimated ("J" qualifier).
6. "Other PAH" is the sum of other PAH (excluding those listed above) detected in the laboratory analysis.
7. "Total PAH" is the sum of all PAH detected in the laboratory analysis.

**TABLE 7**  
**WATER COLUMN ANALYTICAL RESULTS**  
**BARGE B120 SPILL**  
**BUZZARDS BAY, MASSACHUSETTS**

ANALYTE	SWPI-1: Just North of Penikese Island				SWQH-1: Quicks Hole				NOAA SQUIRT
	Sampling Date:	4/30/2003	5/1/2003	5/5/2003	5/12/2003	4/30/2003	5/1/2003	5/5/2003	5/12/2003
Napthalene	ND (<0.0096) U	ND (<0.0096) U	ND (<0.01) U	ND (<0.014) U	ND (<0.0093) U	ND (<0.011) U	ND (<0.011) U	ND (<0.013) U	2,350
Methylnapthalene, 2-	0.017	ND (<0.0096) U	ND (<0.01) U	ND (<0.014) U	0.0093	ND (<0.011) U	ND (<0.011) U	ND (<0.013) U	300
Acenaphthylene	ND (<0.0096) U	ND (<0.0096) U	ND (<0.01) U	ND (<0.014) U	ND (<0.0093) U	ND (<0.011) U	ND (<0.011) U	ND (<0.013) U	300
Acenaphthene	ND (<0.0096) U	ND (<0.0096) U	ND (<0.01) U	ND (<0.014) U	ND (<0.0093) U	ND (<0.011) U	ND (<0.011) U	ND (<0.013) U	970
Fluorene	ND (<0.0096) U	ND (<0.0096) U	ND (<0.01) U	ND (<0.014) U	ND (<0.0093) U	ND (<0.011) U	ND (<0.011) U	ND (<0.013) U	300
Phenanthrene	0.014	ND (<0.0096) U	ND (<0.01) U	ND (<0.014) U	ND (<0.0093) U	ND (<0.011) U	ND (<0.011) U	ND (<0.013) U	7.7
Anthracene	ND (<0.0096) U	ND (<0.0096) U	ND (<0.01) U	ND (<0.014) U	ND (<0.0093) U	ND (<0.011) U	ND (<0.011) U	ND (<0.013) U	300
Fluoranthene	ND (<0.0096) U	ND (<0.0096) U	ND (<0.01) U	ND (<0.014) U	ND (<0.0093) U	ND (<0.011) U	ND (<0.011) U	ND (<0.013) U	40
Pyrene	ND (<0.0096) U	ND (<0.0096) U	ND (<0.01) U	ND (<0.014) U	ND (<0.0093) U	ND (<0.011) U	ND (<0.011) U	ND (<0.013) U	300
Benzo[a]anthracene	ND (<0.0096) U	ND (<0.0096) U	ND (<0.01) U	ND (<0.014) U	ND (<0.0093) U	ND (<0.011) U	ND (<0.011) U	ND (<0.013) U	300
Chrysene	ND (<0.0096) U	ND (<0.0096) U	ND (<0.01) U	ND (<0.014) U	ND (<0.0093) U	ND (<0.011) U	ND (<0.011) U	0.023	300
Benzo[b]fluoranthene	ND (<0.0096) U	ND (<0.0096) U	ND (<0.01) U	ND (<0.014) U	ND (<0.0093) U	ND (<0.011) U	ND (<0.011) U	0.014	300
Benzo[k]fluoranthene	ND (<0.0096) U	ND (<0.0096) U	ND (<0.01) U	ND (<0.014) U	ND (<0.0093) U	ND (<0.011) U	ND (<0.011) U	0.021	300
Benzo[a]pyrene	ND (<0.0096) U	ND (<0.0096) U	ND (<0.01) U	ND (<0.014) U	ND (<0.0093) U	ND (<0.011) U	ND (<0.011) U	0.016	300
Indeno[1,2,3-cd]pyrene	ND (<0.0096) U	ND (<0.0096) U	ND (<0.01) U	ND (<0.014) U	ND (<0.0093) U	ND (<0.011) U	ND (<0.011) U	ND (<0.013) U	300
Dibenzo[a,h]anthracene	ND (<0.0096) U	ND (<0.0096) U	ND (<0.01) U	ND (<0.014) U	ND (<0.0093) U	ND (<0.011) U	ND (<0.011) U	0.021	300
Benzo[g,h,i]perylene	ND (<0.0096) U	ND (<0.0096) U	ND (<0.01) U	ND (<0.014) U	ND (<0.0093) U	ND (<0.011) U	ND (<0.011) U	0.017	300
Other PAH	0.119	0.024	0.024	ND	0.015	ND	ND	0.018	NA
Total PAH	0.150	0.024	0.024	ND	0.024	ND	ND	0.130	300

Notes:

1. All concentrations in ug/l (equivalent to parts per billion).
2. C1-Napthalene reported value was used as a substitute for 2-Methylnapthalene.
3. ND( ) = constituent not detected at practical quantitation limit noted in parentheses.

Notes from lab's validation report:

4. Samples with undetected PAHs can be considered as undetected ("U" qualifier) above the reporting method detection limit.
5. Concentrations with positive results below target reporting method detection limit can be considered as estimated ("J" qualifier).
6. "Other PAH" is the sum of other PAH (excluding those listed above) detected in the laboratory analysis.
7. "Total PAH" is the sum of all PAH detected in the laboratory analysis.

**TABLE 7  
WATER COLUMN ANALYTICAL RESULTS  
BARGE B120 SPILL  
BUZZARDS BAY, MASSACHUSETTS**

ANALYTE	SWCH-1: Cuttyhunk Island				DUP-1	NOAA SQUIRT
	Sampling Date:	4/30/2003	5/1/2003	5/5/2003		5/12/2003
Napthalene	ND (<0.01) U	ND (<0.0091) U	ND (<0.01) U	ND (<0.013) U	<b>0.010</b>	<b>2,350</b>
Methylnapthalene, 2-	ND (<0.01) U	ND (<0.0091) U	ND (<0.01) U	ND (<0.013) U	<b>0.039</b>	<b>300</b>
Acenaphthylene	ND (<0.01) U	ND (<0.0091) U	ND (<0.01) U	ND (<0.013) U	ND (<0.0088) U	<b>300</b>
Acenaphthene	ND (<0.01) U	ND (<0.0091) U	ND (<0.01) U	ND (<0.013) U	ND (<0.0088) U	<b>970</b>
Fluorene	ND (<0.01) U	ND (<0.0091) U	ND (<0.01) U	ND (<0.013) U	ND (<0.0088) U	<b>300</b>
Phenanthrene	<b>0.011</b>	ND (<0.0091) U	ND (<0.01) U	ND (<0.013) U	<b>0.017</b>	<b>7.7</b>
Anthracene	ND (<0.01) U	ND (<0.0091) U	ND (<0.01) U	ND (<0.013) U	ND (<0.0088) U	<b>300</b>
Fluoranthene	<b>0.014</b>	ND (<0.0091) U	ND (<0.01) U	ND (<0.013) U	ND (<0.0088) U	<b>40</b>
Pyrene	<b>0.047</b>	ND (<0.0091) U	ND (<0.01) U	ND (<0.013) U	ND (<0.0088) U	<b>300</b>
Benzo[a]anthracene	ND (<0.01) U	ND (<0.0091) U	ND (<0.01) U	ND (<0.013) U	ND (<0.0088) U	<b>300</b>
Chrysene	ND (<0.01) U	ND (<0.0091) U	ND (<0.01) U	ND (<0.013) U	ND (<0.0088) U	<b>300</b>
Benzo[b]fluoranthene	ND (<0.01) U	ND (<0.0091) U	ND (<0.01) U	ND (<0.013) U	ND (<0.0088) U	<b>300</b>
Benzo[k]fluoranthene	ND (<0.01) U	ND (<0.0091) U	ND (<0.01) U	ND (<0.013) U	ND (<0.0088) U	<b>300</b>
Benzo[a]pyrene	ND (<0.01) U	ND (<0.0091) U	ND (<0.01) U	ND (<0.013) U	ND (<0.0088) U	<b>300</b>
Indeno[1,2,3-cd]pyrene	ND (<0.01) U	ND (<0.0091) U	ND (<0.01) U	ND (<0.013) U	ND (<0.0088) U	<b>300</b>
Dibenzo[a,h]anthracene	ND (<0.01) U	ND (<0.0091) U	ND (<0.01) U	ND (<0.013) U	ND (<0.0088) U	<b>300</b>
Benzo[g,h,i]perylene	ND (<0.01) U	ND (<0.0091) U	ND (<0.01) U	ND (<0.013) U	ND (<0.0088) U	<b>300</b>
Other PAH	<b>0.000</b>	ND	ND	ND	<b>0.314</b>	<b>NA</b>
Total PAH	<b>0.072</b>	ND	ND	ND	<b>0.380</b>	<b>300</b>

Notes:

1. All concentrations in ug/l (equivalent to parts per billion).
2. C1-Napthalene reported value was used as a substitute for 2-Methylnapthalene.
3. ND( ) = constituent not detected at practical quantitation limit noted in parentheses.

Notes from lab's validation report:

4. Samples with undetected PAHs can be considered as undetected ("U" qualifier) above the reporting method detection limit.
5. Concentrations with positive results below target reporting method detection limit can be considered as estimated ("J" qualifier).
6. "Other PAH" is the sum of other PAH (excluding those listed above) detected in the laboratory analysis.
7. "Total PAH" is the sum of all PAH detected in the laboratory analysis.

**TABLE 8**  
**SUBTIDAL SEDIMENT ANALYTICAL RESULTS**  
**BARGE B120 SPILL**  
**BUZZARDS BAY, MASSACHUSETTS**

ANALYTE	WH-Sed-S 05/13/03	BJP-Sed-S 05/13/03	WI-Sed-S 05/13/03	WMN-Sed-S 05/13/03	WN-Sed-S 05/13/03	MCP Method 1 Soil Standards (ppm)			NOAA SQUIRT Effects Range-Low (ERL) (ppm)
						S-1 / GW-1	S-1 / GW-2	S-1 / GW-3	
Napthalene	<b>0.0011</b>	<b>0.0016</b>	<b>0.0016</b>	<b>0.002</b>	<b>0.003</b>	4	100	100	0.16
Methylnapthalene, 2-	<b>0.0002 J</b>	<b>0.0006</b>	<b>0.0006</b>	<b>0.0008</b>	<b>0.0013</b>	4	500	500	0.07
Acenaphthylene	ND(0.0002) U	<b>0.0011</b>	<b>0.0007</b>	<b>0.0007</b>	<b>0.0034</b>	100	100	100	0.044
Acenaphthene	ND(0.0001) U	<b>0.0003</b>	<b>0.0002</b>	<b>0.0003</b>	<b>0.0008</b>	20	1,000	1,000	0.016
Fluorene	<b>0.0001 J</b>	<b>0.0005</b>	<b>0.0002</b>	<b>0.0004</b>	<b>0.0018</b>	400	1,000	1,000	0.019
Phenanthrene	<b>0.0003</b>	<b>0.0044</b>	<b>0.0016</b>	<b>0.0024</b>	<b>0.0232</b>	700	1,000	100	0.24
Anthracene	<b>0.0001 J</b>	<b>0.0011</b>	<b>0.0006</b>	<b>0.0008</b>	<b>0.006</b>	1,000	1,000	1,000	0.0853
Fluoranthene	<b>0.0003</b>	<b>0.0074</b>	<b>0.0026</b>	<b>0.0043</b>	<b>0.0168</b>	1,000	1,000	1,000	0.6
Pyrene	<b>0.0004</b>	<b>0.0069</b>	<b>0.0034</b>	<b>0.0042</b>	<b>0.0456</b>	700	700	700	0.665
Benzo[a]anthracene	<b>0.0002</b>	<b>0.0038</b>	<b>0.0019</b>	<b>0.0023</b>	<b>0.0195</b>	0.7	0.7	0.7	0.261
Chrysene	<b>0.0005</b>	<b>0.0062</b>	<b>0.003</b>	<b>0.0037</b>	<b>0.0243</b>	7	7	7	0.384
Benzo[b]fluoranthene	<b>0.0003</b>	<b>0.0056</b>	<b>0.0026</b>	<b>0.0043</b>	<b>0.0199</b>	0.7	0.7	0.7	NE
Benzo[k]fluoranthene	<b>0.0001 J</b>	<b>0.0031</b>	<b>0.0012</b>	<b>0.002</b>	<b>0.0102</b>	7	7	7	NE
Benzo[a]pyrene	<b>0.0002 J</b>	<b>0.005</b>	<b>0.0022</b>	<b>0.003</b>	<b>0.0153</b>	0.7	0.7	0.7	0.43
Indeno[1,2,3-cd]pyrene	<b>0.0002 J</b>	<b>0.0048</b>	<b>0.002</b>	<b>0.0038</b>	<b>0.0153</b>	0.7	0.7	0.7	NE
Dibenz[a,h]anthracene	<b>0.0001 J</b>	<b>0.0012</b>	<b>0.0003</b>	<b>0.0005</b>	<b>0.0028</b>	0.7	0.7	0.7	0.0634
Benzo[g,h,i]perylene	<b>0.0003</b>	<b>0.004</b>	<b>0.002</b>	<b>0.0032</b>	<b>0.0122</b>	1,000	1,000	1,000	NE
Other PAH	<b>0.011</b>	<b>0.0693</b>	<b>0.0483</b>	<b>0.0448</b>	<b>0.1246</b>	N/A	N/A	N/A	N/A
Total PAH	<b>0.0144</b>	<b>0.1269</b>	<b>0.075</b>	<b>0.0835</b>	<b>0.346</b>	N/A	N/A	N/A	4.022

Notes:

1. Numbers in highlight exceed an applicable criteria.
2. All concentrations in mg/Kg (equivalent to parts per million).
3. ND( ) = constituent not detected at practical quantitation limit noted in parentheses.
4. NE = ERL not established for this compound.
5. C1-Napthalene reported value was used as a substitute for 2-Methylnapthalene.

Notes from lab's validation reports:

6. Samples with undetected PAHs can be considered as undetected ("U" qualifier) above the reporting method detection limit.
7. Concentrations with positive results below target reporting method detection limit can be considered as estimated ("J" qualifier).

WR = Wareham River -  
AP = Sippecan Harbor -  
PP = East Mattapoisett -  
BI = Brandt Island  
PB = Sconticut Neck -  
WI = West Island - West  
BJ = Barney's Joy  
SB = Salters Beach (Salters Point - Dartmouth)  
RISS = South Shore Beach, Rhode Island  
RIWP = Warren's Point, Rhode Island  
WN = North Side of Wings Neck - Reference Site

**TABLE 9**  
**INTERTIDAL SEDIMENT SAMPLING ANALYTICAL RESULTS**  
**BARGE B120 SPILL**  
**BUZZARDS BAY, MASSACHUSETTS**

ANALYTE	WR-SED-UI-01 05/07/03	WR-SED-LI-01 05/07/03	AP-SED-UI-01 05/07/03	AP-SED-LI-01 05/07/03	PP-SED-UI-01 05/07/03	PP-SED-LI-01 05/07/03	BI-SED-UI-01 05/07/03	MCP Method 1 Soil Standards (ppm)			NOAA SQUIRT Effects Range-Low (ERL) (ppm)
								S-1 / GW-1	S-1 / GW-2	S-1 / GW-3	
Napthalene	0.0006	0.0021	0.0056	0.0015	0.0012	0.0014	0.0005	4	100	100	0.16
Methylnapthalene, 2-	0.0005	0.0003 J	0.0014	0.0006	0.0005	0.0004	0.0007	4	500	500	0.07
Acenaphthylene	0.0016	0.0004	0.0022	0.0011	0.0006	0.0007	0.0002	100	100	100	0.044
Acenaphthene	0.0003	0.0002	0.0007	0.0004	0.0004	0.0004	0.0002	20	1,000	1,000	0.016
Fluorene	0.0004	0.0004	0.0015	0.0011	0.0005	0.0007	0.0005	400	1,000	1,000	0.019
Phenanthrene	0.0055	0.0018	0.0215	0.0063	0.0047	0.004	0.0072	700	1,000	100	0.24
Anthracene	0.0019	0.0006	0.0038	0.0016	0.0011	0.0042	0.0014	1,000	1,000	1,000	0.0853
Fluoranthene	0.0105	0.0032	0.0225	0.0092	0.0068	0.0078	0.0065	1,000	1,000	1,000	0.6
Pyrene	0.0107	0.0029	0.0352	0.0115	0.0077	0.0085	0.0247	700	700	700	0.665
Benzo[a]anthracene	0.0049	0.0011	0.0132	0.0057	0.0034	0.004	0.0321	0.7	0.7	0.7	0.261
Chrysene	0.0068	0.0017	0.0273	0.0102	0.0075	0.0061	0.0742	7	7	7	0.384
Benzo[b]fluoranthene	0.0053	0.0017	0.0153	0.007	0.0047	0.0036	0.0109	0.7	0.7	0.7	NE
Benzo[k]fluoranthene	0.0037	0.0011	0.0094	0.0044	0.0028	0.0021	0.0038	7	7	7	NE
Benzo[a]pyrene	0.0051	0.0013	0.015	0.0065	0.0035	0.0031	0.0222	0.7	0.7	0.7	0.43
Indeno[1,2,3-cd]pyrene	0.0054	0.0017	0.015	0.007	0.0036	0.0028	0.004	0.7	0.7	0.7	NE
Dibenz[a,h]anthracene	0.0008	0.0002	0.0027	0.0013	0.0006	0.0006	0.0039	0.7	0.7	0.7	0.0634
Benzo[g,h,i]perylene	0.0039	0.0013	0.0112	0.0054	0.0026	0.0022	0.0072	1,000	1,000	1,000	NE
Other PAH	0.0481	0.0124	0.7765	0.2852	0.1368	0.1634	2.4568	N/A	N/A	N/A	N/A
Total PAH	0.116	0.0341	0.980	0.366	0.189	0.216	2.657	N/A	N/A	N/A	4.022

Notes:

1. Numbers in highlight exceed an applicable criteria.
  2. All concentrations in mg/Kg (equivalent to parts per million).
  3. ND( ) = constituent not detected at practical quantitation limit noted in parentheses.
  4. NE = ERL not established for this compound.
  5. C1-Napthalene reported value was used as a substitute for 2-Methylnapthalene.
- Notes from lab's validation reports:
6. Samples with undetected PAHs can be considered as undetected ("U" qualifier) above the reporting method detection limit.
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WR = Wareham River - Narrows Bridge (SE Corner)  
AP = Sippecan Harbor - Allens Point  
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**TABLE 9**  
**INTERTIDAL SEDIMENT SAMPLING ANALYTICAL RESULTS**  
**BARGE B120 SPILL**  
**BUZZARDS BAY, MASSACHUSETTS**

ANALYTE	BI-SED-LI-01 05/07/03	PB-SED-UI-01 05/08/03	PB-SED-LI-01 05/08/03	WI-SED-UI-01 05/08/03	WI-SED-LI-01 05/08/03	BJ-SED-UI-01 05/08/03	BJ-SED-LI-01 05/08/03	MCP Method 1 Soil Standards (ppm)			NOAA SQUIRT Effects Range-Low (ERL) (ppm)
								S-1 / GW-1	S-1 / GW-2	S-1 / GW-3	
Napthalene	0.0008	0.0331	0.0318	0.0006	0.0005	0.0004	0.0003	4	100	100	0.16
Methylnapthalene, 2-	0.0003 J	0.0143	0.0159	0.014	0.0073	0.075	0.0001 J	4	500	500	0.07
Acenaphthylene	0.0002	0.0438	0.0584	0.0038	0.0012	0.0214	ND(0.0002)	100	100	100	0.044
Acenaphthene	0.0002	0.0098	0.0298	0.0277	0.0072	0.0737	ND(0.0001)	20	1,000	1,000	0.016
Fluorene	0.0014	0.0173	0.0423	0.0755	0.0145	0.192	ND(0.0002)	400	1,000	1,000	0.019
Phenanthrene	0.0298	0.272	0.544	0.537	0.117	1.33	0.0005	700	1,000	100	0.24
Anthracene	0.0046	0.0815	0.157	0.094	0.0261	0.21	0.0001 J	1,000	1,000	1,000	0.0853
Fluoranthene	0.0064	0.526	0.882	0.121	0.0544	0.225	0.0006	1,000	1,000	1,000	0.6
Pyrene	0.0459	0.5	0.754	0.622	0.167	0.996	0.0006	700	700	700	0.665
Benzo[a]anthracene	0.0258	0.263	0.45	0.32	0.11	0.651	0.0002	0.7	0.7	0.7	0.261
Chrysene	0.0444	0.259	0.417	0.596	0.178	0.91	0.0003	7	7	7	0.384
Benzo[b]fluoranthene	0.0068	0.132	0.421	0.102	0.0358	0.154	0.0003	0.7	0.7	0.7	NE
Benzo[k]fluoranthene	0.0021	0.123	0.141	0.0287	0.0085	0.0439	0.0002 J	7	7	7	NE
Benzo[a]pyrene	0.0144	0.209	0.384	0.255	0.0602	0.397	0.0002 J	0.7	0.7	0.7	0.43
Indeno[1,2,3-cd]pyrene	0.0024	0.192	0.343	0.0346	0.0156	0.0485	0.0003	0.7	0.7	0.7	NE
Dibenz[a,h]anthracene	0.0022	0.0233	0.0562	0.0424	0.0111	0.0561	ND(0.0002)	0.7	0.7	0.7	0.0634
Benzo[g,h,i]perylene	0.0041	0.154	0.253	0.0617	0.0188	0.0879	0.0002	1,000	1,000	1,000	NE
Other PAH	2.0395	2.1629	2.3446	32.738	7.7878	60.0991	0.0019	N/A	N/A	N/A	N/A
Total PAH	2.231	5.016	7.325	35.674	8.621	65.571	0.0052	N/A	N/A	N/A	4.022

Notes:

1. Numbers in highlight exceed an applicable criteria.
2. All concentrations in mg/Kg (equivalent to parts per million).
3. ND( ) = constituent not detected at practical quantitation limit noted in parentheses.
4. NE = ERL not established for this compound.
5. C1-Napthalene reported value was used as a substitute for 2-Methylnapthalene.

Notes from lab's validation reports:

6. Samples with undetected PAHs can be considered as undetected ("U" qualifier) above the reporting method detection limit.
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WR = Wareham River - Narrows Bridge (SE Corner)  
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**TABLE 9**  
**INTERTIDAL SEDIMENT SAMPLING ANALYTICAL RESULTS**  
**BARGE B120 SPILL**  
**BUZZARDS BAY, MASSACHUSETTS**

ANALYTE	SB-SED-UI-01 05/08/03	SB-SED-LI-01 05/08/03	RISS-SED-UI-01 05/08/03	RISS-SED-LI-01 05/08/03	RIWP-SED-UI-01 05/08/03	RIWP-SED-LI-01 05/08/03	WN-SED-UI-01 05/09/03	WN-SED-LI-01 05/09/04	MCP Method 1 Soil Standards (ppm)			NOAA SQUIRT Effects Range-Low (ERL) (ppm)
									S-1 / GW-1	S-1 / GW-2	S-1 / GW-3	
Napthalene	0.0002	0.0004	0.0004	0.0003	0.0002	0.0002	0.0002	0.0007	4	100	100	0.16
Methylnapthalene, 2-	0.0002 J	0.0002 J	0.0006	0.0002 J	0.0003 J	0.0002 J	0.0002 J	0.0002 J	4	500	500	0.07
Acenaphthylene	0.0002	0.0003	0.0003	0.0001 J	ND(0.0002)	0.0001 J	ND(0.0002)	0.0008	100	100	100	0.044
Acenaphthene	ND(0.0001)	0.0001 J	0.0007	0.0001 J	0.0001 J	0.0001 J	ND(0.0001)	0.0001 J	20	1,000	1,000	0.016
Fluorene	0.0003	0.0003	0.0031	0.0001 J	0.0001 J	0.0001 J	ND(0.0001)	0.0002	400	1,000	1,000	0.019
Phenanthrene	0.0016	0.0039	0.0283	0.0007	0.0005	0.0003	0.0002	0.0016	700	1,000	100	0.24
Anthracene	0.0004	0.0008	0.0031	0.0001 J	0.0001 J	0.0001 J	ND(0.0002)	0.0005	1,000	1,000	1,000	0.0853
Fluoranthene	0.0012	0.003	0.005	0.0004	0.0004	0.0003	0.0001 J	0.0029	1,000	1,000	1,000	0.6
Pyrene	0.0041	0.0082	0.0261	0.0008	0.0007	0.0006	0.0001 J	0.0072	700	700	700	0.665
Benzo[a]anthracene	0.002	0.0048	0.0123	0.0004	0.0004	0.0003	ND(0.0001)	0.0051	0.7	0.7	0.7	0.261
Chrysene	0.0041	0.0082	0.0211	0.0009	0.0006	0.0004	ND(0.0002)	0.0087	7	7	7	0.384
Benzo[b]fluoranthene	0.0011	0.0022	0.0041	0.0003	0.0002 J	0.0002 J	ND(0.0003)	0.0032	0.7	0.7	0.7	NE
Benzo[k]fluoranthene	0.0003	0.0007	0.0011	0.0001 J	0.0001 J	0.0001 J	ND(0.0002)	0.0015	7	7	7	NE
Benzo[a]pyrene	0.0014	0.0032	0.008	0.0002 J	0.0002 J	0.0001 J	ND(0.0002)	0.004	0.7	0.7	0.7	0.43
Indeno[1,2,3-cd]pyrene	0.0005	0.0012	0.0014	0.0002 J	0.0002 J	0.0001 J	ND(0.0003)	0.0021	0.7	0.7	0.7	NE
Dibenz[a,h]anthracene	0.0003	0.0005	0.0013	0.0001 J	0.0001 J	ND(0.0002)	ND(0.0002)	0.0007	0.7	0.7	0.7	0.0634
Benzo[g,h,i]perylene	0.0006	0.0013	0.0022	0.0002	0.0001 J	0.0001 J	ND(0.0001)	0.0018	1,000	1,000	1,000	NE
Other PAH	0.1597	0.291	1.2859	0.0337	0.026	0.0128	0.0012	0.229	N/A	N/A	N/A	N/A
Total PAH	0.178	0.33	1.405	0.0377	0.0288	0.0149	0.0016	0.270	N/A	N/A	N/A	4.022

Notes:

1. Numbers in highlight exceed an applicable criteria.
2. All concentrations in mg/Kg (equivalent to parts per million).
3. ND( ) = constituent not detected at practical quantitation limit noted in parentheses.
4. NE = ERL not established for this compound.
5. C1-Napthalene reported value was used as a substitute for 2-Methylnapthalene.

Notes from lab's validation reports:

6. Samples with undetected PAHs can be considered as undetected ("U" qualifier) above the reporting method detection limit.
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**TABLE 10  
DEGREE OF OILING  
B120 RELEASE  
BUZZARDS BAY, MASSACHUSETTS**

Segment	Segment Name	Degree of Oiling	Oil Ranking Score
E1-01	Grey Gables-Gilder Road Beach	Very Light	<1.00
E1-02	Mashnee/Hog Islands North	Very Light	<1.00
E1-03	Mashnee Island	Very Light	<1.00
E1-04	Mashnee/Hog Islands South	Unoiled	0.00
E1-05	Monument Beach	Unoiled	0.00
E1-06	Phinney's Harbor South	Unoiled	0.00
E1-07	Wings Neck	Very Light	1.00
E1-08	Barlow's Landing	Very Light	<1.00
E1-09	Patuisset	Very Light	<1.00
E1-10	Scraggy Neck North	Very Light	1.00
E1-11	Scraggy Neck South	Moderate	1.00
E1-12	Megansett Beach	Very Light	1.00
E1-13	Nye's Neck	Heavy	2.92
E1-14	New Silver Beach (Wild Harbor)	Moderate	<1.00
E1-15	Crow Point	Heavy	<1.00
E1-16	Old Silver Beach	Unoiled	0.00
E2-01	Falmouth Cliffs	Very Light	<1.00
E2-02	West Falmouth Harbor	Very Light	<1.00
E2-03	Chappaquoit Beach	Unoiled	0.00
E2-04	Black Beach	Unoiled	0.00
E2-05	Saconnisset Beach	Very Light	<1.00
E2-06	Hamlin's Point Beach	Very Light	<1.00
E2-07	Wood Neck Beach	Very Light	<1.00
E2-08	Racing Beach	Very Light	<1.00
E2-09	Quissett Harbor	Very Light	<1.00
E2-10	Long Neck to Gansett Point	Very Light	<1.00
E2-11	Penzance Island	Very Light	<1.00
E3-01	Penikese Island	Very Light	1.00
E3-02	Cuttyhunk Island	Light	1.72
E3-03	Nashaweena Island	Very Light	1.00
E3-04	Pasque Island	Light	1.21
E3-05	Naushon Island	Light	1.21
E3-06	Uncatena Island	Moderate	2.00
E3-07	Weepecket Islands	Very Light	1.00
W1B-01	Taylor Point Canal	Unoiled	0.00
W1B-02	Taylor Point North	Unoiled	0.00
W1B-03	Butler Cove	Unoiled	0.00
W1B-04	Jacob's Neck	Unoiled	0.00
W1B-05	Pleasant Harbor	Unoiled	0.00
W1B-06	Broad Cove (+seg 6.5)	Unoiled	0.00
W1B-07	Stony Point Dike	Very Light	<1.00
W1B-08	Temples Knob	Very Light	<1.00
W1B-09	Little Harbor Beach	Unoiled	0.00
W1B-10	Little Harbor	Unoiled	0.00
W1B-11	Bourne Cove	Unoiled	0.00
W1B-12	Warren Point (MA)	Moderate	3.00
W1B-13	Indian Neck	Very Light	1.00
W1B-14	Long Beach	Very Light	1.00
W1B-15	Wareham River East Shore	Moderate	1.80
W1B-16	Minot Forest Beach	Moderate	3.00
W1B-17	Wareham Neck North	Very Light	<1.00
W1B-18	Pinehurst Beach	Unoiled	0.00
W1B-19	Broad Marsh River East	Unoiled	0.00
W1B-20	Broad Marsh River West	Unoiled	0.00
W1B-21	Swift's Neck Beach	Light	2.00
W1B-22	Swift's Beach	Light	2.00
W1B-23	Mark's Cove	Light	2.00
W1B-24	Nobska Beach	Very Light	<1.00
W1B-25	Cromeset Beach	Unoiled	0.00
W1B-26	Briarwood Beach	Unoiled	0.00

**TABLE 10  
DEGREE OF OILING  
B120 RELEASE  
BUZZARDS BAY, MASSACHUSETTS**

Segment	Segment Name	Degree of Oiling	Oil Ranking Score
W1B-27	Rose Point	Unoiled	0.00
W1B-28	Weweantic River West Shore	Very Light	<1.00
W1B-29	Delano Road North	Unoiled	0.00
W1B-30	Delano Road South	Unoiled	0.00
W1B-31	Great Hill Point	Moderate	3.00
W1B-32	Piney Point Beach	Very Light	<1.00
W1B-33	Piney Point South	Moderate	3.00
W1C-00	Bird Island	Very Light	1.00
W1C-01	Butler's Point	Moderate	3.00
W1C-02	Planting Island Causeway	Heavy	3.00
W1C-03	Planting Island Cove	Unoiled	0.00
W1C-04	Blankinship Cove	Moderate	1.46
W1C-05	Sippican Harbor East	Moderate	3.00
W1C-06	Hammet's Cove Beach	Unoiled	0.00
W1C-07	Little Neck	Unoiled	0.00
W1C-08	Tabor Academy Beach	Unoiled	0.00
W1C-09	Marion Town Beach	Unoiled	0.00
W1C-10	Silvershell Beach	Moderate	<1.00
W1C-11	Sippican Harbor West	Very Light	<1.00
W1C-12	Converse Point East	Moderate	2.63
W1C-13	Little Ram Island	Very Light	<1.00
W1D-01	Aucoot Cove	Moderate	1.46
W1D-02	Harbor Beach	Very Light	<1.00
W1D-03	Holly Woods / Hiller Cove	Moderate	2.00
W1D-04	Holly Woods / Peases Point	Moderate	2.23
W1D-05	Point Connett Beach	Heavy	2.00
W1E-01	Nye Cove / Strawberry Cove	L	1.33
W1E-02	Strawberry Cove	L	1.46
W1E-03	Strawberry Point West	Moderate	2.28
W1E-04	Crescent Beach	Heavy	3.92
W1E-05	Mattapoisett Harbor East	Moderate	1.26
W1E-06	Mattapoisett Town Beach	Moderate	3.00
W1F-01	Brandt Beach	Heavy	2.49
W1F-02	Brandt Island West	Heavy	3.34
W1F-03	Brandt Island East	Heavy	3.07
W1F-04	Brandt Island Cove	Heavy	2.19
W1F-05	Mattapoisett Neck West	Heavy	3.77
W1F-06	Mattapoisett Neck South	Heavy	2.74
W1F-07	Mattapoisett Shores	Moderate	2.94
W1F-08	Mattapoisett Neck East	Heavy	1.08
W1F-09	Mattapoisett Harbor North	Moderate	1.00
W1G-00	Ram Island	Heavy	4.00
W2A-01	Fort Phoenix	Moderate	1.79
W2A-02	Harbor View	Heavy	3.00
W2A-03	Pope's Beach	Moderate	3.00
W2A-04	Manhattan Ave	Heavy	3.65
W2A-05	Sunset Beach	Moderate	2.00
W2A-06	Silver Shell Beach	Light	2.00
W2A-07	Sconticut Neck West	Heavy	2.17
W2A-08	Wilbur Point	Moderate	2.40
W2A-09	Sconticut Neck East	Heavy	3.00
W2A-10	Long Island and Causeway South	Heavy	3.44
W2A-11	West Island West	Heavy	3.95
W2A-12	Rocky Point to East Cove	Heavy	1.19
W2A-13	East Cove	Light	1.00
W2A-14	Pine Creek to North Point	Moderate	3.00
W2A-15	West Island North	Light	1.10
W2A-16	Long Island and Causeway North	Very Light	<1.00
W2A-17	Sconticut Neck Northeast (Marsh)	Very Light	<1.00
W2A-18	Little Bay (Marsh)	Very Light	<1.00

**TABLE 10  
DEGREE OF OILING  
B120 RELEASE  
BUZZARDS BAY, MASSACHUSETTS**

Segment	Segment Name	Degree of Oiling	Oil Ranking Score
W2A-19	Shaw Cove	Heavy	2.23
W2B-01	Round Hill to Barekneed Rocks	Light	2.00
W2B-02	Padanaram Harbor	Light	<1.00
W2B-03	Clarke's Cove West	Very Light	1.00
W2B-04	Clarke's Cove East	Light	1.60
W2B-05	Fort Taber	Moderate	1.44
W2B-06	Clarke's Point East	Very Light	<1.00
W2B-09	New Bedford Harbor (inner)	Unooled	0.00
W3A-01	Mishaum Point East	Heavy	1.05
W3A-02	Salters Point West	Moderate	3.00
W3A-03	Pier Beach (Salter's Point)	Moderate	2.44
W3A-04	Salters Point East	Light	2.00
W3A-05	Round Hill Beach West	Heavy	2.14
W3A-06	Round Hill Beach East	Heavy	2.77
W3B-01	Slocum's River	Light	1.37
W3B-02	Mishaum Point West	Heavy	3.65
W3C-01	East Beach (Westport)	Light	2.00
W3C-02	Little Beach	Light	1.00
W3C-03	Barney's Joy (W of barbed)	Heavy	4.00
W3C-04	Barney's Joy (E of barbed)	Heavy	2.60
W3C-05	Demarest Lloyd State Park Beach	Very Light	1.00
W3C-06	Demarest Lloyd State Park Marsh	Very Light	1.00
W3D-01	Quicksand Point	Very Light	1.00
W3D-02	Cockeast Pond Beach	Light	2.00
W3D-03	Elephant Rock Beach	Light	2.00
W3D-04	Horseneck Beach West	Moderate	2.18
W3D-05	Horseneck Beach East	Light	1.71
W3D-06	Gooseberry Neck East	Moderate	2.06
W3D-07	Gooseberry Neck West	Moderate	2.05

**TABLE 11**  
**SEGMENTS SELECTED FOR SAMPLING**  
**BARGE B120 SPILL**  
**BUZZARDS BAY, MASSACHUSETTS**

Segment ID	Segment Name	Oiling	Ranking
<b>Heavy Oiling</b>			
W3C-03	Barney's Joy (W of barbed)	H	4
W2A-11	West Island West	H	3.95
W1E-04	Crescent Beach	H	3.92
W2A-04	Manhattan Ave	H	3.65
W2A-09	Sconticut Neck East	H	3
W1F-04	Brandt Island Cove	H	2.189254584
<b>Moderate Oiling</b>			
W1B-16	Minot Forest Beach	M	3
W1E-06	Mattapoissett Town Beach	M	3
W2A-03	Pope's Beach	M	3
W2A-14	Pine Creek to North Point	M	3
W3A-03	Pier Beach (Salter's Point)	M	2.44
W1E-03	Strawberry Point West	M	2.28
W1D-04	Holly Woods / Peases Point	M	2.24
W3D-04	Horseneck Beach West	M	2.18
W1D-01	Aucoot Cove	M	1.46
<b>Light Oiling</b>			
W1B-22	Swift's Beach	L	2
W2B-01	Round Hill to Bareneed Rocks	L	2
W3C-01	East Beach (Westport)	L	2
W3D-03	Elephant Rock Beach	L	2
W2B-04	Clarke's Cove East	L	1.60
E3-04	Pasque Island	L	1.21
W2A-15	West Island North	L	1.10
W2A-13	East Cove	L	1
W3C-06	Demarest Lloyd State Park Marsh	L	
<b>Very Light</b>			
E1-07	Wings Neck	VL	1
W1B-14	Long Beach	VL	1
E2-10	Long Neck to Gansett Point	VL	<1

Notes:

1. Shaded Segments are primarily marshes.

**TABLE 12**  
**SUMMARY OF SEDIMENT ANALYTICAL RESULTS FOR PHASE I CHARACTERIZATION**  
**BUZZARDS BAY, MASSACHUSETTS**  
**SEGMENT: E1-07**  
**Wings Neck, Wareham**  
**Sampling Date: 1/20/04**  
**OILING CATEGORY: VERY LIGHT**

Analyte	Sample Location 1	Sample Location 2	Sample Location 3		MCP Method 1 Standards			NOAA Standards Marine Sediments
	Upper Intertidal Zone	Upper Intertidal Zone	Upper Intertidal Zone	Lower Intertidal Zone	S-1 / GW-1	S-1 / GW-2	S-1 / GW-3	ERL
	E107-UIT-01	E107-UIT-02	E107-UIT-03	E107-LIT-03				
<b>EPH</b>								
C <sub>9</sub> -C <sub>18</sub> Aliphatic Hydrocarbons	ND(32)	ND(30)	ND(32)	ND(33)	1,000	1,000	1,000	NA
C <sub>19</sub> -C <sub>36</sub> Aliphatic Hydrocarbons	ND(32)	39	ND(32)	ND(33)	2,500	1,000	1,000	NA
C <sub>11</sub> -C <sub>22</sub> Aromatic Hydrocarbons	ND(32)	ND(30)	ND(32)	ND(33)	200	800	800	NA
<b>PAH by GC/MS-SIM by method 8270</b>								
Naphthalene	0.006 j	0.007 j	0.006 j	0.007 j	4	100	100	0.160
2-Methylnaphthalene	ND(0.011)	ND(0.010)	ND(0.011)	ND(0.011)	4	500	500	0.070
Acenaphthylene	ND(0.011)	ND(0.010)	ND(0.011)	ND(0.011)	100	100	100	0.044
Acenaphthene	ND(0.011)	ND(0.010)	ND(0.011)	ND(0.011)	20	1,000	1,000	0.016
Fluorene	ND(0.011)	ND(0.010)	ND(0.011)	ND(0.011)	400	1,000	1,000	0.019
Phenanthrene	ND(0.011)	ND(0.010)	ND(0.011)	ND(0.011)	700	1,000	100	0.240
Anthracene	ND(0.011)	ND(0.010)	ND(0.011)	ND(0.011)	1,000	1,000	1,000	0.085
Fluoranthene	ND(0.011)	ND(0.010)	ND(0.011)	ND(0.011)	1,000	1,000	1,000	0.600
Pyrene	ND(0.011)	ND(0.010)	ND(0.011)	ND(0.011)	700	700	700	0.665
Benzo(a)anthracene	ND(0.011)	ND(0.010)	ND(0.011)	ND(0.011)	0.7	0.7	0.7	0.261
Chrysene	ND(0.011)	ND(0.010)	ND(0.011)	ND(0.011)	7	7	7	0.384
Benzo(b)fluoranthene	ND(0.011)	ND(0.010)	ND(0.011)	ND(0.011)	0.7	0.7	0.7	NA
Benzo(k)fluoranthene	ND(0.011)	ND(0.010)	ND(0.011)	ND(0.011)	7	7	7	0.430
Benzo(a)pyrene	ND(0.011)	ND(0.010)	ND(0.011)	ND(0.011)	0.7	0.7	0.7	0.430
Indeno(1,2,3-cd)pyrene	ND(0.011)	ND(0.010)	ND(0.011)	ND(0.011)	0.7	0.7	0.7	NA
Dibenzo(a,h)anthracene	ND(0.011)	ND(0.010)	ND(0.011)	ND(0.011)	0.7	0.7	0.7	0.063
Benzo(g,h,i)perylene	ND(0.011)	ND(0.010)	ND(0.011)	ND(0.011)	1,000	1,000	1,000	NA

NOTES:

1. Results in mg/Kg (milligrams per kilogram).
2. EPH: Extractable Petroleum Hydrocarbons.
2. ND(x) = constituent not detected at practical quantitation limits noted in parentheses.
3. PAH by GC/MS-SIM: Polyaromatic Hydrocarbons with Selected Ion Monitoring.
4. j: estimated concentration/ detected below standard laboratory reporting limits.
5. MCP: Massachusetts Contingency Plan.
6. NOAA ERL: National Oceanic and Atmospheric Administration Effects Range Low.
7. NA: Not Available.

**TABLE 12**  
**SUMMARY OF SEDIMENT ANALYTICAL RESULTS FOR PHASE I CHARACTERIZATION**  
**BUZZARDS BAY, MASSACHUSETTS**  
**SEGMENT: E2-10**  
**Sampling Date: 1/19/04**  
**OILING CATEGORY: CLEAN / VERY LIGHT**

Analyte	Sample Location 1		Sample Location 2		Sample Location 3	MCP Method 1 Standards			NOAA Standards Marine Sediments
	Upper Intertidal Zone	Lower Intertidal Zone	Upper Intertidal Zone	Lower Intertidal Zone	Upper Intertidal Zone	S-1 / GW-1	S-1 / GW-2	S-1 / GW-3	ERL
	E210-UIT-01	E210-LIT-01	E210-UIT-02	E210-LIT-02	E210-UIT-03				
<b>EPH</b>									
C <sub>9</sub> -C <sub>18</sub> Aliphatic Hydrocarbons	ND (32)	ND (35)	ND (30)	ND (30)	ND (30)	1,000	1,000	1,000	NA
C <sub>19</sub> -C <sub>36</sub> Aliphatic Hydrocarbons	ND (32)	ND (35)	ND (30)	ND (30)	ND (30)	2,500	1,000	1,000	NA
C <sub>11</sub> -C <sub>22</sub> Aromatic Hydrocarbons	ND (32)	ND (35)	ND (30)	ND (30)	ND (30)	200	800	800	NA
<b>PAH by GC/MS-SIM by method 8270</b>									
Naphthalene	0.008 j	0.009 j	0.009 j	0.011	0.008 j	4	100	100	0.160
2-Methylnaphthalene	ND (0.011)	ND (0.012)	ND (0.010)	ND (0.010)	ND (0.010)	4	500	500	0.070
Acenaphthylene	ND (0.011)	ND (0.012)	ND (0.010)	ND (0.010)	ND (0.010)	100	100	100	0.044
Acenaphthene	ND (0.011)	ND (0.012)	ND (0.010)	ND (0.010)	ND (0.010)	20	1,000	1,000	0.016
Fluorene	ND (0.011)	ND (0.012)	ND (0.010)	ND (0.010)	ND (0.010)	400	1,000	1,000	0.019
Phenanthrene	ND (0.011)	ND (0.012)	ND (0.010)	ND (0.010)	ND (0.010)	700	1,000	100	0.240
Anthracene	ND (0.011)	ND (0.012)	ND (0.010)	ND (0.010)	ND (0.010)	1,000	1,000	1,000	0.085
Fluoranthene	ND (0.011)	ND (0.012)	ND (0.010)	ND (0.010)	ND (0.010)	1,000	1,000	1,000	0.600
Pyrene	ND (0.011)	ND (0.012)	ND (0.010)	ND (0.010)	ND (0.010)	700	700	700	0.665
Benzo(a)anthracene	ND (0.011)	ND (0.012)	ND (0.010)	ND (0.010)	ND (0.010)	0.7	0.7	0.7	0.261
Chrysene	ND (0.011)	ND (0.012)	ND (0.010)	ND (0.010)	ND (0.010)	7	7	7	0.384
Benzo(b)fluoranthene	ND (0.011)	ND (0.012)	ND (0.010)	ND (0.010)	ND (0.010)	0.7	0.7	0.7	NA
Benzo(k)fluoranthene	ND (0.011)	ND (0.012)	ND (0.010)	ND (0.010)	ND (0.010)	7	7	7	0.430
Benzo(a)pyrene	ND (0.011)	ND (0.012)	ND (0.010)	ND (0.010)	ND (0.010)	0.7	0.7	0.7	0.430
Indeno(1,2,3-cd)pyrene	ND (0.011)	ND (0.012)	ND (0.010)	ND (0.010)	ND (0.010)	0.7	0.7	0.7	NA
Dibenzo(a,h)anthracene	ND (0.011)	ND (0.012)	ND (0.010)	ND (0.010)	ND (0.010)	0.7	0.7	0.7	0.063
Benzo(g,h,i)perylene	ND (0.011)	ND (0.012)	ND (0.010)	ND (0.010)	ND (0.010)	1,000	1,000	1,000	NA

NOTES:

1. Results in mg/Kg (milligrams per kilogram).
2. EPH: Extractable Petroleum Hydrocarbons.
2. ND(x) = constituent not detected at practical quantitation limits noted in parentheses.
3. PAH by GC/MS-SIM: Polycyclic Aromatic Hydrocarbons with Selected Ion Monitoring.
4. j: estimated concentration/ detected below standard laboratory reporting limits.
5. MCP: Massachusetts Contingency Plan.
6. NOAA ERL: National Oceanic and Atmospheric Administration Effects Range Low.
7. NA: Not Available.

**TABLE 12**  
**SUMMARY OF SEDIMENT ANALYTICAL RESULTS FOR PHASE I CHARACTERIZATION**  
**BUZZARDS BAY, MASSACHUSETTS**  
**SEGMENT: E3-04**  
**Pasque Island, Elizabeth Islands**  
**Sampling Date: 3/2/04**  
**OILING CATEGORY: LIGHT**

Analyte	Sample Location 1			Sample Location 2			Sample Location 3			MCP Method 1 Standards			NOAA Standards Marine Sediments
	Upper Intertidal Zone	Middle Intertidal Zone	Lower Intertidal Zone	Upper Intertidal Zone	Middle Intertidal Zone	Lower Intertidal Zone	Upper Intertidal Zone	Middle Intertidal Zone	Lower Intertidal Zone	S-1 / GW-1	S-1 / GW-2	S-1 / GW-3	ERL
	E304-UIT-01	E304-MID-01	E304-LIT-01	E304-UIT-02	E304-MID-02	E304-LIT-02	E304-UIT-03	E304-MID-03	E304-LIT-03				
<b>EPH</b>													
C <sub>9</sub> -C <sub>18</sub> Aliphatic Hydrocarbons	ND(30)	ND(32)	ND(34)	ND(30)	ND(31)	ND(31)	ND(34)	ND(37)	ND(37)	1,000	1,000	1,000	NA
C <sub>19</sub> -C <sub>36</sub> Aliphatic Hydrocarbons	ND(30)	ND(32)	ND(34)	ND(30)	ND(31)	ND(31)	ND(34)	ND(37)	ND(37)	2,500	1,000	1,000	NA
C <sub>11</sub> -C <sub>22</sub> Aromatic Hydrocarbons	ND(30)	ND(32)	ND(34)	ND(30)	ND(31)	ND(31)	ND(34)	NA	ND(37)	200	800	800	NA
<b>PAH by GC/MS-SIM by method 8270</b>													
Naphthalene	0.009 j	0.009 j	0.010 j	0.007 j	0.009 j	0.009 j	0.009 j	0.011 j	0.011 j	4	100	100	0.160
2-Methylnaphthalene	ND(0.010)	ND(0.011)	ND(0.011)	ND(0.010)	ND(0.010)	ND(0.010)	ND(0.011)	ND(0.012)	ND(0.012)	4	500	500	0.070
Acenaphthylene	ND(0.010)	ND(0.011)	ND(0.011)	ND(0.010)	ND(0.010)	ND(0.010)	ND(0.011)	ND(0.012)	ND(0.012)	100	100	100	0.044
Acenaphthene	ND(0.010)	ND(0.011)	ND(0.011)	ND(0.010)	ND(0.010)	ND(0.010)	ND(0.011)	ND(0.012)	ND(0.012)	20	1,000	1,000	0.016
Fluorene	ND(0.010)	ND(0.011)	ND(0.011)	ND(0.010)	ND(0.010)	ND(0.010)	ND(0.011)	ND(0.012)	ND(0.012)	400	1,000	1,000	0.019
Phenanthrene	ND(0.010)	ND(0.011)	ND(0.011)	ND(0.010)	ND(0.010)	ND(0.010)	ND(0.011)	ND(0.012)	ND(0.012)	700	1,000	100	0.240
Anthracene	ND(0.010)	ND(0.011)	ND(0.011)	ND(0.010)	ND(0.010)	ND(0.010)	ND(0.011)	ND(0.012)	ND(0.012)	1,000	1,000	1,000	0.085
Fluoranthene	ND(0.010)	ND(0.011)	ND(0.011)	ND(0.010)	ND(0.010)	ND(0.010)	ND(0.011)	ND(0.012)	ND(0.012)	1,000	1,000	1,000	0.600
Pyrene	ND(0.010)	ND(0.011)	ND(0.011)	ND(0.010)	ND(0.010)	ND(0.010)	ND(0.011)	ND(0.012)	ND(0.012)	700	700	700	0.665
Benzo(a)anthracene	ND(0.010)	ND(0.011)	ND(0.011)	ND(0.010)	ND(0.010)	ND(0.010)	ND(0.011)	ND(0.012)	ND(0.012)	0.7	0.7	0.7	0.261
Chrysene	ND(0.010)	ND(0.011)	ND(0.011)	ND(0.010)	ND(0.010)	ND(0.010)	ND(0.011)	ND(0.012)	ND(0.012)	7	7	7	0.384
Benzo(b)fluoranthene	ND(0.010)	ND(0.011)	ND(0.011)	ND(0.010)	ND(0.010)	ND(0.010)	ND(0.011)	ND(0.012)	ND(0.012)	0.7	0.7	0.7	NA
Benzo(k)fluoranthene	ND(0.010)	ND(0.011)	ND(0.011)	ND(0.010)	ND(0.010)	ND(0.010)	ND(0.011)	ND(0.012)	ND(0.012)	7	7	7	0.430
Benzo(a)pyrene	ND(0.010)	ND(0.011)	ND(0.011)	ND(0.010)	ND(0.010)	ND(0.010)	ND(0.011)	ND(0.012)	ND(0.012)	0.7	0.7	0.7	0.430
Indeno(1,2,3-cd)pyrene	ND(0.010)	ND(0.011)	ND(0.011)	ND(0.010)	ND(0.010)	ND(0.010)	ND(0.011)	ND(0.012)	ND(0.012)	0.7	0.7	0.7	NA
Dibenzo(a,h)anthracene	ND(0.010)	ND(0.011)	ND(0.011)	ND(0.010)	ND(0.010)	ND(0.010)	ND(0.011)	ND(0.012)	ND(0.012)	0.7	0.7	0.7	0.063
Benzo(g,h,i)perylene	ND(0.010)	ND(0.011)	ND(0.011)	ND(0.010)	ND(0.010)	ND(0.010)	ND(0.011)	ND(0.012)	ND(0.012)	1,000	1,000	1,000	NA

NOTES:

1. Results in mg/Kg (milligrams per kilogram).
2. EPH: Extractable Petroleum Hydrocarbons.
3. ND(x) = constituent not detected at practical quantitation limits noted in parentheses.
4. j: estimated concentration/ detected below standard laboratory reporting limits.
5. MCP: Massachusetts Contingency Plan.
6. NOAA ERL: National Oceanic and Atmospheric Administration Effects Range Low.
7. NA: Not Available.



**TABLE 12**  
**SUMMARY OF SEDIMENT ANALYTICAL RESULTS FOR PHASE I CHARACTERIZATION**  
**BUZZARDS BAY, MASSACHUSETTS**  
**SEGMENT: W1B-14**  
**Long Beach, Wareham**  
**Sampling Date: 1/20/04**  
**OILING CATEGORY: VERY LIGHT**

Analyte	Sample Location 1	Sample Location 2		Sample Location 3		MCP Method 1 Standards		NOAA Standards Marine Sediments
	Upper Intertidal Zone	Upper Intertidal Zone	Lower Intertidal Zone	Upper Intertidal Zone	Lower Intertidal Zone	S-1 / GW-2	S-1 / GW-3	ERL
	W1B14-UIT-01	W1B14-UIT-02	W1B14-LIT-02	W1B14-UIT-03	W1B14-LIT-03			
<b>EPH</b>								
C <sub>9</sub> -C <sub>18</sub> Aliphatic Hydrocarbons	ND(34)	ND(33)	ND(34)	ND(33)	ND(35)	1,000	1,000	NA
C <sub>19</sub> -C <sub>36</sub> Aliphatic Hydrocarbons	ND(34)	ND(33)	ND(34)	ND(33)	ND(35)	1,000	1,000	NA
C <sub>11</sub> -C <sub>22</sub> Aromatic Hydrocarbons	ND(34)	ND(33)	ND(34)	ND(33)	ND(35)	800	800	NA
<b>PAH by GC/MS-SIM by method 8270</b>								
Naphthalene	<b>0.013</b>	<b>0.007 j</b>	<b>0.009 j</b>	<b>0.012</b>	<b>0.007 j</b>	100	100	0.160
2-Methylnaphthalene	ND(0.011)	ND(0.011)	ND(0.012)	ND(0.011)	ND(0.012)	500	500	0.070
Acenaphthylene	ND(0.011)	ND(0.011)	ND(0.012)	ND(0.011)	ND(0.012)	100	100	0.044
Acenaphthene	ND(0.011)	ND(0.011)	ND(0.012)	ND(0.011)	ND(0.012)	1,000	1,000	0.016
Fluorene	ND(0.011)	ND(0.011)	ND(0.012)	ND(0.011)	ND(0.012)	1,000	1,000	0.019
Phenanthrene	ND(0.011)	ND(0.011)	ND(0.012)	ND(0.011)	ND(0.012)	1,000	100	0.240
Anthracene	ND(0.011)	ND(0.011)	ND(0.012)	ND(0.011)	ND(0.012)	1,000	1,000	0.085
Fluoranthene	ND(0.011)	ND(0.011)	ND(0.012)	ND(0.011)	ND(0.012)	1,000	1,000	0.600
Pyrene	ND(0.011)	ND(0.011)	ND(0.012)	ND(0.011)	ND(0.012)	700	700	0.665
Benzo(a)anthracene	ND(0.011)	ND(0.011)	ND(0.012)	ND(0.011)	ND(0.012)	0.7	0.7	0.261
Chrysene	ND(0.011)	ND(0.011)	ND(0.012)	ND(0.011)	ND(0.012)	7	7	0.384
Benzo(b)fluoranthene	ND(0.011)	ND(0.011)	ND(0.012)	ND(0.011)	ND(0.012)	0.7	0.7	NA
Benzo(k)fluoranthene	ND(0.011)	ND(0.011)	ND(0.012)	ND(0.011)	ND(0.012)	7	7	0.430
Benzo(a)pyrene	ND(0.011)	ND(0.011)	ND(0.012)	ND(0.011)	ND(0.012)	0.7	0.7	0.430
Indeno(1,2,3-cd)pyrene	ND(0.011)	ND(0.011)	ND(0.012)	ND(0.011)	ND(0.012)	0.7	0.7	NA
Dibenzo(a,h)anthracene	ND(0.011)	ND(0.011)	ND(0.012)	ND(0.011)	ND(0.012)	0.7	0.7	0.063
Benzo(g,h,i)perylene	ND(0.011)	ND(0.011)	ND(0.012)	ND(0.011)	ND(0.012)	1,000	1,000	NA

NOTES:

1. Results in mg/Kg (milligrams per kilogram).
2. EPH: Extractable Petroleum Hydrocarbons.
2. ND(x) = constituent not detected at practical quantitation limits noted in parentheses.
3. PAH by GC/MS-SIM: Polycyclic Aromatic Hydrocarbons with Selected Ion Monitoring.
4. j: estimated concentration/ detected below standard laboratory reporting limits.
5. MCP: Massachusetts Contingency Plan.
6. NOAA ERL: National Oceanic and Atmospheric Administration Effects Range Low.
7. NA: Not Available.

**TABLE 12**  
**SUMMARY OF SEDIMENT ANALYTICAL RESULTS FOR PHASE I CHARACTERIZATION**  
**BUZZARDS BAY, MASSACHUSETTS**  
**SEGMENT: W1B-16**  
**Minot Forest Beach, Wareham**  
**Sampling Date: 1/21/04**  
**OILING CATEGORY: MODERATE**

Analyte	Sample Location 1		Sample Location 2		Sample Location 3		MCP Method 1 Standards		NOAA Standards Marine Sediments ERL
	Upper Intertidal Zone	Lower Intertidal Zone	Upper Intertidal Zone	Lower Intertidal Zone	Upper Intertidal Zone	Lower Intertidal Zone	S-1 / GW-2	S-1 / GW-3	
	W1B16-UIT-01	W1B16-LIT-01	W1B16-UIT-02	W1B16-LIT-02	W1B16-UIT-03	W1B16-LIT-03			
<b>EPH</b>									
C <sub>9</sub> -C <sub>18</sub> Aliphatic Hydrocarbons	ND(31)	ND(33)	ND(31)	ND(37)	ND(37)	ND(35)	<b>1,000</b>	<b>1,000</b>	<b>NA</b>
C <sub>19</sub> -C <sub>36</sub> Aliphatic Hydrocarbons	ND(31)	ND(33)	ND(31)	ND(37)	ND(37)	ND(35)	<b>1,000</b>	<b>1,000</b>	<b>NA</b>
C <sub>11</sub> -C <sub>22</sub> Aromatic Hydrocarbons	ND(31)	ND(33)	ND(31)	ND(37)	ND(37)	ND(35)	<b>800</b>	<b>NA</b>	<b>NA</b>
<b>PAH by GC/MS-SIM method 8270</b>									
Naphthalene	<b>0.009 j</b>	<b>0.010 j</b>	<b>0.008 j</b>	<b>0.011 j</b>	<b>0.010 j</b>	<b>0.011 j</b>	<b>100</b>	<b>100</b>	<b>0.160</b>
2-Methylnaphthalene	ND(0.010)	ND(0.011)	<b>0.006 j</b>	ND(0.012)	<b>0.007 j</b>	ND(0.012)	<b>500</b>	<b>500</b>	<b>0.070</b>
Acenaphthylene	ND(0.010)	ND(0.011)	ND(0.010)	ND(0.012)	ND(0.012)	ND(0.012)	<b>100</b>	<b>100</b>	<b>0.044</b>
Acenaphthene	ND(0.010)	ND(0.011)	ND(0.010)	ND(0.012)	ND(0.012)	ND(0.012)	<b>1,000</b>	<b>1,000</b>	<b>0.016</b>
Fluorene	ND(0.010)	ND(0.011)	ND(0.010)	ND(0.012)	ND(0.012)	ND(0.012)	<b>1,000</b>	<b>1,000</b>	<b>0.019</b>
Phenanthrene	ND(0.010)	ND(0.011)	ND(0.010)	ND(0.012)	ND(0.012)	ND(0.012)	<b>1,000</b>	<b>100</b>	<b>0.240</b>
Anthracene	ND(0.010)	ND(0.011)	ND(0.010)	ND(0.012)	ND(0.012)	ND(0.012)	<b>1,000</b>	<b>1,000</b>	<b>0.085</b>
Fluoranthene	ND(0.010)	ND(0.011)	ND(0.010)	ND(0.012)	ND(0.012)	ND(0.012)	<b>1,000</b>	<b>1,000</b>	<b>0.600</b>
Pyrene	ND(0.010)	ND(0.011)	ND(0.010)	ND(0.012)	ND(0.012)	<b>0.009 j</b>	<b>700</b>	<b>700</b>	<b>0.665</b>
Benzo(a)anthracene	ND(0.010)	ND(0.011)	ND(0.010)	ND(0.012)	ND(0.012)	ND(0.012)	<b>0.7</b>	<b>0.7</b>	<b>0.261</b>
Chrysene	ND(0.010)	ND(0.011)	ND(0.010)	ND(0.012)	ND(0.012)	ND(0.012)	<b>7</b>	<b>7</b>	<b>0.384</b>
Benzo(b)fluoranthene	ND(0.010)	ND(0.011)	ND(0.010)	ND(0.012)	ND(0.012)	ND(0.012)	<b>0.7</b>	<b>0.7</b>	<b>NA</b>
Benzo(k)fluoranthene	ND(0.010)	ND(0.011)	ND(0.010)	ND(0.012)	ND(0.012)	ND(0.012)	<b>7</b>	<b>7</b>	<b>0.430</b>
Benzo(a)pyrene	ND(0.010)	ND(0.011)	ND(0.010)	ND(0.012)	ND(0.012)	ND(0.012)	<b>0.7</b>	<b>0.7</b>	<b>0.430</b>
Indeno(1,2,3-cd)pyrene	ND(0.010)	ND(0.011)	ND(0.010)	ND(0.012)	ND(0.012)	ND(0.012)	<b>0.7</b>	<b>0.7</b>	<b>NA</b>
Dibenzo(a,h)anthracene	ND(0.010)	ND(0.011)	ND(0.010)	ND(0.012)	ND(0.012)	ND(0.012)	<b>0.7</b>	<b>0.7</b>	<b>0.063</b>
Benzo(g,h,i)perylene	ND(0.010)	ND(0.011)	ND(0.010)	ND(0.012)	ND(0.012)	ND(0.012)	<b>1,000</b>	<b>1,000</b>	<b>NA</b>

NOTES:

1. Results in mg/Kg (milligrams per kilogram).
2. EPH: Extractable Petroleum Hydrocarbons.
3. ND(x) = constituent not detected at practical quantitation limits noted in parentheses.
4. j: estimated concentration/ detected below standard laboratory reporting limits.
5. MCP: Massachusetts Contingency Plan.
6. NOAA ERL: National Oceanic and Atmospheric Administration Effects Range Low.
7. NA: Not Available.

TABLE 12  
SUMMARY OF SEDIMENT ANALYTICAL RESULTS FOR PHASE I CHARACTERIZATION  
BUZZARDS BAY, MASSACHUSETTS  
SEGMENT: W1B-22  
Swift's Beach, Wareham  
Sampling Date: 1/21/04  
OILING CATEGORY: LIGHT

Analyte	Sample Location 1		Sample Location 2		Sample Location 3		MCP Method 1 Standards		NOAA Standards Marine Sediments ERL
	Upper Intertidal Zone	Lower Intertidal Zone	Upper Intertidal Zone	Lower Intertidal Zone	Upper Intertidal Zone	Lower Intertidal Zone	S-1 / GW-2	S-1 / GW-3	
	W1B22-UIT-01	W1B22-LIT-01	W1B22-UIT-02	W1B22-LIT-02	W1B22-UIT-03	W1B22-LIT-03			
<b>EPH</b>									
C <sub>9</sub> -C <sub>18</sub> Aliphatic Hydrocarbons	ND(31)	ND(34)	ND(30)	ND(35)	ND(34)	ND(36)	1,000	1,000	NA
C <sub>19</sub> -C <sub>36</sub> Aliphatic Hydrocarbons	ND(31)	ND(34)	ND(30)	ND(35)	ND(34)	ND(36)	1,000	1,000	NA
C <sub>11</sub> -C <sub>22</sub> Aromatic Hydrocarbons	ND(31)	ND(34)	ND(30)	ND(35)	ND(34)	ND(36)	800	NA	NA
<b>PAH by GC/MS-SIM method 8270</b>									
Naphthalene	0.008 j	0.010 j	0.009 j	0.011 j	0.010 j	0.011 j	100	100	0.160
2-Methylnaphthalene	ND(0.010)	0.006 j	0.006 j	0.006 j	ND(0.011)	0.006 j	500	500	0.070
Acenaphthylene	ND(0.010)	ND(0.011)	ND(0.010)	ND(0.012)	ND(0.011)	ND(0.012)	100	100	0.044
Acenaphthene	ND(0.010)	ND(0.011)	ND(0.010)	ND(0.012)	ND(0.011)	ND(0.012)	1,000	1,000	0.016
Fluorene	ND(0.010)	ND(0.011)	ND(0.010)	ND(0.012)	ND(0.011)	ND(0.012)	1,000	1,000	0.019
Phenanthrene	ND(0.010)	ND(0.011)	ND(0.010)	ND(0.012)	ND(0.011)	ND(0.012)	1,000	100	0.240
Anthracene	ND(0.010)	ND(0.011)	ND(0.010)	ND(0.012)	ND(0.011)	ND(0.012)	1,000	1,000	0.085
Fluoranthene	ND(0.010)	ND(0.011)	ND(0.010)	0.013	ND(0.011)	ND(0.012)	1,000	1,000	0.600
Pyrene	ND(0.010)	ND(0.011)	ND(0.010)	0.011 j	ND(0.011)	ND(0.012)	700	700	0.665
Benzo(a)anthracene	ND(0.010)	ND(0.011)	ND(0.010)	0.014	ND(0.011)	ND(0.012)	0.7	0.7	0.261
Chrysene	ND(0.010)	ND(0.011)	ND(0.010)	0.012	ND(0.011)	ND(0.012)	7	7	0.384
Benzo(b)fluoranthene	ND(0.010)	ND(0.011)	ND(0.010)	0.013	ND(0.011)	ND(0.012)	0.7	0.7	NA
Benzo(k)fluoranthene	ND(0.010)	ND(0.011)	ND(0.010)	0.013	ND(0.011)	ND(0.012)	7	7	0.430
Benzo(a)pyrene	ND(0.010)	ND(0.011)	ND(0.010)	0.009 j	ND(0.011)	ND(0.012)	0.7	0.7	0.430
Indeno(1,2,3-cd)pyrene	ND(0.010)	ND(0.011)	ND(0.010)	ND(0.012)	ND(0.011)	ND(0.012)	0.7	0.7	NA
Dibenzo(a,h)anthracene	ND(0.010)	ND(0.011)	ND(0.010)	ND(0.012)	ND(0.011)	ND(0.012)	0.7	0.7	0.063
Benzo(g,h,i)perylene	ND(0.010)	ND(0.011)	ND(0.010)	ND(0.012)	ND(0.011)	ND(0.012)	1,000	1,000	NA

NOTES:

1. Results in mg/Kg (milligrams per kilogram).
2. EPH: Extractable Petroleum Hydrocarbons.
3. ND(x) = constituent not detected at practical quantitation limits noted in parentheses.
4. j: estimated concentration/ detected below standard laboratory reporting limits.
5. MCP: Massachusetts Contingency Plan.
6. NOAA ERL: National Oceanic and Atmospheric Administration Effects Range Low.
7. NA: Not Available.

**TABLE 12**  
**SUMMARY OF SEDIMENT ANALYTICAL RESULTS FOR PHASE I CHARACTERIZATION**  
**BUZZARDS BAY, MASSACHUSETTS**  
**SEGMENT: W1D-01**  
**Aucoot Cove, Marion**  
**Sampling Date: 1/21/04**  
**OILING CATEGORY: MODERATE (MARSH)**

Analyte	Sample Location 1			MCP Method 1 Standards		NOAA Standards Marine Sediments
	Marsh Area	Marsh Area	Marsh Area	S-1 / GW-2	S-1 / GW-3	ERL
	W1D01-M-01	W1D01-M-02	W1D01-M-03			
<b>EPH</b>						
C <sub>9</sub> -C <sub>18</sub> Aliphatic Hydrocarbons	ND(30)	ND(42)	ND(30)	1,000	1,000	NA
C <sub>19</sub> -C <sub>36</sub> Aliphatic Hydrocarbons	ND(30)	ND(42)	ND(30)	1,000	1,000	NA
C <sub>11</sub> -C <sub>22</sub> Aromatic Hydrocarbons	ND(30)	ND(42)	ND(30)	800	800	NA
<b>PAH by GC/MS-SIM by method 8270</b>						
Naphthalene	0.008 j	0.011 j	0.009 j	100	100	0.160
2-Methylnaphthalene	ND(0.010)	ND(0.014)	ND(0.010)	500	500	0.070
Acenaphthylene	ND(0.010)	ND(0.014)	ND(0.010)	100	100	0.044
Acenaphthene	ND(0.010)	ND(0.014)	ND(0.010)	1,000	1,000	0.016
Fluorene	ND(0.010)	ND(0.014)	ND(0.010)	1,000	1,000	0.019
Phenanthrene	ND(0.010)	ND(0.014)	ND(0.010)	1,000	100	0.240
Anthracene	ND(0.010)	ND(0.014)	ND(0.010)	1,000	1,000	0.085
Fluoranthene	ND(0.010)	ND(0.014)	ND(0.010)	1,000	1,000	0.600
Pyrene	ND(0.010)	ND(0.014)	ND(0.010)	700	700	0.665
Benzo(a)anthracene	ND(0.010)	ND(0.014)	ND(0.010)	0.7	0.7	0.261
Chrysene	ND(0.010)	ND(0.014)	ND(0.010)	7	7	0.384
Benzo(b)fluoranthene	ND(0.010)	ND(0.014)	ND(0.010)	0.7	0.7	NA
Benzo(k)fluoranthene	ND(0.010)	ND(0.014)	ND(0.010)	7	7	0.430
Benzo(a)pyrene	ND(0.010)	ND(0.014)	ND(0.010)	0.7	0.7	0.430
Indeno(1,2,3-cd)pyrene	ND(0.010)	ND(0.014)	ND(0.010)	0.7	0.7	NA
Dibenzo(a,h)anthracene	ND(0.010)	ND(0.014)	ND(0.010)	0.7	0.7	0.063
Benzo(g,h,i)perylene	ND(0.010)	ND(0.014)	ND(0.010)	1,000	1,000	NA

NOTES:

1. Results in mg/Kg (milligrams per kilogram).
2. EPH: Extractable Petroleum Hydrocarbons.
2. ND(x) = constituent not detected at practical quantitation limits noted in parentheses.
3. PAH by GC/MS-SIM: Polyaromatic Hydrocarbons with Selected Ion Monitoring.
4. j: estimated concentration/ detected below standard laboratory reporting limits.
5. MCP: Massachusetts Contingency Plan.
6. NOAA ERL: National Oceanic and Atmospheric Administration Effects Range Low.
7. NA: Not Available.

**TABLE 12**  
**SUMMARY OF SEDIMENT ANALYTICAL RESULTS FOR PHASE I CHARACTERIZATION**  
**BUZZARDS BAY, MASSACHUSETTS**  
**SEGMENT: WID-04**  
**Peases Point, Mattapoisett**  
**Sampling Date: 1/22/04**  
**OILING CATEGORY: MODERATE**

Analyte	Sample Location 1		Sample Location 2		Sample Location 3			MCP Method 1 Standards		NOAA Standards
	Upper Intertidal Zone	Lower Intertidal Zone	Upper Intertidal Zone	Lower Intertidal Zone	Upper Intertidal Zone	Middle Intertidal Zone	Lower Intertidal Zone	S-1 / GW-2	S-1 / GW-3	ERL
	WID04-UIT-01	WID04-LIT-01	WID04-UIT-02	WID04-LIT-02	WID04-UIT-03	WID04-MID-03	WID04-LIT-03			
<b>EPH</b>										
C <sub>9</sub> -C <sub>18</sub> Aliphatic Hydrocarbons	ND (34)	ND (34)	ND (33)	ND (32)	ND (33)	ND (33)	ND (32)	1,000	1,000	NA
C <sub>19</sub> -C <sub>36</sub> Aliphatic Hydrocarbons	ND (34)	ND (34)	ND (33)	ND (32)	ND (33)	ND (33)	ND (32)	1,000	1,000	NA
C <sub>11</sub> -C <sub>22</sub> Aromatic Hydrocarbons	ND (34)	ND (34)	ND (33)	ND (32)	ND (33)	ND (33)	ND (32)	NA	800	NA
<b>PAH by GC/MS-SIM by method 8270</b>										
Naphthalene	<b>0.008 j</b>	<b>0.008 j</b>	<b>0.007 j</b>	<b>0.009 j</b>	<b>0.008 j</b>	<b>0.008 j</b>	<b>0.008 j</b>	100	100	0.160
2-Methylnaphthalene	ND (0.011)	ND (0.011)	ND (0.011)	ND (0.011)	ND (0.011)	ND (0.011)	ND (0.011)	500	500	0.070
Acenaphthylene	ND (0.011)	ND (0.011)	ND (0.011)	ND (0.011)	ND (0.011)	ND (0.011)	ND (0.011)	100	100	0.044
Acenaphthene	ND (0.011)	ND (0.011)	ND (0.011)	ND (0.011)	ND (0.011)	ND (0.011)	ND (0.011)	1,000	1,000	0.016
Fluorene	ND (0.011)	ND (0.011)	ND (0.011)	ND (0.011)	ND (0.011)	ND (0.011)	ND (0.011)	1,000	1,000	0.019
Phenanthrene	ND (0.011)	ND (0.011)	ND (0.011)	ND (0.011)	ND (0.011)	ND (0.011)	ND (0.011)	1,000	100	0.240
Anthracene	ND (0.011)	ND (0.011)	ND (0.011)	ND (0.011)	ND (0.011)	ND (0.011)	ND (0.011)	1,000	1,000	0.085
Fluoranthene	ND (0.011)	ND (0.011)	ND (0.011)	ND (0.011)	ND (0.011)	ND (0.011)	ND (0.011)	1,000	1,000	0.600
Pyrene	ND (0.011)	ND (0.011)	ND (0.011)	ND (0.011)	ND (0.011)	ND (0.011)	ND (0.011)	700	700	0.665
Benzo(a)anthracene	ND (0.011)	ND (0.011)	ND (0.011)	ND (0.011)	ND (0.011)	ND (0.011)	ND (0.011)	0.7	0.7	0.261
Chrysene	ND (0.011)	ND (0.011)	ND (0.011)	ND (0.011)	ND (0.011)	ND (0.011)	ND (0.011)	7	7	0.384
Benzo(b)fluoranthene	ND (0.011)	ND (0.011)	ND (0.011)	ND (0.011)	ND (0.011)	ND (0.011)	ND (0.011)	0.7	0.7	NA
Benzo(k)fluoranthene	ND (0.011)	ND (0.011)	ND (0.011)	ND (0.011)	ND (0.011)	ND (0.011)	ND (0.011)	7	7	0.430
Benzo(a)pyrene	ND (0.011)	ND (0.011)	ND (0.011)	ND (0.011)	ND (0.011)	ND (0.011)	ND (0.011)	0.7	0.7	0.430
Indeno(1,2,3-cd)pyrene	ND (0.011)	ND (0.011)	ND (0.011)	ND (0.011)	ND (0.011)	ND (0.011)	ND (0.011)	0.7	0.7	NA
Dibenzo(a,h)anthracene	ND (0.011)	ND (0.011)	ND (0.011)	ND (0.011)	ND (0.011)	ND (0.011)	ND (0.011)	0.7	0.7	0.063
Benzo(g,h,i)perylene	ND (0.011)	ND (0.011)	ND (0.011)	ND (0.011)	ND (0.011)	ND (0.011)	ND (0.011)	1,000	1,000	NA

NOTES:

1. Results in mg/Kg (milligrams per kilogram).
2. EPH: Extractable Petroleum Hydrocarbons.
3. ND(x) = constituent not detected at practical quantitation limits noted in parentheses.
4. j: estimated concentration/ detected below standard laboratory reporting limits.
5. MCP: Massachusetts Contingency Plan.
6. NOAA ERL: National Oceanic and Atmospheric Administration Effects Range Low.
7. NA: Not Available.

**TABLE 12**  
**SUMMARY OF SEDIMENT ANALYTICAL RESULTS FOR PHASE I CHARACTERIZATION**  
**BUZZARDS BAY, MASSACHUSETTS**  
**DUPLICATE SAMPLE DDD-02 (Laboratory QA/QC)**  
**SEGMENT: W1D-04**  
**Peases Point, Mattapoisett**  
**Sampling Date: 1/22/04**  
**OILING CATEGORY: MODERATE**

Analyte	Sample Location 3			MCP Method 1 Standards			NOAA Standards Marine Sediments
	Upper Intertidal Zone	Middle Intertidal Zone	Lower Intertidal Zone	S-1 / GW-1	S-1 / GW-2	S-1 / GW-3	
	DDD2-UIT-03	DDD2-MID-03	DDD2-LIT-03				ERL
<b>EPH</b>							
C <sub>9</sub> -C <sub>18</sub> Aliphatic Hydrocarbons	ND (33)	ND (33)	ND (33)	1,000	1,000	1,000	NA
C <sub>19</sub> -C <sub>36</sub> Aliphatic Hydrocarbons	ND (33)	ND (33)	ND (33)	2,500	1,000	1,000	NA
C <sub>11</sub> -C <sub>22</sub> Aromatic Hydrocarbons	ND (33)	ND (33)	ND (33)	200	800	800	NA
<b>PAH by GC/MS-SIM by method 8270</b>							
Naphthalene	0.010 j	0.011	0.011	4	100	100	0.160
2-Methylnaphthalene	0.007 j	0.007 j	0.007 j	4	500	500	0.070
Acenaphthylene	ND (0.011)	ND (0.011)	ND (0.011)	100	100	100	0.044
Acenaphthene	ND (0.011)	ND (0.011)	ND (0.011)	20	1,000	1,000	0.016
Fluorene	ND (0.011)	ND (0.011)	ND (0.011)	400	1,000	1,000	0.019
Phenanthrene	ND (0.011)	ND (0.011)	ND (0.011)	700	1,000	100	0.240
Anthracene	ND (0.011)	ND (0.011)	ND (0.011)	1,000	1,000	1,000	0.085
Fluoranthene	ND (0.011)	0.007 j	ND (0.011)	1,000	1,000	1,000	0.600
Pyrene	ND (0.011)	0.006 j	ND (0.011)	700	700	700	0.665
Benzo(a)anthracene	ND (0.011)	ND (0.011)	ND (0.011)	0.7	0.7	0.7	0.261
Chrysene	ND (0.011)	ND (0.011)	ND (0.011)	7	7	7	0.384
Benzo(b)fluoranthene	ND (0.011)	ND (0.011)	ND (0.011)	0.7	0.7	0.7	NA
Benzo(k)fluoranthene	ND (0.011)	ND (0.011)	ND (0.011)	7	7	7	0.430
Benzo(a)pyrene	ND (0.011)	ND (0.011)	ND (0.011)	0.7	0.7	0.7	0.430
Indeno(1,2,3-cd)pyrene	ND (0.011)	ND (0.011)	ND (0.011)	0.7	0.7	0.7	NA
Dibenzo(a,h)anthracene	ND (0.011)	ND (0.011)	ND (0.011)	0.7	0.7	0.7	0.063
Benzo(g,h,i)perylene	ND (0.011)	ND (0.011)	ND (0.011)	1,000	1,000	1,000	NA

NOTES:

1. Results in mg/Kg (milligrams per kilogram).
2. EPH: Extractable Petroleum Hydrocarbons.
2. ND(x) = constituent not detected at practical quantitation limits noted in parentheses.
3. PAH by GC/MS-SIM: Polyaromatic Hydrocarbons with Selected Ion Monitoring.
4. j: estimated concentration/ detected below standard laboratory reporting limits.
5. MCP: Massachusetts Contingency Plan.
6. NOAA ERL: National Oceanic and Atmospheric Administration Effects Range Low.
7. NA: Not Available.

**TABLE 12**  
**SUMMARY OF SEDIMENT ANALYTICAL RESULTS FOR PHASE I CHARACTERIZATION**  
**BUZZARDS BAY, MASSACHUSETTS**  
**SEGMENT: WIE-03**  
**Strawberry Point West, Mattapoisett**  
**Sampling Date: 1/21/04**  
**OILING CATEGORY: MODERATE (MARSH)**

Analyte	Sample Location 1	Sample Location 2	Sample Location 3	MCP Method 1 Standards			NOAA Standards Marine Sediments
	Upper Intertidal Zone	Upper Intertidal Zone	Upper Intertidal Zone	S-1 / GW-1	S-1 / GW-2	S-1 / GW-3	ERL
	WIE03-UIT-01	WIE03-UIT-02	WIE03-UIT-03				
<b>EPH</b>							
C <sub>9</sub> -C <sub>18</sub> Aliphatic Hydrocarbons	ND (36)	ND (33)	ND (30)	1,000	1,000	1,000	NA
C <sub>19</sub> -C <sub>36</sub> Aliphatic Hydrocarbons	ND (36)	ND (33)	ND (30)	2,500	1,000	1,000	NA
C <sub>11</sub> -C <sub>22</sub> Aromatic Hydrocarbons	ND (36)	ND (33)	ND (30)	200	800	800	NA
<b>PAH by GC/MS-SIM by method 8270</b>							
Naphthalene	0.013	0.011	0.008 j	4	100	100	0.160
2-Methylnaphthalene	0.010 j	0008 j	0.006 j	4	500	500	0.070
Acenaphthylene	ND (0.012)	ND (0.011)	ND (0.010)	100	100	100	0.044
Acenaphthene	ND (0.012)	ND (0.011)	ND (0.010)	20	1,000	1,000	0.016
Fluorene	ND (0.012)	ND (0.011)	ND (0.010)	400	1,000	1,000	0.019
Phenanthrene	ND (0.012)	ND (0.011)	ND (0.010)	700	1,000	100	0.240
Anthracene	ND (0.012)	ND (0.011)	ND (0.010)	1,000	1,000	1,000	0.085
Fluoranthene	ND (0.012)	ND (0.011)	0.007 j	1,000	1,000	1,000	0.600
Pyrene	ND (0.012)	ND (0.011)	0.007 j	700	700	700	0.665
Benzo(a)anthracene	ND (0.012)	ND (0.011)	ND (0.010)	0.7	0.7	0.7	0.261
Chrysene	ND (0.012)	ND (0.011)	ND (0.010)	7	7	7	0.384
Benzo(b)fluoranthene	ND (0.012)	ND (0.011)	ND (0.010)	0.7	0.7	0.7	NA
Benzo(k)fluoranthene	ND (0.012)	ND (0.011)	ND (0.010)	7	7	7	0.430
Benzo(a)pyrene	ND (0.012)	ND (0.011)	ND (0.010)	0.7	0.7	0.7	0.430
Indeno(1,2,3-cd)pyrene	ND (0.012)	ND (0.011)	ND (0.010)	0.7	0.7	0.7	NA
Dibenzo(a,h)anthracene	ND (0.012)	ND (0.011)	ND (0.010)	0.7	0.7	0.7	0.063
Benzo(g,h,i)perylene	ND (0.012)	ND (0.011)	ND (0.010)	1,000	1,000	1,000	NA

NOTES:

1. Results in mg/Kg (milligrams per kilogram).
2. EPH: Extractable Petroleum Hydrocarbons.
2. ND(x) = constituent not detected at practical quantitation limits noted in parentheses.
3. PAH by GC/MS-SIM: Polyaromatic Hydrocarbons with Selected Ion Monitoring.
4. j: estimated concentration/ detected below standard laboratory reporting limits.
5. MCP: Massachusetts Contingency Plan.
6. NOAA ERL: National Oceanic and Atmospheric Administration Effects Range Low.
7. NA: Not Available.

**TABLE 12**  
**SUMMARY OF SEDIMENT ANALYTICAL RESULTS FOR PHASE I CHARACTERIZATION**  
**BUZZARDS BAY, MASSACHUSETTS**  
**SEGMENT: WIE-04**  
**Town Beach, Mattapoisett**  
**Sampling Date: 1/21/04**  
**OILING CATEGORY: HEAVY**

Analyte	Sample Location 1		Sample Location 2		Sample Location 3		MCP Method 1 Standards			NOAA Standards Marine Sediments
	Upper Intertidal Zone	Lower Intertidal Zone	Upper Intertidal Zone	Lower Intertidal Zone	Upper Intertidal Zone	Lower Intertidal Zone	S-1 / GW-1	S-1 / GW-2	S-1 / GW-3	ERL
	WIE04-UIT-01	WIE04-LIT-01	WIE04-UIT-02	WIE04-LIT-02	WIE04-UIT-03	WIE04-LIT-03				
<b>EPH</b>										
C <sub>9</sub> -C <sub>18</sub> Aliphatic Hydrocarbons	ND (34)	ND (36)	ND (32)	ND (30)	ND (31)	ND (30)	1,000	1,000	1,000	NA
C <sub>19</sub> -C <sub>36</sub> Aliphatic Hydrocarbons	ND (34)	ND (36)	ND (32)	ND (30)	ND (31)	ND (30)	2,500	1,000	1,000	NA
C <sub>11</sub> -C <sub>22</sub> Aromatic Hydrocarbons	ND (34)	ND (36)	ND (32)	ND (30)	ND (31)	ND (30)	200	NA	800	NA
<b>PAH by GC/MS-SIM by method 8270</b>										
Naphthalene	0.010 j	0.011 j	0.011	0.010	0.010	0.009 j	4	100	100	0.160
2-Methylnaphthalene	0.006 j	0.007 j	0.007 j	0.006 j	0.006 j	0.007 j	4	500	500	0.070
Acenaphthylene	ND (0.011)	ND (0.012)	ND (0.011)	ND (0.010)	ND (0.010)	ND (0.010)	100	100	100	0.044
Acenaphthene	ND (0.011)	ND (0.012)	ND (0.011)	ND (0.010)	ND (0.010)	ND (0.010)	20	1,000	1,000	0.016
Fluorene	ND (0.011)	ND (0.012)	ND (0.011)	ND (0.010)	ND (0.010)	ND (0.010)	400	1,000	1,000	0.019
Phenanthrene	ND (0.011)	ND (0.012)	0.011	0.018	0.015	0.012	700	1,000	100	0.240
Anthracene	ND (0.011)	ND (0.012)	ND (0.011)	ND (0.010)	ND (0.010)	ND (0.010)	1,000	1,000	1,000	0.085
Fluoranthene	ND (0.011)	ND (0.012)	0.016	0.024	0.030	0.026	1,000	1,000	1,000	0.600
Pyrene	ND (0.011)	ND (0.012)	0.02	0.028	0.027	0.023	700	700	700	0.665
Benzo(a)anthracene	ND (0.011)	ND (0.012)	0.006 j	0.008 j	0.014	0.008 j	0.7	0.7	0.7	0.261
Chrysene	ND (0.011)	ND (0.012)	0.013	0.014	0.014	0.013	7	7	7	0.384
Benzo(b)fluoranthene	ND (0.011)	ND (0.012)	0.006 j	0.007 j	0.012	0.010	0.7	0.7	0.7	NA
Benzo(k)fluoranthene	ND (0.011)	ND (0.012)	0.006 j	0.008 j	0.012	0.009 j	7	7	7	0.430
Benzo(a)pyrene	ND (0.011)	ND (0.012)	0.006 j	0.007 j	0.014	0.011	0.7	0.7	0.7	0.430
Indeno(1,2,3-cd)pyrene	ND (0.011)	ND (0.012)	ND (0.011)	ND (0.010)	0.008 j	0.008 j	0.7	0.7	0.7	NA
Dibenzo(a,h)anthracene	ND (0.011)	ND (0.012)	ND (0.011)	ND (0.010)	ND (0.010)	ND (0.010)	0.7	0.7	0.7	0.063
Benzo(g,h,i)perylene	ND (0.011)	ND (0.012)	ND (0.011)	0.005 j	0.009 j	0.009 j	1,000	1,000	1,000	NA

NOTES:

1. Results in mg/Kg (milligrams per kilogram).
2. EPH: Extractable Petroleum Hydrocarbons.
3. ND(x) = constituent not detected at practical quantitation limits noted in parentheses.
4. PAH by GC/MS-SIM: Polyaromatic Hydrocarbons with Selected Ion Monitoring.
5. j: estimated concentration/ detected below standard laboratory reporting limits.
6. MCP: Massachusetts Contingency Plan.
7. NOAA ERL: National Oceanic and Atmospheric Administration Effects Range Low.
8. NA: Not Available.



**TABLE 12**  
**SUMMARY OF SEDIMENT ANALYTICAL RESULTS FOR PHASE I CHARACTERIZATION**  
**BUZZARDS BAY, MASSACHUSETTS**  
**DUPLICATE SAMPLE DDD-01 (Laboratory QA/QC)**  
**SEGMENT: W1E-04**  
**Town Beach, Mattapoisett**  
**Sampling Date: 1/21/04**  
**OILING CATEGORY: HEAVY**

Analyte	Sample Location 3		MCP Method 1 Standards			NOAA Standards Marine Sediments
	Upper Intertidal Zone	Lower Intertidal Zone	S-1 / GW-1	S-1 / GW-2	S-1 / GW-3	ERL
	DDD01-UIT-01	DDD01-LIT-01				
<b>EPH</b>						
C <sub>9</sub> -C <sub>18</sub> Aliphatic Hydrocarbons	ND (31)	ND (31)	1,000	1,000	1,000	NA
C <sub>19</sub> -C <sub>36</sub> Aliphatic Hydrocarbons	ND (31)	ND (31)	2,500	1,000	1,000	NA
C <sub>11</sub> -C <sub>22</sub> Aromatic Hydrocarbons	ND (31)	ND (31)	200	800	800	NA
<b>PAH by GC/MS-SIM method 8270</b>						
Naphthalene	0.010	0.010	4	100	100	0.160
2-Methylnaphthalene	0.007 j	0.008 j	4	500	500	0.070
Acenaphthylene	ND (0.010)	ND (0.010)	100	100	100	0.044
Acenaphthene	ND (0.010)	ND (0.010)	20	1,000	1,000	0.016
Fluorene	ND (0.010)	ND (0.010)	400	1,000	1,000	0.019
Phenanthrene	0.006 j	ND (0.010)	700	1,000	100	0.240
Anthracene	ND (0.010)	ND (0.010)	1,000	1,000	1,000	0.085
Fluoranthene	0.019	ND (0.010)	1,000	1,000	1,000	0.600
Pyrene	0.017	ND (0.010)	700	700	700	0.665
Benzo(a)anthracene	0.008 j	ND (0.010)	0.7	0.7	0.7	0.261
Chrysene	0.010 j	ND (0.010)	7	7	7	0.384
Benzo(b)fluoranthene	0.008 j	ND (0.010)	0.7	0.7	0.7	NA
Benzo(k)fluoranthene	0.007 j	ND (0.010)	7	7	7	0.430
Benzo(a)pyrene	0.008 j	ND (0.010)	0.7	0.7	0.7	0.430
Indeno(1,2,3-cd)pyrene	ND (0.010)	ND (0.010)	0.7	0.7	0.7	NA
Dibenzo(a,h)anthracene	ND (0.010)	ND (0.010)	0.7	0.7	0.7	0.063
Benzo(g,h,i)perylene	0.006 j	ND (0.010)	1,000	1,000	1,000	NA

NOTES:

1. Results in mg/Kg (milligrams per kilogram).
2. EPH: Extractable Petroleum Hydrocarbons.
3. ND(x) = constituent not detected at practical quantitation limits noted in parentheses.
4. j: estimated concentration/ detected below standard laboratory reporting limits.
5. MCP: Massachusetts Contingency Plan.
6. NOAA ERL: National Oceanic and Atmospheric Administration Effects Range Low.
7. NA: Not Available.

**TABLE 12**  
**SUMMARY OF SEDIMENT ANALYTICAL RESULTS FOR PHASE I CHARACTERIZATION**  
**BUZZARDS BAY, MASSACHUSETTS**  
**SEGMENT: WIE-06**  
**Town Beach, Mattapoisett**  
**Sampling Date: 1/20/04**  
**OILING CATEGORY: MODERATE**

Analyte	Sample Location 1		Sample Location 2		Sample Location 3		MCP Method 1 Standards			NOAA Standards Marine Sediments
	Upper Intertidal Zone	Lower Intertidal Zone	Upper Intertidal Zone	Lower Intertidal Zone	Upper Intertidal Zone	Lower Intertidal Zone	S-1 / GW-1	S-1 / GW-2	S-1 / GW-3	ERL
	WIE06-UIT-01	WIE06-LIT-01	WIE06-UIT-02	WIE06-LIT-02	WIE06-UIT-03	WIE06-LIT-03				
<b>EPH</b>										
C <sub>9</sub> -C <sub>18</sub> Aliphatic Hydrocarbons	ND (31)	ND (31)	ND (35)	ND (37)	ND (32)	ND (37)	1,000	1,000	1,000	NA
C <sub>19</sub> -C <sub>36</sub> Aliphatic Hydrocarbons	ND (31)	ND (31)	ND (35)	ND (37)	ND (32)	ND (37)	2,500	1,000	1,000	NA
C <sub>11</sub> -C <sub>22</sub> Aromatic Hydrocarbons	ND (31)	ND (31)	ND (35)	ND (37)	ND (32)	ND (37)	200	NA	800	NA
<b>PAH by GC/MS-SIM by method 8270</b>										
Naphthalene	ND (0.010)	0.006 j	0.007 j	0.007 j	0.010 j	0.007 j	4	100	100	0.160
2-Methylnaphthalene	ND (0.010)	ND (0.010)	ND (0.012)	ND (0.012)	ND (0.011)	ND (0.012)	4	500	500	0.070
Acenaphthylene	ND (0.010)	ND (0.010)	ND (0.012)	ND (0.012)	0.012	ND (0.012)	100	100	100	0.044
Acenaphthene	ND (0.010)	ND (0.010)	ND (0.012)	ND (0.012)	ND (0.011)	ND (0.012)	20	1,000	1,000	0.016
Fluorene	ND (0.010)	ND (0.010)	ND (0.012)	ND (0.012)	0.021	ND (0.012)	400	1,000	1,000	0.019
Phenanthrene	ND (0.010)	0.008 j	0.009 j	0.012	0.280	0.016	700	1,000	100	0.240
Anthracene	ND (0.010)	ND (0.010)	ND (0.012)	ND (0.012)	0.073	ND (0.012)	1,000	1,000	1,000	0.085
Fluoranthene	ND (0.010)	0.009 j	0.018	0.045	0.650	0.055	1,000	1,000	1,000	0.600
Pyrene	ND (0.010)	0.008 j	0.016	0.040	0.490	0.048	700	700	700	0.665
Benzo(a)anthracene	ND (0.010)	ND (0.010)	0.007 j	0.021	0.270	0.025	0.7	0.7	0.7	0.261
Chrysene	ND (0.010)	ND (0.010)	0.010 j	0.025	0.250	0.031	7	7	7	0.384
Benzo(b)fluoranthene	ND (0.010)	ND (0.010)	0.008 j	0.020	0.190	0.027	0.7	0.7	0.7	NA
Benzo(k)fluoranthene	ND (0.010)	ND (0.010)	0.009 j	0.021	0.200	0.028	7	7	7	0.430
Benzo(a)pyrene	ND (0.010)	ND (0.010)	0.009 j	0.027	0.240	0.035	0.7	0.7	0.7	0.430
Indeno(1,2,3-cd)pyrene	ND (0.010)	ND (0.010)	ND (0.012)	0.015	0.120	0.020	0.7	0.7	0.7	NA
Dibenzo(a,h)anthracene	ND (0.010)	ND (0.010)	ND (0.012)	ND (0.012)	0.036	ND (0.012)	0.7	0.7	0.7	0.063
Benzo(g,h,i)perylene	ND (0.010)	ND (0.010)	ND (0.012)	0.015	0.120	0.020	1,000	1,000	1,000	NA

NOTES:

1. Results in mg/Kg (milligrams per kilogram).
2. EPH: Extractable Petroleum Hydrocarbons.
3. ND(x) = constituent not detected at practical quantitation limits noted in parentheses.
4. j: estimated concentration/ detected below standard laboratory reporting limits.
5. MCP: Massachusetts Contingency Plan.
6. NOAA ERL: National Oceanic and Atmospheric Administration Effects Range Low.
7. NA: Not Available.

**TABLE 12**  
**SUMMARY OF SEDIMENT ANALYTICAL RESULTS FOR PHASE I CHARACTERIZATION**  
**BUZZARDS BAY, MASSACHUSETTS**  
**SEGMENT: WIF-04**  
**Brandt Island Cove, Mattapoisett**  
**Sampling Date: 1/20/04**  
**OILING CATEGORY: HEAVY (MARSH)**

Analyte	Sample Location 1	Sample Location 2	Sample Location 3	MCP Method 1 Standards			NOAA Standards Marine Sediments
	Upper Intertidal Zone	Upper Intertidal Zone	Upper Intertidal Zone	S-1 / GW-1	S-1 / GW-2	S-1 / GW-3	ERL
	WIF-UIT-01	WIF-UIT-02	WIF-UIT-03				
<b>EPH</b>							
C <sub>9</sub> -C <sub>18</sub> Aliphatic Hydrocarbons	ND (45)	ND (44)	ND (38)	1,000	1,000	1,000	NA
C <sub>19</sub> -C <sub>36</sub> Aliphatic Hydrocarbons	ND (45)	ND (44)	ND (38)	2,500	1,000	1,000	NA
C <sub>11</sub> -C <sub>22</sub> Aromatic Hydrocarbons	ND (45)	ND (44)	ND (38)	200	800	800	NA
<b>PAH by GC/MS-SIM by method 8270</b>							
Naphthalene	0.012 j	0.015	0.013	4	100	100	0.160
2-Methylnaphthalene	0.009 j	0.009 j	0.008 j	4	500	500	0.070
Acenaphthylene	ND (0.015)	ND (0.015)	ND (0.013)	100	100	100	0.044
Acenaphthene	ND (0.015)	ND (0.015)	ND (0.013)	20	1,000	1,000	0.016
Fluorene	ND (0.015)	ND (0.015)	ND (0.013)	400	1,000	1,000	0.019
Phenanthrene	ND (0.015)	ND (0.015)	ND (0.013)	700	1,000	100	0.240
Anthracene	ND (0.015)	ND (0.015)	ND (0.013)	1,000	1,000	1,000	0.085
Fluoranthene	ND (0.015)	ND (0.015)	ND (0.013)	1,000	1,000	1,000	0.600
Pyrene	ND (0.015)	ND (0.015)	ND (0.013)	700	700	700	0.665
Benzo(a)anthracene	ND (0.015)	ND (0.015)	ND (0.013)	0.7	0.7	0.7	0.261
Chrysene	ND (0.015)	ND (0.015)	ND (0.013)	7	7	7	0.384
Benzo(b)fluoranthene	ND (0.015)	ND (0.015)	ND (0.013)	0.7	0.7	0.7	NA
Benzo(k)fluoranthene	ND (0.015)	ND (0.015)	ND (0.013)	7	7	7	0.430
Benzo(a)pyrene	ND (0.015)	ND (0.015)	ND (0.013)	0.7	0.7	0.7	0.430
Indeno(1,2,3-cd)pyrene	ND (0.015)	ND (0.015)	ND (0.013)	0.7	0.7	0.7	NA
Dibenzo(a,h)anthracene	ND (0.015)	ND (0.015)	ND (0.013)	0.7	0.7	0.7	0.063
Benzo(g,h,i)perylene	ND (0.015)	ND (0.015)	ND (0.013)	1,000	1,000	1,000	NA

NOTES:

1. Results in mg/Kg (milligrams per kilogram).
2. EPH: Extractable Petroleum Hydrocarbons.
2. ND(x) = constituent not detected at practical quantitation limits noted in parentheses.
3. PAH by GC/MS-SIM: Polyaromatic Hydrocarbons with Selected Ion Monitoring.
4. j: estimated concentration/ detected below standard laboratory reporting limits.
5. MCP: Massachusetts Contingency Plan.
6. NOAA ERL: National Oceanic and Atmospheric Administration Effects Range Low.
7. NA: Not Available.

**TABLE 12**  
**SUMMARY OF SEDIMENT ANALYTICAL RESULTS FOR PHASE I CHARACTERIZATION**  
**BUZZARDS BAY, MASSACHUSETTS**  
**SEGMENT: W2A-03**  
**Pope's Beach, Fairhaven**  
**Sampling Date: 1/19/04**  
**OILING CATEGORY: MODERATE**

Analyte	Sample Location 1		Sample Location 2		Sample Location 3		MCP Method 1 Standards			NOAA Standards Marine Sediments
	Upper Intertidal Zone	Lower Intertidal Zone	Upper Intertidal Zone	Lower Intertidal Zone	Upper Intertidal Zone	Lower Intertidal Zone	S-1 / GW-1	S-1 / GW-2	S-1 / GW-3	ERL
	W2A03-UIT-01	W2A03-LIT-01	W2A03-UIT-02	W2A03-LIT-02	W2A03-UIT-03	W2A13-LIT-03				
<b>EPH</b>										
C <sub>9</sub> -C <sub>18</sub> Aliphatic Hydrocarbons	ND (31)	ND (38)	ND (34)	ND (39)	ND (37)	ND (35)	1,000	1,000	1,000	NA
C <sub>19</sub> -C <sub>36</sub> Aliphatic Hydrocarbons	ND (31)	ND (38)	ND (34)	ND (39)	ND (37)	ND (35)	2,500	1,000	1,000	NA
C <sub>11</sub> -C <sub>22</sub> Aromatic Hydrocarbons	ND (31)	ND (38)	ND (34)	ND (39)	ND (37)	ND (35)	200	NA	800	NA
<b>PAH by GC/MS-SIM method 8270</b>										
Naphthalene	<b>0.009 j</b>	<b>0.014</b>	<b>0.008 j</b>	<b>0.059</b>	<b>0.014</b>	<b>0.012</b>	4	100	100	0.160
2-Methylnaphthalene	ND (0.010)	ND (0.013)	ND (0.011)	<b>0.029</b>	ND (0.012)	ND (0.012)	4	500	500	0.070
Acenaphthylene	ND (0.010)	ND (0.013)	ND (0.011)	<b>0.025</b>	<b>0.011</b>	ND (0.012)	100	100	100	0.044
Acenaphthene	ND (0.010)	ND (0.013)	ND (0.011)	<b>0.089</b>	ND (0.012)	ND (0.012)	20	1,000	1,000	0.016
Fluorene	ND (0.010)	ND (0.013)	ND (0.011)	<b>0.130</b>	<b>0.011</b>	ND (0.012)	400	1,000	1,000	0.019
Phenanthrene	<b>0.006 j</b>	ND (0.013)	<b>0.041</b>	<b>0.790</b>	<b>0.160</b>	<b>0.072</b>	700	1,000	100	0.240
Anthracene	ND (0.010)	ND (0.013)	<b>0.009 j</b>	<b>0.220</b>	<b>0.025</b>	<b>0.012</b>	1,000	1,000	1,000	0.085
Fluoranthene	<b>0.010</b>	ND (0.013)	<b>0.060</b>	<b>1.0</b>	<b>0.310</b>	<b>0.160</b>	1,000	1,000	1,000	0.600
Pyrene	<b>0.009 j</b>	ND (0.013)	<b>0.048</b>	<b>0.740</b>	<b>0.300</b>	<b>0.130</b>	700	700	700	0.665
Benzo(a)anthracene	ND (0.010)	ND (0.013)	<b>0.021</b>	<b>0.410</b>	<b>0.110</b>	<b>0.060</b>	0.7	0.7	0.7	0.261
Chrysene	<b>0.006 j</b>	ND (0.013)	<b>0.025</b>	<b>0.390</b>	<b>0.130</b>	<b>0.079</b>	7	7	7	0.384
Benzo(b)fluoranthene	<b>0.006 j</b>	ND (0.013)	<b>0.022</b>	<b>0.350</b>	<b>0.110</b>	<b>0.064</b>	0.7	0.7	0.7	NA
Benzo(k)fluoranthene	ND (0.010)	ND (0.013)	<b>0.019</b>	<b>0.310</b>	<b>0.095</b>	<b>0.061</b>	7	7	7	0.430
Benzo(a)pyrene	ND (0.010)	ND (0.013)	<b>0.029</b>	<b>0.460</b>	<b>0.170</b>	<b>0.080</b>	0.7	0.7	0.7	0.430
Indeno(1,2,3-cd)pyrene	ND (0.010)	ND (0.013)	<b>0.016</b>	<b>0.240</b>	<b>0.097</b>	<b>0.042</b>	0.7	0.7	0.7	NA
Dibenzo(a,h)anthracene	ND (0.010)	ND (0.013)	ND (0.011)	<b>0.071</b>	<b>0.019</b>	<b>0.012</b>	0.7	0.7	0.7	0.063
Benzo(g,h,i)perylene	ND (0.010)	ND (0.013)	<b>0.020</b>	<b>0.250</b>	<b>0.120</b>	<b>0.046</b>	1,000	1,000	1,000	NA

NOTES:

1. Results in mg/Kg (milligrams per kilogram).
2. EPH: Extractable Petroleum Hydrocarbons.
3. ND(x) = constituent not detected at practical quantitation limits noted in parentheses.
4. j: estimated concentration/ detected below standard laboratory reporting limits.
5. MCP: Massachusetts Contingency Plan.
6. NOAA ERL: National Oceanic and Atmospheric Administration Effects Range Low.
7. NA: Not Available.

**TABLE 12**  
**SUMMARY OF SEDIMENT ANALYTICAL RESULTS FOR PHASE I CHARACTERIZATION**  
**BUZZARDS BAY, MASSACHUSETTS**  
**SEGMENT: W2A-04**  
**Manhattan Avenue, Fairhaven**  
**Sampling Date: 1/19/04**  
**OILING CATEGORY: HEAVY**

Analyte	Sample Location 1		Sample Location 2		Sample Location 3		MCP Method 1 Standards			NOAA Standards Marine Sediments
	Upper Intertidal Zone	Lower Intertidal Zone	Upper Intertidal Zone	Lower Intertidal Zone	Upper Intertidal Zone	Lower Intertidal Zone	S-1 / GW-1	S-1 / GW-2	S-1 / GW-3	ERL
	W2A04-UIT-01	W2A04-LIT-01	W2A04-UIT-02	W2A04-LIT-02	W2A04-UIT-03	W2A04-LIT-03				
<b>EPH</b>										
C <sub>9</sub> -C <sub>18</sub> Aliphatic Hydrocarbons	ND (34)	ND (31)	ND (32)	ND (35)	ND (34)	ND (34)	1,000	1,000	1,000	NA
C <sub>19</sub> -C <sub>36</sub> Aliphatic Hydrocarbons	ND (34)	ND (31)	ND (32)	ND (35)	ND (34)	ND (34)	2,500	1,000	1,000	NA
C <sub>11</sub> -C <sub>22</sub> Aromatic Hydrocarbons	ND (34)	ND (31)	ND (32)	ND (35)	ND (34)	ND (34)	200	NA	800	NA
<b>PAH by GC/MS-SIM by method 8270</b>										
Naphthalene	<b>0.009 j</b>	<b>0.007 j</b>	<b>0.014</b>	<b>0.007 j</b>	<b>0.007 j</b>	<b>0.008 j</b>	<b>4</b>	<b>100</b>	<b>100</b>	<b>0.160</b>
2-Methylnaphthalene	ND (0.011)	ND (0.010)	ND (0.011)	ND (0.012)	ND (0.011)	ND (0.011)	<b>4</b>	<b>500</b>	<b>500</b>	<b>0.070</b>
Acenaphthylene	ND (0.011)	ND (0.010)	ND (0.011)	ND (0.012)	ND (0.011)	ND (0.011)	<b>100</b>	<b>100</b>	<b>100</b>	<b>0.044</b>
Acenaphthene	ND (0.011)	ND (0.010)	ND (0.011)	ND (0.012)	ND (0.011)	ND (0.011)	<b>20</b>	<b>1,000</b>	<b>1,000</b>	<b>0.016</b>
Fluorene	ND (0.011)	ND (0.010)	ND (0.011)	ND (0.012)	ND (0.011)	ND (0.011)	<b>400</b>	<b>1,000</b>	<b>1,000</b>	<b>0.019</b>
Phenanthrene	ND (0.011)	ND (0.010)	ND (0.011)	ND (0.012)	ND (0.011)	ND (0.011)	<b>700</b>	<b>1,000</b>	<b>100</b>	<b>0.240</b>
Anthracene	ND (0.011)	ND (0.010)	ND (0.011)	ND (0.012)	ND (0.011)	ND (0.011)	<b>1,000</b>	<b>1,000</b>	<b>1,000</b>	<b>0.085</b>
Fluoranthene	ND (0.011)	ND (0.010)	ND (0.011)	ND (0.012)	ND (0.011)	ND (0.011)	<b>0.016</b>	<b>1,000</b>	<b>1,000</b>	<b>0.600</b>
Pyrene	ND (0.011)	ND (0.010)	ND (0.011)	ND (0.012)	ND (0.011)	ND (0.011)	<b>700</b>	<b>700</b>	<b>700</b>	<b>0.665</b>
Benzo(a)anthracene	ND (0.011)	ND (0.010)	ND (0.011)	ND (0.012)	ND (0.011)	ND (0.011)	<b>0.7</b>	<b>0.7</b>	<b>0.7</b>	<b>0.261</b>
Chrysene	ND (0.011)	ND (0.010)	ND (0.011)	ND (0.012)	ND (0.011)	ND (0.011)	<b>0.012</b>	<b>7</b>	<b>7</b>	<b>0.384</b>
Benzo(b)fluoranthene	ND (0.011)	ND (0.010)	ND (0.011)	ND (0.012)	ND (0.011)	ND (0.011)	<b>0.010 j</b>	<b>0.7</b>	<b>0.7</b>	<b>NA</b>
Benzo(k)fluoranthene	ND (0.011)	ND (0.010)	ND (0.011)	ND (0.012)	ND (0.011)	ND (0.011)	<b>0.008 j</b>	<b>7</b>	<b>7</b>	<b>0.430</b>
Benzo(a)pyrene	ND (0.011)	ND (0.010)	ND (0.011)	ND (0.012)	ND (0.011)	ND (0.011)	<b>0.7</b>	<b>0.7</b>	<b>0.7</b>	<b>0.430</b>
Indeno(1,2,3-cd)pyrene	ND (0.011)	ND (0.010)	ND (0.011)	ND (0.012)	ND (0.011)	ND (0.011)	<b>0.7</b>	<b>0.7</b>	<b>0.7</b>	<b>NA</b>
Dibenzo(a,h)anthracene	ND (0.011)	ND (0.010)	ND (0.011)	ND (0.012)	ND (0.011)	ND (0.011)	<b>0.7</b>	<b>0.7</b>	<b>0.7</b>	<b>0.063</b>
Benzo(g,h,i)perylene	ND (0.011)	ND (0.010)	ND (0.011)	ND (0.012)	ND (0.011)	ND (0.011)	<b>0.006 j</b>	<b>1,000</b>	<b>1,000</b>	<b>NA</b>

NOTES:

1. Results in mg/Kg (milligrams per kilogram).
2. EPH: Extractable Petroleum Hydrocarbons.
3. ND(x) = constituent not detected at practical quantitation limits noted in parentheses.
4. PAH by GC/MS-SIM: Polycyclic Aromatic Hydrocarbons with Selected Ion Monitoring.
5. j: estimated concentration/ detected below standard laboratory reporting limits.
6. MCP: Massachusetts Contingency Plan.
7. NOAA ERL: National Oceanic and Atmospheric Administration Effects Range Low.
8. NA: Not Available.

**TABLE 12**  
**SUMMARY OF SEDIMENT ANALYTICAL RESULTS FOR PHASE I CHARACTERIZATION**  
**BUZZARDS BAY, MASSACHUSETTS**  
**SEGMENT: W2A-09**  
**Sconticut Neck East, Fairhaven**  
**Sampling Date: 1/20/04**  
**OILING CATEGORY: HEAVY**

Analyte	Sample Location 1		Sample Location 2		Sample Location 3		MCP Method 1 Standards			NOAA Standards Marine Sediments
	Upper Intertidal Zone	Lower Intertidal Zone	Upper Intertidal Zone	Lower Intertidal Zone	Upper Intertidal Zone	Lower Intertidal Zone	S-1 / GW-1	S-1 / GW-2	S-1 / GW-3	ERL
	W2A09-UIT-01	W2A09-LIT-01	W2A09-UIT-02	W2A09-LIT-02	W2A09-UIT-03	W2A09-LIT-03				
<b>EPH</b>										
C <sub>9</sub> -C <sub>18</sub> Aliphatic Hydrocarbons	ND (33)	ND (31)	ND (33)	ND (34)	ND (32)	ND (40)	1,000	1,000	1,000	NA
C <sub>19</sub> -C <sub>36</sub> Aliphatic Hydrocarbons	ND (33)	ND (31)	ND (33)	ND (34)	ND (32)	ND (40)	2,500	1,000	1,000	NA
C <sub>11</sub> -C <sub>22</sub> Aromatic Hydrocarbons	ND (33)	ND (31)	ND (33)	ND (34)	ND (32)	ND (40)	200	NA	800	NA
<b>PAH by GC/MS-SIM by method 8270</b>										
Naphthalene	0.010 j	0.008 j	0.010 j	0.011	0.009 j	0.013	4	100	100	0.160
2-Methylnaphthalene	0.006 j	ND (0.010)	ND (0.011)	0.007 j	0.006 j	0.009 j	4	500	500	0.070
Acenaphthylene	ND (0.011)	ND (0.010)	ND (0.011)	ND (0.011)	ND (0.011)	ND (0.013)	100	100	100	0.044
Acenaphthene	ND (0.011)	ND (0.010)	ND (0.011)	ND (0.011)	ND (0.011)	ND (0.013)	20	1,000	1,000	0.016
Fluorene	ND (0.011)	ND (0.010)	ND (0.011)	ND (0.011)	ND (0.011)	ND (0.013)	400	1,000	1,000	0.019
Phenanthrene	ND (0.011)	ND (0.010)	0.010 j	0.024	ND (0.011)	ND (0.013)	700	1,000	100	0.240
Anthracene	ND (0.011)	ND (0.010)	ND (0.011)	ND (0.011)	ND (0.011)	ND (0.013)	1,000	1,000	1,000	0.085
Fluoranthene	ND (0.011)	ND (0.010)	0.014	0.035	ND (0.011)	ND (0.013)	1,000	1,000	1,000	0.600
Pyrene	ND (0.011)	ND (0.010)	0.012	0.030	ND (0.011)	ND (0.013)	700	700	700	0.665
Benzo(a)anthracene	ND (0.011)	ND (0.010)	0.007 j	0.012	ND (0.011)	ND (0.013)	0.7	0.7	0.7	0.261
Chrysene	ND (0.011)	ND (0.010)	0.007 j	0.012	ND (0.011)	ND (0.013)	7	7	7	0.384
Benzo(b)fluoranthene	ND (0.011)	ND (0.010)	ND (0.011)	0.011	ND (0.011)	ND (0.013)	0.7	0.7	0.7	NA
Benzo(k)fluoranthene	ND (0.011)	ND (0.010)	ND (0.011)	0.010 j	ND (0.011)	ND (0.013)	7	7	7	0.430
Benzo(a)pyrene	ND (0.011)	ND (0.010)	0.006 j	0.011	ND (0.011)	ND (0.013)	0.7	0.7	0.7	0.430
Indeno(1,2,3-cd)pyrene	ND (0.011)	ND (0.010)	ND (0.011)	0.006 j	ND (0.011)	ND (0.013)	0.7	0.7	0.7	NA
Dibenzo(a,h)anthracene	ND (0.011)	ND (0.010)	ND (0.011)	ND (0.011)	ND (0.011)	ND (0.013)	0.7	0.7	0.7	0.063
Benzo(g,h,i)perylene	ND (0.011)	ND (0.010)	ND (0.011)	0.007 j	ND (0.011)	ND (0.013)	1,000	1,000	1,000	NA

NOTES:

1. Results in mg/Kg (milligrams per kilogram).
2. EPH: Extractable Petroleum Hydrocarbons.
3. ND(x) = constituent not detected at practical quantitation limits noted in parentheses.
3. PAH by GC/MS-SIM: Polycyclic Aromatic Hydrocarbons with Selected Ion Monitoring.
4. j: estimated concentration/ detected below standard laboratory reporting limits.
5. MCP: Massachusetts Contingency Plan.
6. NOAA ERL: National Oceanic and Atmospheric Administration Effects Range Low.
7. NA: Not Available.

**TABLE 12**  
**SUMMARY OF SEDIMENT ANALYTICAL RESULTS FOR PHASE I CHARACTERIZATION**  
**BUZZARDS BAY, MASSACHUSETTS**  
**SEGMENT: W2A-11**  
**West Island West, Fairhaven**  
**Sampling Date: 1/20/04**  
**OILING CATEGORY: HEAVY**

Analyte	Sample Location 1		Sample Location 2		Sample Location 3		MCP Method 1 Standards			NOAA Standards Marine Sediments
	Upper Intertidal Zone	Lower Intertidal Zone	Upper Intertidal Zone	Lower Intertidal Zone	Upper Intertidal Zone	Lower Intertidal Zone	S-1 / GW-1	S-1 / GW-2	S-1 / GW-3	ERL
	W2A11-UIT-01	W2A11-LIT-01	W2A11-UIT-02	W2A11-LIT-02	W2A11-UIT-03	W2A11-LIT-03				
<b>EPH</b>										
C <sub>9</sub> -C <sub>18</sub> Aliphatic Hydrocarbons	ND (33)	ND (35)	ND (30)	ND (36)	ND (35)	ND (35)	1,000	1,000	1,000	NA
C <sub>19</sub> -C <sub>36</sub> Aliphatic Hydrocarbons	ND (33)	ND (35)	ND (30)	ND (36)	ND (35)	ND (35)	2,500	1,000	1,000	NA
C <sub>11</sub> -C <sub>22</sub> Aromatic Hydrocarbons	ND (33)	ND (35)	ND (30)	ND (36)	ND (35)	ND (35)	200	NA	800	NA
<b>PAH by GC/MS-SIM by method 8270</b>										
Naphthalene	0.010 j	0.011 j	0.009 j	0.010 j	0.010 j	0.010 j	4	100	100	0.160
2-Methylnaphthalene	ND (0.011)	0.007 j	ND (0.010)	ND (0.012)	0.006 j	ND (0.012)	4	500	500	0.070
Acenaphthylene	ND (0.011)	ND (0.012)	ND (0.010)	ND (0.012)	ND (0.012)	ND (0.012)	100	100	100	0.044
Acenaphthene	ND (0.011)	ND (0.012)	ND (0.010)	ND (0.012)	ND (0.012)	ND (0.012)	20	1,000	1,000	0.016
Fluorene	ND (0.011)	ND (0.012)	ND (0.010)	ND (0.012)	ND (0.012)	ND (0.012)	400	1,000	1,000	0.019
Phenanthrene	ND (0.011)	ND (0.012)	ND (0.010)	ND (0.012)	ND (0.012)	ND (0.012)	700	1,000	100	0.240
Anthracene	ND (0.011)	ND (0.012)	ND (0.010)	ND (0.012)	ND (0.012)	ND (0.012)	1,000	1,000	1,000	0.085
Fluoranthene	ND (0.011)	ND (0.012)	ND (0.010)	ND (0.012)	ND (0.012)	ND (0.012)	1,000	1,000	1,000	0.600
Pyrene	ND (0.011)	ND (0.012)	ND (0.010)	ND (0.012)	ND (0.012)	ND (0.012)	700	700	700	0.665
Benzo(a)anthracene	ND (0.011)	ND (0.012)	ND (0.010)	ND (0.012)	ND (0.012)	ND (0.012)	0.7	0.7	0.7	0.261
Chrysene	ND (0.011)	ND (0.012)	ND (0.010)	ND (0.012)	ND (0.012)	ND (0.012)	7	7	7	0.384
Benzo(b)fluoranthene	ND (0.011)	ND (0.012)	ND (0.010)	ND (0.012)	ND (0.012)	ND (0.012)	0.7	0.7	0.7	NA
Benzo(k)fluoranthene	ND (0.011)	ND (0.012)	ND (0.010)	ND (0.012)	ND (0.012)	ND (0.012)	7	7	7	0.430
Benzo(a)pyrene	ND (0.011)	ND (0.012)	ND (0.010)	ND (0.012)	ND (0.012)	ND (0.012)	0.7	0.7	0.7	0.430
Indeno(1,2,3-cd)pyrene	ND (0.011)	ND (0.012)	ND (0.010)	ND (0.012)	ND (0.012)	ND (0.012)	0.7	0.7	0.7	NA
Dibenzo(a,h)anthracene	ND (0.011)	ND (0.012)	ND (0.010)	ND (0.012)	ND (0.012)	ND (0.012)	0.7	0.7	0.7	0.063
Benzo(g,h,i)perylene	ND (0.011)	ND (0.012)	ND (0.010)	ND (0.012)	ND (0.012)	ND (0.012)	1,000	1,000	1,000	NA

NOTES:

1. Results in mg/Kg (milligrams per kilogram).
2. EPH: Extractable Petroleum Hydrocarbons.
3. ND(x) = constituent not detected at practical quantitation limits noted in parentheses.
4. PAH by GC/MS-SIM: Polycyclic Aromatic Hydrocarbons with Selected Ion Monitoring.
5. j: estimated concentration/ detected below standard laboratory reporting limits.
6. MCP: Massachusetts Contingency Plan.
7. NOAA ERL: National Oceanic and Atmospheric Administration Effects Range Low.
8. NA: Not Available.

**TABLE 12**  
**SUMMARY OF SEDIMENT ANALYTICAL RESULTS FOR PHASE I CHARACTERIZATION**  
**BUZZARDS BAY, MASSACHUSETTS**  
**SEGMENT: W2A-13**  
**East Cove, Fairhaven**  
**Sampling Date: 1/22/04**  
**OILING CATEGORY: LIGHT (MARSH)**

Analyte	Sample Location 2	Sample Location 3	MCP Method 1 Standards			NOAA Standards Marine Sediments
	Marsh Area	Marsh Area	S-1 / GW-1	S-1 / GW-2	S-1 / GW-3	ERL
	<b>W2A13-M-02</b>	<b>W2A13-M-03</b>				
<b>EPH</b>						
C <sub>9</sub> -C <sub>18</sub> Aliphatic Hydrocarbons	ND (94)	ND (40)	1,000	1,000	1,000	NA
C <sub>19</sub> -C <sub>36</sub> Aliphatic Hydrocarbons	ND (94)	ND (40)	2,500	1,000	1,000	NA
C <sub>11</sub> -C <sub>22</sub> Aromatic Hydrocarbons	160	ND (40)	200	800	800	NA
<b>PAH by GC/MS-SIM by method 8270</b>						
Naphthalene	0.033	0.012 j	4	100	100	0.160
2-Methylnaphthalene	0.021 j	0.007 j	4	500	500	0.070
Acenaphthylene	ND (0.031)	ND (0.013)	100	100	100	0.044
Acenaphthene	ND (0.031)	ND (0.013)	20	1,000	1,000	0.016
Fluorene	ND (0.031)	ND (0.013)	400	1,000	1,000	0.019
Phenanthrene	0.019 j	ND (0.013)	700	1,000	100	0.240
Anthracene	ND (0.031)	ND (0.013)	1,000	1,000	1,000	0.085
Fluoranthene	ND (0.031)	ND (0.013)	1,000	1,000	1,000	0.600
Pyrene	ND (0.031)	ND (0.013)	700	700	700	0.665
Benzo(a)anthracene	ND (0.031)	ND (0.013)	0.7	0.7	0.7	0.261
Chrysene	ND (0.031)	ND (0.013)	7	7	7	0.384
Benzo(b)fluoranthene	ND (0.031)	ND (0.013)	0.7	0.7	0.7	NA
Benzo(k)fluoranthene	ND (0.031)	ND (0.013)	7	7	7	0.430
Benzo(a)pyrene	ND (0.031)	ND (0.013)	0.7	0.7	0.7	0.430
Indeno(1,2,3-cd)pyrene	ND (0.031)	ND (0.013)	0.7	0.7	0.7	NA
Dibenzo(a,h)anthracene	ND (0.031)	ND (0.013)	0.7	0.7	0.7	0.063
Benzo(g,h,i)perylene	ND (0.031)	ND (0.013)	1,000	1,000	1,000	NA

NOTES:

1. Results in mg/Kg (milligrams per kilogram).
2. EPH: Extractable Petroleum Hydrocarbons.
2. ND(x) = constituent not detected at practical quantitation limits noted in parentheses.
3. PAH by GC/MS-SIM: Polyaromatic Hydrocarbons with Selected Ion Monitoring.
4. j: estimated concentration/ detected below standard laboratory reporting limits.
5. MCP: Massachusetts Contingency Plan.
6. NOAA ERL: National Oceanic and Atmospheric Administration Effects Range Low.
7. NA: Not Available.



**TABLE 12**  
**SUMMARY OF SEDIMENT ANALYTICAL RESULTS FOR PHASE I CHARACTERIZATION**  
**BUZZARDS BAY, MASSACHUSETTS**  
**SEGMENT: W2A-14**  
**Pine Creek, Fairhaven**  
**Sampling Date: 1/22/04**  
**OILING CATEGORY: MODERATE (MARSH)**

Analyte	Sample Location 1	Sample Location 2	Sample Location 3	MCP Method 1 Standards			NOAA Standards Marine Sediments
	Marsh Area	Upper Intertidal Zone	Upper Intertidal Zone	S-1 / GW-1	S-1 / GW-2	S-1 / GW-3	ERL
	W2A14-M-01	W2A14-UIT-02	W2A14-UIT-03				
<b>EPH</b>							
C <sub>9</sub> -C <sub>18</sub> Aliphatic Hydrocarbons	ND (31)	ND (30)	ND (31)	1,000	1,000	1,000	NA
C <sub>19</sub> -C <sub>36</sub> Aliphatic Hydrocarbons	ND (31)	ND (30)	ND (31)	2,500	1,000	1,000	NA
C <sub>11</sub> -C <sub>22</sub> Aromatic Hydrocarbons	ND (31)	ND (30)	ND (31)	200	800	800	NA
<b>PAH by GC/MS-SIM by method 8270</b>							
Naphthalene	0.010 j	0.009 j	0.010 j	4	100	100	0.160
2-Methylnaphthalene	ND (0.010)	ND (0.010)	0.006 j	4	500	500	0.070
Acenaphthylene	0.006 j	ND (0.010)	ND (0.010)	100	100	100	0.044
Acenaphthene	ND (0.010)	ND (0.010)	ND (0.010)	20	1,000	1,000	0.016
Fluorene	ND (0.010)	ND (0.010)	ND (0.010)	400	1,000	1,000	0.019
Phenanthrene	ND (0.010)	ND (0.010)	ND (0.010)	700	1,000	100	0.240
Anthracene	ND (0.010)	ND (0.010)	ND (0.010)	1,000	1,000	1,000	0.085
Fluoranthene	ND (0.010)	ND (0.010)	ND (0.010)	1,000	1,000	1,000	0.600
Pyrene	ND (0.010)	ND (0.010)	ND (0.010)	700	700	700	0.665
Benzo(a)anthracene	ND (0.010)	ND (0.010)	ND (0.010)	0.7	0.7	0.7	0.261
Chrysene	ND (0.010)	ND (0.010)	ND (0.010)	7	7	7	0.384
Benzo(b)fluoranthene	ND (0.010)	ND (0.010)	ND (0.010)	0.7	0.7	0.7	NA
Benzo(k)fluoranthene	ND (0.010)	ND (0.010)	ND (0.010)	7	7	7	0.430
Benzo(a)pyrene	ND (0.010)	ND (0.010)	ND (0.010)	0.7	0.7	0.7	0.430
Indeno(1,2,3-cd)pyrene	ND (0.010)	ND (0.010)	ND (0.010)	0.7	0.7	0.7	NA
Dibenzo(a,h)anthracene	ND (0.010)	ND (0.010)	ND (0.010)	0.7	0.7	0.7	0.063
Benzo(g,h,i)perylene	ND (0.010)	ND (0.010)	ND (0.010)	1,000	1,000	1,000	NA

NOTES:

1. Results in mg/Kg (milligrams per kilogram).
2. EPH: Extractable Petroleum Hydrocarbons.
2. ND(x) = constituent not detected at practical quantitation limits noted in parentheses.
3. PAH by GC/MS-SIM: Polyaromatic Hydrocarbons with Selected Ion Monitoring.
4. j: estimated concentration/ detected below standard laboratory reporting limits.
5. MCP: Massachusetts Contingency Plan.
6. NOAA ERL: National Oceanic and Atmospheric Administration Effects Range Low.
7. NA: Not Available.

**TABLE 12**  
**SUMMARY OF SEDIMENT ANALYTICAL RESULTS FOR PHASE I CHARACTERIZATION**  
**BUZZARDS BAY, MASSACHUSETTS**  
**SEGMENT: W2A-15**  
**West Island North, New Bedford**  
**Sampling Date: 1/21/04**  
**OILING CATEGORY: LIGHT**

Analyte	Sample Location 1	Sample Location 2	Sample Location 3		MCP Method 1 Standards			NOAA Standards Marine Sediments
	Upper Intertidal Zone	Upper Intertidal Zone	Upper Intertidal Zone	Lower Intertidal Zone	S-1 / GW-1	S-1 / GW-2	S-1 / GW-3	ERL
	W2A15-UIT-01	W2A15-UIT-02	W2A15-UIT-03	W2A15-LIT-03				
<b>EPH</b>								
C <sub>9</sub> -C <sub>18</sub> Aliphatic Hydrocarbons	ND (34)	ND (40)	ND (35)	ND (33)	1,000	1,000	1,000	NA
C <sub>19</sub> -C <sub>36</sub> Aliphatic Hydrocarbons	ND (34)	ND (40)	ND (35)	ND (33)	2,500	1,000	1,000	NA
C <sub>11</sub> -C <sub>22</sub> Aromatic Hydrocarbons	ND (34)	ND (40)	ND (35)	ND (33)	200	800	800	NA
<b>PAH by GC/MS-SIM by method 8270</b>								
Naphthalene	0.011	0.015	0.011 j	0.010 j	4	100	100	0.160
2-Methylnaphthalene	0.008 j	0.009 j	0.006 j	ND (0.011)	4	500	500	0.070
Acenaphthylene	ND (0.011)	ND (0.013)	ND (0.012)	ND (0.011)	100	100	100	0.044
Acenaphthene	ND (0.011)	ND (0.013)	ND (0.012)	ND (0.011)	20	1,000	1,000	0.016
Fluorene	ND (0.011)	ND (0.013)	ND (0.012)	ND (0.011)	400	1,000	1,000	0.019
Phenanthrene	ND (0.011)	ND (0.013)	ND (0.012)	ND (0.011)	700	1,000	100	0.240
Anthracene	ND (0.011)	0.007 j	ND (0.012)	ND (0.011)	1,000	1,000	1,000	0.085
Fluoranthene	ND (0.011)	0.013	ND (0.012)	ND (0.011)	1,000	1,000	1,000	0.600
Pyrene	ND (0.011)	0.018	ND (0.012)	ND (0.011)	700	700	700	0.665
Benzo(a)anthracene	ND (0.011)	ND (0.013)	ND (0.012)	ND (0.011)	0.7	0.7	0.7	0.261
Chrysene	ND (0.011)	0.017	ND (0.012)	ND (0.011)	7	7	7	0.384
Benzo(b)fluoranthene	ND (0.011)	0.009 j	ND (0.012)	ND (0.011)	0.7	0.7	0.7	NA
Benzo(k)fluoranthene	ND (0.011)	0.007 j	ND (0.012)	ND (0.011)	7	7	7	0.430
Benzo(a)pyrene	ND (0.011)	0.009 j	ND (0.012)	ND (0.011)	0.7	0.7	0.7	0.430
Indeno(1,2,3-cd)pyrene	ND (0.011)	ND (0.013)	ND (0.012)	ND (0.011)	0.7	0.7	0.7	NA
Dibenzo(a,h)anthracene	ND (0.011)	ND (0.013)	ND (0.012)	ND (0.011)	0.7	0.7	0.7	0.063
Benzo(g,h,i)perylene	ND (0.011)	0.008 j	ND (0.012)	ND (0.011)	1,000	1,000	1,000	NA

NOTES:

1. Results in mg/Kg (milligrams per kilogram).
2. EPH: Extractable Petroleum Hydrocarbons.
3. ND(x) = constituent not detected at practical quantitation limits noted in parentheses.
4. j: estimated concentration/ detected below standard laboratory reporting limits.
5. MCP: Massachusetts Contingency Plan.
6. NOAA ERL: National Oceanic and Atmospheric Administration Effects Range Low.
7. NA: Not Available.

**TABLE 12**  
**SUMMARY OF SEDIMENT ANALYTICAL RESULTS FOR PHASE I CHARACTERIZATION**  
**BUZZARDS BAY, MASSACHUSETTS**  
**SEGMENT: W2B-01**  
**Round Hill Beach, Dartmouth**  
**Sampling Date: 1/21/04**  
**OILING CATEGORY: LIGHT**

Analyte	Sample Location 1		Sample Location 2		Sample Location 3		MCP Method 1 Standards			NOAA Standards Marine Sediments
	Upper Intertidal Zone	Lower Intertidal Zone	Upper Intertidal Zone	Lower Intertidal Zone	Upper Intertidal Zone	Lower Intertidal Zone	S-1 / GW-1	S-1 / GW-2	S-1 / GW-3	ERL
	W2B01-UIT-01	W2B01-LIT-01	W2B01-UIT-02	W2B01-LIT-02	W2B01-UIT-03	W2B01-LIT-03				
<b>EPH</b>										
C <sub>9</sub> -C <sub>18</sub> Aliphatic Hydrocarbons	ND(31)	ND(35)	ND(32)	ND(37)	ND(33)	ND(34)	1,000	1,000	1,000	NA
C <sub>19</sub> -C <sub>36</sub> Aliphatic Hydrocarbons	ND(31)	ND(35)	ND(32)	ND(37)	ND(33)	ND(34)	2,500	1,000	1,000	NA
C <sub>11</sub> -C <sub>22</sub> Aromatic Hydrocarbons	ND(31)	ND(35)	ND(32)	ND(37)	ND(33)	ND(34)	200	NA	800	NA
<b>PAH by GC/MS-SIM method 8270</b>										
Naphthalene	0.012	0.012	0.012	0.015	0.009 j	0.011	4	100	100	0.160
2-Methylnaphthalene	0.008 j	0.008 j	0.008 j	0.010 j	0.006 j	0.008 j	4	500	500	0.070
Acenaphthylene	ND(0.010)	ND(0.012)	ND(0.011)	ND(0.012)	ND(0.011)	ND(0.011)	100	100	100	0.044
Acenaphthene	ND(0.010)	ND(0.012)	ND(0.011)	ND(0.012)	ND(0.011)	ND(0.011)	20	1,000	1,000	0.016
Fluorene	ND(0.010)	0.011 j	ND(0.011)	0.009 j	ND(0.011)	ND(0.011)	400	1,000	1,000	0.019
Phenanthrene	0.052	0.120	0.014	0.110	0.006 j	0.024	700	1,000	100	0.240
Anthracene	0.010	0.031	ND(0.011)	0.041	ND(0.011)	0.008 j	1,000	1,000	1,000	0.085
Fluoranthene	0.110	0.210	0.034	0.270	0.014	0.068	1,000	1,000	1,000	0.600
Pyrene	0.082	0.160	0.028	0.220	0.012	0.054	700	700	700	0.665
Benzo(a)anthracene	0.039	0.078	0.013	0.120	0.006 j	0.028	0.7	0.7	0.7	0.261
Chrysene	0.044	0.084	0.018	0.120	0.007 j	0.032	7	7	7	0.384
Benzo(b)fluoranthene	0.036	0.064	0.014	0.094	0.006 j	0.025	0.7	0.7	0.7	NA
Benzo(k)fluoranthene	0.036	0.063	0.012	0.092	0.006 j	0.024	7	7	7	0.430
Benzo(a)pyrene	0.042	0.078	0.016	0.120	0.007 j	0.030	0.7	0.7	0.7	0.430
Indeno(1,2,3-cd)pyrene	0.024	0.042	0.009 j	0.058	ND(0.011)	0.017	0.7	0.7	0.7	NA
Dibenzo(a,h)anthracene	0.006 j	0.011 j	ND(0.011)	0.017	ND(0.011)	ND(0.011)	0.7	0.7	0.7	0.063
Benzo(g,h,i)perylene	0.025	0.042	0.009 j	0.058	ND(0.011)	0.017	1,000	1,000	1,000	NA

NOTES:

1. Results in mg/Kg (milligrams per kilogram).
2. EPH: Extractable Petroleum Hydrocarbons.
3. ND(x) = constituent not detected at practical quantitation limits noted in parentheses.
4. PAH by GC/MS-SIM: Polyaromatic Hydrocarbons with Selected Ion Monitoring.
5. j: estimated concentration/ detected below standard laboratory reporting limits.
6. MCP: Massachusetts Contingency Plan.
7. NOAA ERL: National Oceanic and Atmospheric Administration Effects Range Low.
8. NA: Not Available.

**TABLE 12**  
**SUMMARY OF SEDIMENT ANALYTICAL RESULTS FOR PHASE I CHARACTERIZATION**  
**BUZZARDS BAY, MASSACHUSETTS**  
**SEGMENT: W2B-04**  
**Clark's Cove East, New Bedford**  
**Sampling Date: 1/21/04**  
**OILING CATEGORY: LIGHT**

Analyte	Sample Location 1		Sample Location 2		Sample Location 3		MCP Method 1 Standards			NOAA Standards Marine Sediments
	Upper Intertidal Zone	Lower Intertidal Zone	Upper Intertidal Zone	Lower Intertidal Zone	Upper Intertidal Zone	Lower Intertidal Zone	S-1 / GW-1	S-1 / GW-2	S-1 / GW-3	ERL
	W2B04-UIT-01	W2B04-LIT-01	W2B04-UIT-02	W2B04-LIT-02	W2B04-UIT-03	W2B04-LIT-03				
<b>EPH</b>										
C <sub>9</sub> -C <sub>18</sub> Aliphatic Hydrocarbons	ND(35)	ND(35)	ND(35)	ND(33)	ND(30)	ND(31)	1,000	1,000	1,000	NA
C <sub>19</sub> -C <sub>36</sub> Aliphatic Hydrocarbons	ND(35)	ND(35)	ND(35)	ND(33)	ND(30)	ND(31)	2,500	1,000	1,000	NA
C <sub>11</sub> -C <sub>22</sub> Aromatic Hydrocarbons	ND(35)	ND(35)	ND(35)	ND(33)	ND(30)	ND(31)	200	NA	800	NA
<b>PAH by GC/MS-SIM method 8270</b>										
Naphthalene	0.012	0.014	0.012	0.012	0.009 j	0.012	4	100	100	0.160
2-Methylnaphthalene	0.007 j	0.010 j	0.006 j	0.007 j	0.005 j	0.007 j	4	500	500	0.070
Acenaphthylene	ND(0.012)	ND(0.012)	ND(0.012)	ND(0.011)	ND(0.010)	ND(0.010)	100	100	100	0.044
Acenaphthene	ND(0.012)	ND(0.012)	ND(0.012)	ND(0.011)	ND(0.010)	ND(0.010)	20	1,000	1,000	0.016
Fluorene	ND(0.012)	ND(0.012)	ND(0.012)	ND(0.011)	ND(0.010)	ND(0.010)	400	1,000	1,000	0.019
Phenanthrene	0.009 j	0.027	0.008 j	0.009	ND(0.010)	0.053	700	1,000	100	0.240
Anthracene	ND(0.012)	0.006 j	ND(0.012)	ND(0.011)	ND(0.010)	0.015	1,000	1,000	1,000	0.085
Fluoranthene	0.022	0.072	0.022	0.022	ND(0.010)	0.074	1,000	1,000	1,000	0.600
Pyrene	0.019	0.058	0.019	0.020	ND(0.010)	0.058	700	700	700	0.665
Benzo(a)anthracene	0.010 j	0.028	0.009 j	0.010 j	ND(0.010)	0.031	0.7	0.7	0.7	0.261
Chrysene	0.010 j	0.027	0.011 j	0.011	ND(0.010)	0.031	7	7	7	0.384
Benzo(b)fluoranthene	0.009 j	0.023	0.010 j	0.010 j	ND(0.010)	0.026	0.7	0.7	0.7	NA
Benzo(k)fluoranthene	0.009 j	0.021	0.009 j	0.009 j	ND(0.010)	0.025	7	7	7	0.430
Benzo(a)pyrene	0.012	0.028	0.012	0.012	ND(0.010)	0.033	0.7	0.7	0.7	0.430
Indeno(1,2,3-cd)pyrene	0.007 j	0.017	0.008 j	0.007 j	ND(0.010)	0.017	0.7	0.7	0.7	NA
Dibenzo(a,h)anthracene	ND(0.012)	ND(0.012)	ND(0.012)	ND(0.011)	ND(0.010)	ND(0.010)	0.7	0.7	0.7	0.063
Benzo(g,h,i)perylene	0.008 j	0.018	0.009 j	0.008 j	ND(0.010)	0.018	1,000	1,000	1,000	NA

NOTES:

1. Results in mg/Kg (milligrams per kilogram).
2. EPH: Extractable Petroleum Hydrocarbons.
2. ND(x) = constituent not detected at practical quantitation limits noted in parentheses.
3. PAH by GC/MS-SIM: Polyaromatic Hydrocarbons with Selected Ion Monitoring.
4. j: estimated concentration/ detected below standard laboratory reporting limits.
5. MCP: Massachusetts Contingency Plan.
6. NOAA ERL: National Oceanic and Atmospheric Administration Effects Range Low.
7. NA: Not Available.

**TABLE 12**  
**SUMMARY OF SEDIMENT ANALYTICAL RESULTS FOR PHASE I CHARACTERIZATION**  
**BUZZARDS BAY, MASSACHUSETTS**  
**SEGMENT: W3A-02**  
**Salter's Point West, Dartmouth**  
**Sampling Date: 1/19/04**  
**OILING CATEGORY: MODERATE**

Analyte	Sample Location 1		Sample Location 2		Sample Location 3		MCP Method 1 Standards		NOAA Standards Marine Sediments
	Upper Intertidal Zone	Lower Intertidal Zone	Upper Intertidal Zone	Lower Intertidal Zone	Upper Intertidal Zone	Lower Intertidal Zone	S-1 / GW-2	S-1 / GW-3	ERL
	W3A02-UIT-01	W3A02-LIT-01	W3A02-UIT-02	W3A02-LIT-02	W3A02-UIT-03	W3A02-LIT-03			
<b>EPH</b>									
C <sub>9</sub> -C <sub>18</sub> Aliphatic Hydrocarbons	ND (32)	ND (30)	ND (31)	ND (30)	ND (33)	ND (31)	1,000	1,000	NA
C <sub>19</sub> -C <sub>36</sub> Aliphatic Hydrocarbons	ND (32)	ND (30)	ND (31)	ND (30)	ND (33)	ND (31)	1,000	1,000	NA
C <sub>11</sub> -C <sub>22</sub> Aromatic Hydrocarbons	ND (32)	ND (30)	ND (31)	ND (30)	ND (33)	ND (31)	800	NA	NA
<b>PAH by GC/MS-SIM by method 8270</b>									
Naphthalene	<b>0.006 j</b>	<b>0.006 j</b>	<b>0.006 j</b>	<b>0.007 j</b>	<b>0.007 j</b>	<b>0.006 j</b>	100	100	0.160
2-Methylnaphthalene	ND (0.011)	ND (0.010)	ND (0.010)	ND (0.010)	ND (0.011)	ND (0.010)	500	500	0.070
Acenaphthylene	ND (0.011)	ND (0.010)	ND (0.010)	ND (0.010)	ND (0.011)	ND (0.010)	100	100	0.044
Acenaphthene	ND (0.011)	ND (0.010)	ND (0.010)	ND (0.010)	ND (0.011)	ND (0.010)	1,000	1,000	0.016
Fluorene	ND (0.011)	ND (0.010)	ND (0.010)	ND (0.010)	ND (0.011)	ND (0.010)	1,000	1,000	0.019
Phenanthrene	ND (0.011)	ND (0.010)	ND (0.010)	ND (0.010)	ND (0.011)	ND (0.010)	1,000	100	0.240
Anthracene	ND (0.011)	ND (0.010)	ND (0.010)	ND (0.010)	ND (0.011)	ND (0.010)	1,000	1,000	0.085
Fluoranthene	ND (0.011)	ND (0.010)	ND (0.010)	ND (0.010)	ND (0.011)	ND (0.010)	1,000	1,000	0.600
Pyrene	ND (0.011)	ND (0.010)	ND (0.010)	ND (0.010)	ND (0.011)	ND (0.010)	700	700	0.665
Benzo(a)anthracene	ND (0.011)	ND (0.010)	ND (0.010)	ND (0.010)	ND (0.011)	ND (0.010)	0.7	0.7	0.261
Chrysene	ND (0.011)	ND (0.010)	ND (0.010)	ND (0.010)	ND (0.011)	ND (0.010)	7	7	0.384
Benzo(b)fluoranthene	ND (0.011)	ND (0.010)	ND (0.010)	ND (0.010)	ND (0.011)	ND (0.010)	0.7	0.7	NA
Benzo(k)fluoranthene	ND (0.011)	ND (0.010)	ND (0.010)	ND (0.010)	ND (0.011)	ND (0.010)	7	7	0.430
Benzo(a)pyrene	ND (0.011)	ND (0.010)	ND (0.010)	ND (0.010)	ND (0.011)	ND (0.010)	0.7	0.7	0.430
Indeno(1,2,3-cd)pyrene	ND (0.011)	ND (0.010)	ND (0.010)	ND (0.010)	ND (0.011)	ND (0.010)	0.7	0.7	NA
Dibenzo(a,h)anthracene	ND (0.011)	ND (0.010)	ND (0.010)	ND (0.010)	ND (0.011)	ND (0.010)	0.7	0.7	0.063
Benzo(g,h,i)perylene	ND (0.011)	ND (0.010)	ND (0.010)	ND (0.010)	ND (0.011)	ND (0.010)	1,000	1,000	NA

NOTES:

1. Results in mg/Kg (milligrams per kilogram).
2. EPH: Extractable Petroleum Hydrocarbons.
2. ND(x) = constituent not detected at practical quantitation limits noted in parentheses.
3. PAH by GC/MS-SIM: Polyaromatic Hydrocarbons with Selected Ion Monitoring.
4. j: estimated concentration/ detected below standard laboratory reporting limits.
5. MCP: Massachusetts Contingency Plan.
6. NOAA ERL: National Oceanic and Atmospheric Administration Effects Range Low.
7. NA: Not Available.

**TABLE 12**  
**SUMMARY OF SEDIMENT ANALYTICAL RESULTS FOR PHASE I CHARACTERIZATION**  
**BUZZARDS BAY, MASSACHUSETTS**  
**SEGMENT: W3A-03**  
**Pier Beach (Salter's Point), Dartmouth**  
**Sampling Date: 1/19/04**  
**OILING CATEGORY: MODERATE**

Analyte	Sample Location 2		Sample Location 3		MCP Method 1 Standards		NOAA Standards Marine Sediments
	Upper Intertidal Zone	Lower Intertidal Zone	Upper Intertidal Zone	Lower Intertidal Zone	S-1 / GW-2	S-1 / GW-3	
	W3A03-UIT-02	W3A03-LIT-02	W3A03-UIT-03	W3A03-LIT-03			ERL
<b>EPH</b>							
C <sub>9</sub> -C <sub>18</sub> Aliphatic Hydrocarbons	ND (38)	ND (37)	ND (31)	ND (30)	1,000	1,000	NA
C <sub>19</sub> -C <sub>36</sub> Aliphatic Hydrocarbons	ND (38)	ND (37)	ND (31)	ND (30)	1,000	1,000	NA
C <sub>11</sub> -C <sub>22</sub> Aromatic Hydrocarbons	ND (38)	ND (37)	ND (31)	ND (30)	800	800	NA
<b>PAH by GC/MS-SIM by method 8270</b>							
Naphthalene	<b>0.008 j</b>	<b>0.007 j</b>	<b>0.006 j</b>	<b>0.008 j</b>	100	100	0.160
2-Methylnaphthalene	ND (0.013)	ND (0.012)	ND (0.010)	ND (0.010)	500	500	0.070
Acenaphthylene	ND (0.013)	ND (0.012)	ND (0.010)	ND (0.010)	100	100	0.044
Acenaphthene	ND (0.013)	ND (0.012)	ND (0.010)	ND (0.010)	1,000	1,000	0.016
Fluorene	ND (0.013)	ND (0.012)	ND (0.010)	ND (0.010)	1,000	1,000	0.019
Phenanthrene	ND (0.013)	ND (0.012)	ND (0.010)	<b>0.006 j</b>	1,000	100	0.240
Anthracene	ND (0.013)	ND (0.012)	ND (0.010)	ND (0.010)	1,000	1,000	0.085
Fluoranthene	ND (0.013)	ND (0.012)	ND (0.010)	<b>0.010</b>	1,000	1,000	0.600
Pyrene	ND (0.013)	ND (0.012)	ND (0.010)	<b>0.008 j</b>	700	700	0.665
Benzo(a)anthracene	ND (0.013)	ND (0.012)	ND (0.010)	ND (0.010)	0.7	0.7	0.261
Chrysene	ND (0.013)	ND (0.012)	ND (0.010)	<b>0.006 j</b>	7	7	0.384
Benzo(b)fluoranthene	ND (0.013)	ND (0.012)	ND (0.010)	<b>0.005 j</b>	0.7	0.7	NA
Benzo(k)fluoranthene	ND (0.013)	ND (0.012)	ND (0.010)	ND (0.010)	7	7	0.430
Benzo(a)pyrene	ND (0.013)	ND (0.012)	ND (0.010)	ND (0.010)	0.7	0.7	0.430
Indeno(1,2,3-cd)pyrene	ND (0.013)	ND (0.012)	ND (0.010)	ND (0.010)	0.7	0.7	NA
Dibenzo(a,h)anthracene	ND (0.013)	ND (0.012)	ND (0.010)	ND (0.010)	0.7	0.7	0.063
Benzo(g,h,i)perylene	ND (0.013)	ND (0.012)	ND (0.010)	ND (0.010)	1,000	1,000	NA

NOTES:

1. Results in mg/Kg (milligrams per kilogram).
2. EPH: Extractable Petroleum Hydrocarbons.
2. ND(x) = constituent not detected at practical quantitation limits noted in parentheses.
3. PAH by GC/MS-SIM: Polyaromatic Hydrocarbons with Selected Ion Monitoring.
4. j: estimated concentration/ detected below standard laboratory reporting limits.
5. MCP: Massachusetts Contingency Plan.
6. NOAA ERL: National Oceanic and Atmospheric Administration Effects Range Low.
7. NA: Not Available.

**TABLE 12**  
**SUMMARY OF SEDIMENT ANALYTICAL RESULTS FOR PHASE I CHARACTERIZATION**  
**BUZZARDS BAY, MASSACHUSETTS**  
**SEGMENT: W3C-01**  
**East Beach, Westport**  
**Sampling Date: 1/21/04**  
**OILING CATEGORY: LIGHT**

Analyte	Sample Location 1		Sample Location 2		Sample Location 3		MCP Method 1 Standards		NOAA Standards Marine Sediments ERL
	Upper Intertidal Zone	Lower Intertidal Zone	Upper Intertidal Zone	Lower Intertidal Zone	Upper Intertidal Zone	Lower Intertidal Zone	S-1 / GW-2	S-1 / GW-3	
	W3C01-UIT-01	W3C01-LIT-01	W3C01-UIT-02	W3C01-LIT-02	W3C01-UIT-03	W3C01-LIT-03			
<b>EPH</b>									
C <sub>9</sub> -C <sub>18</sub> Aliphatic Hydrocarbons	ND(33)	ND(36)	ND(34)	ND(37)	ND(32)	ND(38)	1,000	1,000	NA
C <sub>19</sub> -C <sub>36</sub> Aliphatic Hydrocarbons	ND(33)	ND(36)	ND(34)	ND(37)	ND(32)	ND(38)	1,000	1,000	NA
C <sub>11</sub> -C <sub>22</sub> Aromatic Hydrocarbons	ND(33)	ND(36)	ND(34)	ND(37)	ND(32)	ND(38)	800	NA	NA
<b>PAH by GC/MS-SIM method 8270</b>									
Naphthalene	<b>0.009 j</b>	<b>0.011 j</b>	<b>0.010 j</b>	<b>0.011 j</b>	<b>0.010 j</b>	<b>0.013</b>	100	100	0.160
2-Methylnaphthalene	ND (0.011)	<b>0.009 j</b>	<b>0.008 j</b>	<b>0.007 j</b>	<b>0.0006 j</b>	<b>0.009 j</b>	500	500	0.070
Acenaphthylene	ND (0.011)	ND (0.012)	ND (0.011)	ND (0.012)	ND (0.011)	ND (0.013)	100	100	0.044
Acenaphthene	ND (0.011)	ND (0.012)	ND (0.011)	ND (0.012)	ND (0.011)	ND (0.013)	1,000	1,000	0.016
Fluorene	ND (0.011)	ND (0.012)	ND (0.011)	ND (0.012)	ND (0.011)	ND (0.013)	1,000	1,000	0.019
Phenanthrene	<b>0.010 j</b>	ND (0.012)	ND (0.011)	ND (0.012)	ND (0.011)	ND (0.013)	1,000	100	0.240
Anthracene	ND (0.011)	ND (0.012)	ND (0.011)	ND (0.012)	ND (0.011)	ND (0.013)	1,000	1,000	0.085
Fluoranthene	<b>0.007 j</b>	ND (0.012)	ND (0.011)	ND (0.012)	ND (0.011)	ND (0.013)	1,000	1,000	0.600
Pyrene	<b>0.006 j</b>	ND (0.012)	ND (0.011)	ND (0.012)	ND (0.011)	ND (0.013)	700	700	0.665
Benzo(a)anthracene	ND (0.011)	ND (0.012)	ND (0.011)	ND (0.012)	ND (0.011)	ND (0.013)	0.7	0.7	0.261
Chrysene	ND (0.011)	ND (0.012)	ND (0.011)	ND (0.012)	ND (0.011)	ND (0.013)	7	7	0.384
Benzo(b)fluoranthene	ND (0.011)	ND (0.012)	ND (0.011)	ND (0.012)	ND (0.011)	ND (0.013)	0.7	0.7	NA
Benzo(k)fluoranthene	ND (0.011)	ND (0.012)	ND (0.011)	ND (0.012)	ND (0.011)	ND (0.013)	7	7	0.430
Benzo(a)pyrene	ND (0.011)	ND (0.012)	ND (0.011)	ND (0.012)	ND (0.011)	ND (0.013)	0.7	0.7	0.430
Indeno(1,2,3-cd)pyrene	ND (0.011)	ND (0.012)	ND (0.011)	ND (0.012)	ND (0.011)	ND (0.013)	0.7	0.7	NA
Dibenzo(a,h)anthracene	ND (0.011)	ND (0.012)	ND (0.011)	ND (0.012)	ND (0.011)	ND (0.013)	0.7	0.7	0.063
Benzo(g,h,i)perylene	ND (0.011)	ND (0.012)	ND (0.011)	ND (0.012)	ND (0.011)	ND (0.013)	1,000	1,000	NA

NOTES:

1. Results in mg/Kg (milligrams per kilogram).
2. EPH: Extractable Petroleum Hydrocarbons.
3. ND(x) = constituent not detected at practical quantitation limits noted in parentheses.
4. j: estimated concentration/ detected below standard laboratory reporting limits.
5. MCP: Massachusetts Contingency Plan.
6. NOAA ERL: National Oceanic and Atmospheric Administration Effects Range Low.
7. NA: Not Available.

**SUMMARY OF SEDIMENT ANALYTICAL RESULTS FOR PHASE I CHARACTERIZATION**  
**BUZZARDS BAY, MASSACHUSETTS**  
**SEGMENT: W3C-03**  
**Barneys Joy (West of Barbed Wire)**  
**Sampling Date: January 22, 2004**  
**OILING CATEGORY: HEAVY**

Analyte	Sample Location 1			Sample Location 2			Sample Location 3			MCP Method 1 Standards		NOAA Standards
	Upper Intertidal Zone	Middle Intertidal Zone	Lower Intertidal Zone	Upper Intertidal Zone	Middle Intertidal Zone	Lower Intertidal Zone	Upper Intertidal Zone	Middle Intertidal Zone	Lower Intertidal Zone	S-1 / GW-2	S-1 / GW-3	Marine Sediments
	W3C03-UIT-01	W3C03-MIT-01	W3C03-LIT-01	W3C03-UIT-02	W3C03-MIT-02	W3C03-LIT-02	W3C03-UIT-03	W3C03-MIT-03	W3C03-LIT-03			ERL
<b>EPH</b>												
C <sub>9</sub> -C <sub>18</sub> Aliphatic Hydrocarbons	ND (32)	ND (30)	ND (31)	ND (33)	ND (31)	ND (31)	ND (31)	ND (31)	ND (31)	1,000	1,000	NA
C <sub>19</sub> -C <sub>36</sub> Aliphatic Hydrocarbons	ND (32)	ND (30)	ND (31)	ND (33)	ND (31)	ND (31)	ND (31)	ND (31)	ND (31)	1,000	1,000	NA
C <sub>11</sub> -C <sub>22</sub> Aromatic Hydrocarbons	ND (32)	ND (30)	ND (31)	ND (33)	ND (31)	ND (31)	ND (31)	NA	ND (31)	800	800	NA
<b>PAH by GC/MS-SIM by method 8270</b>												
Naphthalene	0.008 j	0.016	0.007 j	0.007 j	0.008 j	0.008 j	0.007 j	0.007 j	0.006 j	100	100	0.160
2-Methylnaphthalene	ND (0.011)	0.018	ND (0.010)	ND (0.011)	ND (0.010)	ND (0.010)	ND (0.010)	ND (0.010)	ND (0.010)	500	500	0.070
Acenaphthylene	ND (0.011)	ND (0.010)	ND (0.010)	ND (0.011)	ND (0.010)	ND (0.010)	ND (0.010)	ND (0.010)	ND (0.010)	100	100	0.044
Acenaphthene	0.010 j	ND (0.010)	ND (0.010)	ND (0.011)	ND (0.010)	ND (0.010)	ND (0.010)	ND (0.010)	ND (0.010)	1,000	1,000	0.016
Fluorene	ND (0.011)	ND (0.010)	ND (0.010)	ND (0.011)	ND (0.010)	ND (0.010)	ND (0.010)	ND (0.010)	ND (0.010)	1,000	1,000	0.019
Phenanthrene	ND (0.011)	ND (0.010)	ND (0.010)	ND (0.011)	ND (0.010)	ND (0.010)	ND (0.010)	ND (0.010)	ND (0.010)	1,000	100	0.240
Anthracene	ND (0.011)	ND (0.010)	ND (0.010)	ND (0.011)	ND (0.010)	ND (0.010)	ND (0.010)	ND (0.010)	ND (0.010)	1,000	1,000	0.085
Fluoranthene	ND (0.011)	ND (0.010)	ND (0.010)	ND (0.011)	ND (0.010)	ND (0.010)	ND (0.010)	ND (0.010)	ND (0.010)	1,000	1,000	0.600
Pyrene	ND (0.011)	ND (0.010)	ND (0.010)	ND (0.011)	ND (0.010)	ND (0.010)	ND (0.010)	ND (0.010)	ND (0.010)	700	700	0.665
Benzo(a)anthracene	ND (0.011)	ND (0.010)	ND (0.010)	ND (0.011)	ND (0.010)	ND (0.010)	ND (0.010)	ND (0.010)	ND (0.010)	0.7	0.7	0.261
Chrysene	ND (0.011)	ND (0.010)	ND (0.010)	ND (0.011)	ND (0.010)	ND (0.010)	ND (0.010)	ND (0.010)	ND (0.010)	7	7	0.384
Benzo(b)fluoranthene	ND (0.011)	ND (0.010)	ND (0.010)	ND (0.011)	ND (0.010)	ND (0.010)	ND (0.010)	ND (0.010)	ND (0.010)	0.7	0.7	NA
Benzo(k)fluoranthene	ND (0.011)	ND (0.010)	ND (0.010)	ND (0.011)	ND (0.010)	ND (0.010)	ND (0.010)	ND (0.010)	ND (0.010)	7	7	0.430
Benzo(a)pyrene	ND (0.011)	ND (0.010)	ND (0.010)	ND (0.011)	ND (0.010)	ND (0.010)	ND (0.010)	ND (0.010)	ND (0.010)	0.7	0.7	0.430
Indeno(1,2,3-cd)pyrene	ND (0.011)	ND (0.010)	ND (0.010)	ND (0.011)	ND (0.010)	ND (0.010)	ND (0.010)	ND (0.010)	ND (0.010)	0.7	0.7	NA
Dibenzo(a,h)anthracene	ND (0.011)	ND (0.010)	ND (0.010)	ND (0.011)	ND (0.010)	ND (0.010)	ND (0.010)	ND (0.010)	ND (0.010)	0.7	0.7	0.063
Benzo(g,h,i)perylene	ND (0.011)	ND (0.010)	ND (0.010)	ND (0.011)	ND (0.010)	ND (0.010)	ND (0.010)	ND (0.010)	ND (0.010)	1,000	1,000	NA

NOTES:

1. Results in mg/Kg (milligrams per kilogram).
2. EPH: Extractable Petroleum Hydrocarbons.
3. ND(x) = constituent not detected at practical quantitation limits noted in parentheses.
4. PAH by GC/MS-SIM: Polycyclic Aromatic Hydrocarbons with Selected Ion Monitoring.
5. j: estimated concentration/ detected below standard laboratory reporting limits.
6. MCP: Massachusetts Contingency Plan.
7. NOAA ERL: National Oceanic and Atmospheric Administration Effects Range Low.
8. NA: Not Available.



**TABLE 12**  
**SUMMARY OF SEDIMENT ANALYTICAL RESULTS FOR PHASE I CHARACTERIZATION**  
**BUZZARDS BAY, MASSACHUSETTS**  
**SEGMENT: W3C-06**  
**Demarest Lloyd State Park Marsh, Dartmouth**  
**Sampling Date: 1/21/04**  
**OILING CATEGORY: VERY LIGHT (MARSH)**

Analyte	Sample Location 1	Sample Location 2	Sample Location 3	MCP Method 1 Standards		NOAA Standards Marine Sediments ERL
	Marsh Area	Marsh Area	Marsh Area	S-1 / GW-2	S-1 / GW-3	
	W3C06-M-01	W3C06-M-02	W3C06-M-03			
<b>EPH</b>						
C <sub>9</sub> -C <sub>18</sub> Aliphatic Hydrocarbons	ND(48)	ND(35)	ND(44)	1,000	1,000	NA
C <sub>19</sub> -C <sub>36</sub> Aliphatic Hydrocarbons	ND(48)	ND(35)	ND(44)	1,000	1,000	NA
C <sub>11</sub> -C <sub>22</sub> Aromatic Hydrocarbons	ND(48)	ND(35)	ND(44)	800	800	NA
<b>PAH by GC/MS-SIM by method 8270</b>						
Naphthalene	0.018	0.011 j	0.018	100	100	0.160
2-Methylnaphthalene	0.012 j	0.007 j	0.013 j	500	500	0.070
Acenaphthylene	ND(0.016)	ND (0.012)	ND (0.015)	100	100	0.044
Acenaphthene	ND(0.016)	ND (0.012)	ND (0.015)	1,000	1,000	0.016
Fluorene	ND(0.016)	ND (0.012)	ND (0.015)	1,000	1,000	0.019
Phenanthrene	0.036	ND (0.012)	0.034	1,000	100	0.240
Anthracene	0.010 j	ND (0.012)	ND (0.015)	1,000	1,000	0.085
Fluoranthene	0.059	ND (0.012)	0.08	1,000	1,000	0.600
Pyrene	0.054	ND (0.012)	0.067	700	700	0.665
Benzo(a)anthracene	0.023	ND (0.012)	0.028	0.7	0.7	0.261
Chrysene	0.031	ND (0.012)	0.040	7	7	0.384
Benzo(b)fluoranthene	0.027	ND (0.012)	0.039	0.7	0.7	NA
Benzo(k)fluoranthene	0.021	ND (0.012)	0.035	7	7	0.430
Benzo(a)pyrene	0.031	ND (0.012)	0.041		0.7	0.430
Indeno(1,2,3-cd)pyrene	0.020	ND (0.012)	0.029	0.7	0.7	NA
Dibenzo(a,h)anthracene	ND (0.016)	ND (0.012)	ND (0.015)	0.7	0.7	0.063
Benzo(g,h,i)perylene	0.022	ND (0.012)	0.032	1,000	1,000	NA

NOTES:

1. Results in mg/Kg (milligrams per kilogram).
2. EPH: Extractable Petroleum Hydrocarbons.
2. ND(x) = constituent not detected at practical quantitation limits noted in parentheses.
3. PAH by GC/MS-SIM: Polyaromatic Hydrocarbons with Selected Ion Monitoring.
4. j: estimated concentration/ detected below standard laboratory reporting limits.
5. MCP: Massachusetts Contingency Plan.
6. NOAA ERL: National Oceanic and Atmospheric Administration Effects Range Low.
7. NA: Not Available.

**TABLE 12**  
**SUMMARY OF SEDIMENT ANALYTICAL RESULTS FOR PHASE I CHARACTERIZATION**  
**BUZZARDS BAY, MASSACHUSETTS**  
**SEGMENT: W3D-03**  
**Elephant Rock Beach, Westport**  
**Sampling Date: 1/20/04**  
**OILING CATEGORY: LIGHT**

Analyte	Sample Location 1		Sample Location 2		Sample Location 3		MCP Method 1 Standards			NOAA Standards Marine Sediments
	Upper Intertidal Zone	Lower Intertidal Zone	Upper Intertidal Zone	Lower Intertidal Zone	Upper Intertidal Zone	Lower Intertidal Zone	S-1 / GW-1	S-1 / GW-2	S-1 / GW-3	ERL
	W3D03-UIT-01	W3D03-LIT-01	W3D03-UIT-02	W3D03-LIT-02	W3D03-UIT-03	W3D03-LIT-03				
<b>EPH</b>										
C <sub>9</sub> -C <sub>18</sub> Aliphatic Hydrocarbons	ND (35)	ND (34)	ND (33)	ND (38)	ND (34)	ND (36)	1,000	1,000	1,000	NA
C <sub>19</sub> -C <sub>36</sub> Aliphatic Hydrocarbons	ND (35)	ND (34)	ND (33)	ND (38)	ND (34)	ND (36)	2,500	1,000	1,000	NA
C <sub>11</sub> -C <sub>22</sub> Aromatic Hydrocarbons	ND (35)	ND (34)	ND (33)	ND (38)	ND (34)	ND (36)	200	NA	800	NA
<b>PAH by GC/MS-SIM by method 8270</b>										
Naphthalene	0.006 j	0.006 j	0.006 j	0.008 j	0.006 j	0.006 j	4	100	100	0.160
2-Methylnaphthalene	ND (0.012)	ND (0.011)	ND (0.011)	ND (0.013)	ND (0.011)	ND (0.012)	4	500	500	0.070
Acenaphthylene	ND (0.012)	ND (0.011)	ND (0.011)	ND (0.013)	ND (0.011)	ND (0.012)	100	100	100	0.044
Acenaphthene	ND (0.012)	ND (0.011)	ND (0.011)	ND (0.013)	ND (0.011)	ND (0.012)	20	1,000	1,000	0.016
Fluorene	ND (0.012)	ND (0.011)	ND (0.011)	ND (0.013)	ND (0.011)	ND (0.012)	400	1,000	1,000	0.019
Phenanthrene	ND (0.012)	ND (0.011)	ND (0.011)	ND (0.013)	ND (0.011)	ND (0.012)	700	1,000	100	0.240
Anthracene	ND (0.012)	ND (0.011)	ND (0.011)	ND (0.013)	ND (0.011)	ND (0.012)	1,000	1,000	1,000	0.085
Fluoranthene	ND (0.012)	ND (0.011)	ND (0.011)	ND (0.013)	ND (0.011)	ND (0.012)	1,000	1,000	1,000	0.600
Pyrene	ND (0.012)	ND (0.011)	ND (0.011)	ND (0.013)	ND (0.011)	ND (0.012)	700	700	700	0.665
Benzo(a)anthracene	ND (0.012)	ND (0.011)	ND (0.011)	ND (0.013)	ND (0.011)	ND (0.012)	0.7	0.7	0.7	0.261
Chrysene	ND (0.012)	ND (0.011)	ND (0.011)	ND (0.013)	ND (0.011)	ND (0.012)	7	7	7	0.384
Benzo(b)fluoranthene	ND (0.012)	ND (0.011)	ND (0.011)	ND (0.013)	ND (0.011)	ND (0.012)	0.7	0.7	0.7	NA
Benzo(k)fluoranthene	ND (0.012)	ND (0.011)	ND (0.011)	ND (0.013)	ND (0.011)	ND (0.012)	7	7	7	0.430
Benzo(a)pyrene	ND (0.012)	ND (0.011)	ND (0.011)	ND (0.013)	ND (0.011)	ND (0.012)	0.7	0.7	0.7	0.430
Indeno(1,2,3-cd)pyrene	ND (0.012)	ND (0.011)	ND (0.011)	ND (0.013)	ND (0.011)	ND (0.012)	0.7	0.7	0.7	NA
Dibenzo(a,h)anthracene	ND (0.012)	ND (0.011)	ND (0.011)	ND (0.013)	ND (0.011)	ND (0.012)	0.7	0.7	0.7	0.063
Benzo(g,h,i)perylene	ND (0.012)	ND (0.011)	ND (0.011)	ND (0.013)	ND (0.011)	ND (0.012)	1,000	1,000	1,000	NA

NOTES:

1. Results in mg/Kg (milligrams per kilogram).
2. EPH: Extractable Petroleum Hydrocarbons.
3. ND(x) = constituent not detected at practical quantitation limits noted in parentheses.
4. PAH by GC/MS-SIM: Polycyclic Aromatic Hydrocarbons with Selected Ion Monitoring.
5. j: estimated concentration/ detected below standard laboratory reporting limits.
6. MCP: Massachusetts Contingency Plan.
7. NOAA ERL: National Oceanic and Atmospheric Administration Effects Range Low.
8. NA: Not Available.

**TABLE 12**  
**SUMMARY OF SEDIMENT ANALYTICAL RESULTS FOR PHASE I CHARACTERIZATION**  
**BUZZARDS BAY, MASSACHUSETTS**  
**SEGMENT: W3D-04**  
**Horseneck Beach West, Westport**  
**Sampling Date: 1/20/04**  
**OILING CATEGORY: MODERATE**

Analyte	Sample Location 1		Sample Location 2		Sample Location 3		MCP Method 1 Standards			NOAA Standards Marine Sediments
	Upper Intertidal Zone	Lower Intertidal Zone	Upper Intertidal Zone	Lower Intertidal Zone	Upper Intertidal Zone	Lower Intertidal Zone	S-1 / GW-1	S-1 / GW-2	S-1 / GW-3	ERL
	W3D04-UIT-01	W3D04-LIT-01	W3D04-UIT-02	W3D04-LIT-02	W3D04-UIT-03	W3D04-LIT-03				
<b>EPH</b>										
C <sub>9</sub> -C <sub>18</sub> Aliphatic Hydrocarbons	ND (30)	ND (35)	ND (33)	ND (37)	ND (37)	ND (38)	1,000	1,000	1,000	NA
C <sub>19</sub> -C <sub>36</sub> Aliphatic Hydrocarbons	ND (30)	ND (35)	ND (33)	ND (37)	ND (37)	ND (38)	2,500	1,000	1,000	NA
C <sub>11</sub> -C <sub>22</sub> Aromatic Hydrocarbons	ND (30)	ND (35)	ND (33)	ND (37)	ND (37)	ND (38)	200	NA	800	NA
<b>PAH by GC/MS-SIM by method 8270</b>										
Naphthalene	0.006 j	0.006 j	0.006 j	0.007 j	0.008 j	0.008 j	4	100	100	0.160
2-Methylnaphthalene	ND (0.010)	ND (0.012)	ND (0.011)	ND (0.012)	ND (0.012)	ND (0.013)	4	500	500	0.070
Acenaphthylene	ND (0.010)	ND (0.012)	ND (0.011)	ND (0.012)	ND (0.012)	ND (0.013)	100	100	100	0.044
Acenaphthene	ND (0.010)	ND (0.012)	ND (0.011)	ND (0.012)	ND (0.012)	ND (0.013)	20	1,000	1,000	0.016
Fluorene	ND (0.010)	ND (0.012)	ND (0.011)	ND (0.012)	ND (0.012)	ND (0.013)	400	1,000	1,000	0.019
Phenanthrene	ND (0.010)	ND (0.012)	ND (0.011)	ND (0.012)	ND (0.012)	ND (0.013)	700	1,000	100	0.240
Anthracene	ND (0.010)	ND (0.012)	ND (0.011)	ND (0.012)	ND (0.012)	ND (0.013)	1,000	1,000	1,000	0.085
Fluoranthene	ND (0.010)	ND (0.012)	ND (0.011)	ND (0.012)	ND (0.012)	ND (0.013)	1,000	1,000	1,000	0.600
Pyrene	ND (0.010)	ND (0.012)	ND (0.011)	ND (0.012)	ND (0.012)	ND (0.013)	700	700	700	0.665
Benzo(a)anthracene	ND (0.010)	ND (0.012)	ND (0.011)	ND (0.012)	ND (0.012)	ND (0.013)	0.7	0.7	0.7	0.261
Chrysene	ND (0.010)	ND (0.012)	ND (0.011)	ND (0.012)	ND (0.012)	ND (0.013)	7	7	7	0.384
Benzo(b)fluoranthene	ND (0.010)	ND (0.012)	ND (0.011)	ND (0.012)	ND (0.012)	ND (0.013)	0.7	0.7	0.7	NA
Benzo(k)fluoranthene	ND (0.010)	ND (0.012)	ND (0.011)	ND (0.012)	ND (0.012)	ND (0.013)	7	7	7	0.430
Benzo(a)pyrene	ND (0.010)	ND (0.012)	ND (0.011)	ND (0.012)	ND (0.012)	ND (0.013)	0.7	0.7	0.7	0.430
Indeno(1,2,3-cd)pyrene	ND (0.010)	ND (0.012)	ND (0.011)	ND (0.012)	ND (0.012)	ND (0.013)	0.7	0.7	0.7	NA
Dibenzo(a,h)anthracene	ND (0.010)	ND (0.012)	ND (0.011)	ND (0.012)	ND (0.012)	ND (0.013)	0.7	0.7	0.7	0.063
Benzo(g,h,i)perylene	ND (0.010)	ND (0.012)	ND (0.011)	ND (0.012)	ND (0.012)	ND (0.013)	1,000	1,000	1,000	NA

NOTES:

1. Results in mg/Kg (milligrams per kilogram).
2. EPH: Extractable Petroleum Hydrocarbons.
3. ND(x) = constituent not detected at practical quantitation limits noted in parentheses.
4. PAH by GC/MS-SIM: Polyaromatic Hydrocarbons with Selected Ion Monitoring.
5. j: estimated concentration/ detected below standard laboratory reporting limits.
6. MCP: Massachusetts Contingency Plan.
7. NOAA ERL: National Oceanic and Atmospheric Administration Effects Range Low.
8. NA: Not Available.

**TABLE 13**  
**RELATIVE PERCENT DIFFERENCES BETWEEN DUPLICATE SAMPLES**  
**BUZZARDS BAY, MASSACHUSETTS**  
**SEGMENT: W1D-04**  
**Sampling Date: 1/22/04**  
**OILING CATEGORY: MODERATE**

Analyte	Sample Location 3								
	Upper Intertidal Zone	Upper Intertidal Zone	Relative Percent Difference (RPD)	Middle Intertidal Zone	Middle Intertidal Zone	Relative Percent Difference (RPD)	Lower Intertidal Zone	Lower Intertidal Zone	Relative Percent Difference (RPD)
	WID04-UIT-03	DDD2-UIT-03		WID04-MID-03	DDD2-MID-03		WID04-LIT-03	DDD2-LIT-03	
<b>EPH</b>									
C <sub>9</sub> -C <sub>18</sub> Aliphatic Hydrocarbons	ND (33)	ND (33)	N/A	ND (33)	ND (33)	N/A	ND (32)	ND (33)	N/A
C <sub>19</sub> -C <sub>36</sub> Aliphatic Hydrocarbons	ND (33)	ND (33)	N/A	ND (33)	ND (33)	N/A	ND (32)	ND (33)	N/A
C <sub>11</sub> -C <sub>22</sub> Aromatic Hydrocarbons	ND (33)	ND (33)	N/A	ND (33)	ND (33)	N/A	ND (32)	ND (33)	N/A
<b>PAH by GC/MS-SIM by method 8270</b>									
Naphthalene	<b>0.008 j</b>	<b>0.010 j</b>	<b>22*</b>	<b>0.008 j</b>	<b>0.011</b>	<b>32*</b>	<b>0.008 j</b>	<b>0.011</b>	<b>32*</b>
2-Methylnaphthalene	ND (0.011)	<b>0.007 j</b>	N/A	ND (0.011)	<b>0.007 j</b>	N/A	ND (0.011)	<b>0.007 j</b>	N/A
Acenaphthylene	ND (0.011)	ND (0.011)	N/A	ND (0.011)	ND (0.011)	N/A	ND (0.011)	ND (0.011)	N/A
Acenaphthene	ND (0.011)	ND (0.011)	N/A	ND (0.011)	ND (0.011)	N/A	ND (0.011)	ND (0.011)	N/A
Fluorene	ND (0.011)	ND (0.011)	N/A	ND (0.011)	ND (0.011)	N/A	ND (0.011)	ND (0.011)	N/A
Phenanthrene	ND (0.011)	ND (0.011)	N/A	ND (0.011)	ND (0.011)	N/A	ND (0.011)	ND (0.011)	N/A
Anthracene	ND (0.011)	ND (0.011)	N/A	ND (0.011)	ND (0.011)	N/A	ND (0.011)	ND (0.011)	N/A
Fluoranthene	ND (0.011)	ND (0.011)	N/A	ND (0.011)	<b>0.007 j</b>	N/A	ND (0.011)	ND (0.011)	N/A
Pyrene	ND (0.011)	ND (0.011)	N/A	ND (0.011)	<b>0.006 j</b>	N/A	ND (0.011)	ND (0.011)	N/A
Benzo(a)anthracene	ND (0.011)	ND (0.011)	N/A	ND (0.011)	ND (0.011)	N/A	ND (0.011)	ND (0.011)	N/A
Chrysene	ND (0.011)	ND (0.011)	N/A	ND (0.011)	ND (0.011)	N/A	ND (0.011)	ND (0.011)	N/A
Benzo(b)fluoranthene	ND (0.011)	ND (0.011)	N/A	ND (0.011)	ND (0.011)	N/A	ND (0.011)	ND (0.011)	N/A
Benzo(k)fluoranthene	ND (0.011)	ND (0.011)	N/A	ND (0.011)	ND (0.011)	N/A	ND (0.011)	ND (0.011)	N/A
Benzo(a)pyrene	ND (0.011)	ND (0.011)	N/A	ND (0.011)	ND (0.011)	N/A	ND (0.011)	ND (0.011)	N/A
Indeno(1,2,3-cd)pyrene	ND (0.011)	ND (0.011)	N/A	ND (0.011)	ND (0.011)	N/A	ND (0.011)	ND (0.011)	N/A
Dibenzo(a,h)anthracene	ND (0.011)	ND (0.011)	N/A	ND (0.011)	ND (0.011)	N/A	ND (0.011)	ND (0.011)	N/A
Benzo(g,h,i)perylene	ND (0.011)	ND (0.011)	N/A	ND (0.011)	ND (0.011)	N/A	ND (0.011)	ND (0.011)	N/A

NOTES:

1. Results in mg/Kg (milligrams per kilogram).
2. EPH: Extractable Petroleum Hydrocarbons.
3. ND(x) = constituent not detected at practical quantitation limits noted in parentheses.
3. PAH by GC/MS-SIM: Polyaromatic Hydrocarbons with Selected Ion Monitoring.
4. j: estimated concentration/ detected below standard laboratory reporting limits.
5. N/A = Not applicable.
6. \* = estimated RPD due to one or both sample results below reporting limits.

**TABLE 13**  
**RELATIVE PERCENT DIFFERENCES BETWEEN DUPLICATE SAMPLES**  
**BUZZARDS BAY, MASSACHUSETTS**  
**SEGMENT: WIE-04**  
**Town Beach, Mattapoisett**  
**Sampling Date: 1/21/04**  
**OILING CATEGORY: HEAVY**

Analyte	Sample Location 3					
	Upper Intertidal Zone	Upper Intertidal Zone	Relative Percent Difference (RPD)	Lower Intertidal Zone	Lower Intertidal Zone	Relative Percent Difference (RPD)
	WIE04-UIT-03	DDD01-UIT-01		WIE04-LIT-03	DDD01-LIT-01	
<b>EPH</b>						
C <sub>9</sub> -C <sub>18</sub> Aliphatic Hydrocarbons	ND (31)	ND (31)	N/A	ND (30)	ND (31)	N/A
C <sub>19</sub> -C <sub>36</sub> Aliphatic Hydrocarbons	ND (31)	ND (31)	N/A	ND (30)	ND (31)	N/A
C <sub>11</sub> -C <sub>22</sub> Aromatic Hydrocarbons	ND (31)	ND (31)	N/A	ND (30)	ND (31)	N/A
<b>PAH by GC/MS-SIM by method 8270</b>						
Naphthalene	<b>0.010</b>	<b>0.010</b>	<b>0</b>	<b>0.009 j</b>	<b>0.010</b>	<b>22</b>
2-Methylnaphthalene	<b>0.006 j</b>	<b>0.007 j</b>	N/A	<b>0.007 j</b>	<b>0.008 j</b>	<b>13*</b>
Acenaphthylene	ND (0.010)	ND (0.010)	N/A	ND (0.010)	ND (0.010)	N/A
Acenaphthene	ND (0.010)	ND (0.010)	N/A	ND (0.010)	ND (0.010)	N/A
Fluorene	ND (0.010)	ND (0.010)	N/A	ND (0.010)	ND (0.010)	N/A
Phenanthrene	<b>0.015</b>	<b>0.006 j</b>	<b>86*</b>	<b>0.012</b>	ND (0.010)	N/A
Anthracene	ND (0.010)	ND (0.010)	N/A	ND (0.010)	ND (0.010)	N/A
Fluoranthene	<b>0.030</b>	<b>0.019</b>	<b>45</b>	<b>0.026</b>	ND (0.010)	N/A
Pyrene	<b>0.027</b>	<b>0.017</b>	<b>45</b>	<b>0.023</b>	ND (0.010)	N/A
Benzo(a)anthracene	<b>0.014</b>	<b>0.008 j</b>	<b>55*</b>	<b>0.008 j</b>	ND (0.010)	N/A
Chrysene	<b>0.014</b>	<b>0.010 j</b>	<b>33*</b>	<b>0.013</b>	ND (0.010)	N/A
Benzo(b)fluoranthene	<b>0.012</b>	<b>0.008 j</b>	<b>40*</b>	<b>0.010</b>	ND (0.010)	N/A
Benzo(k)fluoranthene	<b>0.012</b>	<b>0.007 j</b>	<b>53*</b>	<b>0.009 j</b>	ND (0.010)	N/A
Benzo(a)pyrene	<b>0.014</b>	<b>0.008 j</b>	<b>55*</b>	<b>0.011</b>	ND (0.010)	N/A
Indeno(1,2,3-cd)pyrene	<b>0.008 j</b>	ND (0.010)	N/A	<b>0.008 j</b>	ND (0.010)	N/A
Dibenzo(a,h)anthracene	ND (0.010)	ND (0.010)	N/A	ND (0.010)	ND (0.010)	N/A
Benzo(g,h,i)perylene	<b>0.009 j</b>	<b>0.006 j</b>	<b>40*</b>	<b>0.009 j</b>	ND (0.010)	N/A

NOTES:

1. Results in mg/Kg (milligrams per kilogram).
2. EPH: Extractable Petroleum Hydrocarbons.
2. ND(x) = constituent not detected at practical quantitation limits noted in parentheses.
3. PAH by GC/MS-SIM: Polyaromatic Hydrocarbons with Selected Ion Monitoring.
4. j: estimated concentration/ detected below standard laboratory reporting limits.
5. N/A = Not applicable.
6. \* = estimated RPD due to one or both sample results below reporting limits.

**TABLE 14  
POTENTIAL EXPOSURE PATHWAYS  
BARGE B120 SPILL  
BUZZARDS BAY, MASSACHUSETTS**

Potentially Affected Media	Potential Human Exposure Routes					Potential Ecological Exposure Routes			
	Inhalation	Ingestion	Dermal Absorption	Public Welfare	Safety	Aquatic		Terrestrial	
						Shellfish	Other Organisms	Animals	Plants
Public Sand Beaches	X	X	X	X		X		X	
Private Sand Beaches	X	X	X			X		X	
Mixed Sand/Gravel and RipRap Groins (jetties)	X	X	X	X	X	X		X	
RipRap Seawalls, Bulkheads, Piers,		X	X	X	X	X		X	
Rocky Shores		X	X	X	X	X		X	
Marsh		X	X	X		X		X	X
Subtidal Surface/Sediment		X	X			X	X		
Surface Water		X	X				X	X	
Ground Water		X	X						
Air	X								

Notes:

1. Ingestion includes particulate ingestion, hand-to-mouth, and via food consumption (e.g., shellfish)
2. Surface water is considered an exposure point from both human (e.g., swimming) and ecological perspectives.