UPDATED 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
GAI	Groundwater Analytical, Inc.
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 Resource Council
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

Executive Summary

As a result of the April 27, 2003 release of No. 6 fuel oil from Bouchard Barge B120 into Buzzards Bay, Massachusetts (B120 oil spill), GeoInsight, Inc. (GeoInsight) and ENTRIX. Inc. (ENTRIX) prepared this updated Conceptual Site Model (CSM) on behalf of Bouchard Transportation Company, Inc. (Bouchard or RP) to evaluate the transport and fate of the released oil in the environment as it relates to identification of the media and locations where residual oil could continue to have an effect on the environment. The CSM also identifies potential exposure pathways and receptors for future risk characterization. This CSM is intended to assist in the response action plans conducted for this release (RTN- 4-17786) under the Massachusetts Contingency Plan (MCP), 310 CMR 40.0000. Areas that are identified to potentially have residual oil present will be evaluated further as part of the Phase II Comprehensive Site Assessment activities.

This CSM was developed using:

- Pertinent literature on the behavior, effects, and persistence of oil in the environment from previous oil spills and scientific studies (Section 3.0);
- Extensive field observations and studies conducted for the B120 oil spill over the past 2 years (Section 4.0); and
- State-of-the-art computer modeling on the fate and transport of the released B120 oil (Section 5.0).

The results of this three-pronged assessment validate the transport and fate of the oil in the environment. Specifically, the large majority of the released volume floated on the water surface, and was carried by winds and waves until it was stranded on the shorelines of Buzzards Bay within two to three days of the release. The heaviest oiling occurred on exposed, southwest facing shorelines, such as Barney's Joy or West Island. Small percentages of the released volume evaporated into the air (approximately 4 percent), dissolved into the water column (less than 1 percent), or sank to the seafloor (less than 1 percent). The oil that evaporated into the air or dissolved into the water dissipated within hours or days of the release. Oil that sank formed sporadic tarballs that were highly localized in the vicinity of Barney's Joy during the spring and summer of 2003. By the end of the summer of 2003, there were no reports of substantial tarball occurrences in the Buzzards Bay spill area, and various field and laboratory studies in 2004 found no evidence of subtidal oiling with the exception of one specific nearshore subtidal location immediately adjacent to a boat ramp on Long Island. Note that the nearshore subtidal zone of concern is generally considered as the marine habitat between mean low water and a depth of approximately 3 feet below mean low water. Nearshore subtidal sediment samples, including samples collected from the Long Island boat ramp and water quality samples collected during Phase I activities were below effects-based screening criteria commonly used in MCP Stage I ecological risk characterization.

The large majority of the oil that stranded on the shoreline was removed during intensive cleanup efforts overseen by Unified Command during the spring and summer of 2003. By the end of the emergency response phase in September 2003, a total of 5,341 tons of solid waste had been removed as part of the cleanup efforts, and over 75 percent of the previously oiled shoreline were

documented to satisfy cleanup criteria established by federal and state resource agencies. Most of the shoreline segments that did not satisfy cleanup criteria by September 2003 were either not inspected because they were determined to have minimal likelihood of remaining oil (some Elizabeth Islands) or failed inspections due to highly localized oil splatter on rocks (e.g., Barney's Joy).

Additional cleanup and field surveys were conducted under a MCP Immediate Response Action approved by the Massachusetts Department of Environmental Protection along shorelines after the completion of the emergency response phase in September 2003 and have continued to date. This additional cleanup resulted in the removal of approximately 13 tons of solid waste. Field surveys conducted since the emergency response phase ended have confirmed that over 95 percent of the previously oiled shoreline satisfied emergency response cleanup criteria, and at least 60 percent of the previously oiled shoreline satisfied MCP requirements leading to the transmittal of a partial Class A-2 Response Action Outcome Statement for 57 of the 120 shoreline segments that were oiled by the release. Additional shoreline surveys and laboratory analysis conducted after the Phase I assessment indicate that, with the exception of four shoreline segments, sediment and water quality were below effects-based screening criteria commonly used in Stage I ecological risk characterization, and remaining residual oil on these shorelines is localized and sporadic. The four shoreline segments where residual oil was most obvious during 2004 include short portions of shoreline at Long Island, Strawberry Point, Barney's Joy, and Howard's Beach. With the additional cleanup conducted in 2004 and 2005, current oil at these locations is highly localized and largely consists of staining on rocks (Long Island, Strawberry Point, Barney's Joy) or minute "pepper flecks" in sand (Howard's Beach).

Based upon the data presented in this CSM, exposure pathways to surface water, ground water, and air are considered to be incomplete. Residual oil may be present in intertidal areas, primarily in mixed sand and gravel shorelines where the initial degree of oiling was characterized as moderate or relatively heavy. Minimal amounts of residual oil may be present in the nearshore subtidal zone adjacent to mixed sand and gravel shorelines that were initially moderately to heavily oiled (e.g., Long Island) or in quiescent areas near these areas where erosional material may be deposited. Further evaluation of these areas will be conducted as part of Phase II Comprehensive Site Assessment activities to characterize potential exposure to human and environmental receptors.

1.0 INTRODUCTION

This updated Conceptual Site Model (CSM) provides additional information on the short-term and long-term fate and transport of oil spilled into Buzzards Bay, Massachusetts from the Bouchard Barge B120 on April 27, 2003 (B120 spill). It is intended to complement the Phase I Initial Site Investigation and Conceptual Site Model (Phase I/CSM) that was submitted to the Massachusetts Department of Environmental Protection (MADEP) on May 3, 2004. An amended CSM was also requested by MADEP in the July 27, 2004 Decision to Grant Permit letter issued at the completion of the MADEP's review of the Phase I/CSM and Tier IA Permit Application.

This report summarizes the expected and actual fate and transport of the spilled oil based on an extensive literature review related to oil spills, comprehensive modeling conducted specifically for the B120 spill, and over two years of field studies conducted in Buzzards Bay. These three lines of evidence are used to characterize oil fate and transport in Buzzards Bay and identify potential exposure pathways and receptors for use in developing a Phase II Comprehensive Site Assessment (CSA) Scope of Work.

This CSM was prepared by GeoInsight, Inc. (GeoInsight) and ENTRIX, Inc. (ENTRIX) on behalf of Bouchard Transportation Company, Inc. ("Bouchard" or "RP") to assist in response actions conducted under the Massachusetts Contingency Plan (MCP), 310 CMR 40.0000. Richard J. Wozmak, P.E., P.H. is the Licensed Site Professional (LSP)-of-record for response actions conducted under the MCP for this release (RTN 4-17786).

Portions of the work described in this CSM were prepared as part of ongoing activities being conducted pursuant to the Natural Resource Damage Assessment (NRDA) in accordance with the requirements of the Oil Pollution Act of 1990 (OPA 1990). The NRDA includes an assessment of injury to natural resources caused by the release, and their subsequent recovery to baseline conditions; therefore, some of the NRDA activities are applicable to the activities being conducted under the MCP. The NRDA is being conducted as a cooperative assessment between the RP and the natural resource trustees (Trustees) pursuant to OPA 1990. The Trustee representatives include the National Oceanic and Atmospheric Administration (NOAA) as the lead administrative trustee, the U.S. Fish and Wildlife Service (USFWS), the Massachusetts Executive Office of Environmental Affairs, and the Rhode Island Department of Environmental Management (RIDEM). The Wamapanoag "Aquinnah" Tribe of Gay Head was previously a Trustee; however, the Tribe subsequently completed a settlement agreement with the RP and has formally withdrawn from the NRDA process.

1.1 CONCEPTUAL SITE MODEL OBJECTIVES

The objectives of the CSM are to identify: 1) oil release and transport mechanisms, 2) areas where residual oil could potentially be located, and the expected condition of residual oil at these potential locations if such oil exists, 3) potential exposure pathways that may exist in areas where residual oil is present, and 4) potential human and environmental receptors associated with these potential exposure pathways. These areas that are identified as locations where residual oil may currently be present will be evaluated further as part of Phase II CSA activities. The data obtained from the Phase II investigation will then be used to calibrate and revise the CSM as necessary. The transport of oil in Buzzards Bay after the release was developed using a

combination of physical observations (e.g., helicopter overflight observations, shoreline inspection reports, field studies and reports of oil from citizens) and numerical models developed and being used as part of the NRDA process. Identification of potentially impacted media, exposure pathways, and receptors is based on the outcome of the numerical models, visual inspection of shoreline segments, and laboratory analysis of sediment and surface water samples that were collected as part of on-going MCP and NRDA activities.

The CSM was developed using the currently available data and model results. Collection of additional data during the Phase II investigation may slightly change the CSM presented in this report. Although there may be minor modifications to the CSM based on future data, the overall results of the CSM are considered to be valid and accurate for the purposes of identifying areas of investigation for the MCP Phase II CSA Scope of Work.

1.2 NUMERICAL MODELING OVERVIEW

This CSM incorporates the results of numerical models performed to date that depict oil transport and distribution. Numerical modeling is being conducted under the NRDA process to evaluate aquatic and shoreline impacts for damage assessments. Two numerical models, the NOAA Natural Resource Damage Assessment Model for Coastal and Marine Environments (commonly known as the "Type A" model) and COSIM (the Chemical/Oil Spill Impact Module), were utilized by the RP for this release. The Type A model is codified at 43 Code of Federal Regulations Part 11, subpart D under Comprehensive Environmental Resource Conservation Liability Act and 15 Code of Federal Regulations Part 990.27 (b) (iii) under OPA 1990. The Type A model was run initially as a screening tool to identify general fate and transport of oil following the April 27, 2003 spill. The COSIM model was implemented to incorporate more complete and updated incident-specific information to further refine the understanding of the fate and transport of the released oil.

In the absence of factual data, the model results provide estimates regarding the transport of the oil in Buzzards Bay using the best available and accepted methods, but focus on the initial oil transport. Therefore, the modeling results are limited in duration to the time period within the first few days to weeks following the release.

1.3 LITERATURE OVERVIEW

Substantial information is available on the fate, transport, persistence and magnitude of environmental exposure associated with previous marine oil spills. The existing information can be highly useful based on similarities as well as dissimilarities of oil type, type(s) of oiled habitat, sea conditions, air and water temperatures, and clean-up efforts. Pertinent literature on the general fate and transport of oil during oil spills has been employed in a variety of scientific articles and reports that illustrate the primary considerations for understanding potential exposure and persistence in the environment. This information is presented in Section 3.0 and was applied to the B120 release to provide insight into the potential fate and transport of the spilled oil.

1.4 FIELD OBSERVATIONS OVERVIEW

Field observations and studies during the first day of the spill, and over the weeks and months following the spill provide supporting documentation on the potential transport of spilled oil in

Buzzards Bay. During the first weeks, field observations and studies included aerial overflights, various sediment, water, and shellfish tissue sampling, and qualitative field surveys (i.e., Shoreline Clean-up Assessment (SCAT) surveys and chain drag surveys). Additional field efforts have continued to present and are further described in Section 4.0.

1.5 INCIDENT OVERVIEW

An unknown volume of No. 6 fuel oil was released from Bouchard Barge B120 which was carrying approximately 4 millions gallons on or about the afternoon of April 27, 2003. The precise volume of released oil will probably never be known because of the inherent difficulty in measuring the exact amounts of oil contained in the oil/water mixtures that were offloaded from the ruptured tank, and the unspecified quantity of cargo remaining in the lightering barge and the ruptured tank due to clingage and other factors after the fluid oil was removed from the ruptured tank. The present estimates range between 22,000 and 98,000 gallons.

On the evening of April 27, 2003, federal and state response agencies arrived on site. The federal and state agencies included the United States Coast Guard (USCG), NOAA, and the 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 to coordinate clean-up activities. Over 1,500 feet of 16-inch containment boom were initially deployed around the barge's stern to contain the released oil within hours of the release being reported.

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, 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 (including skimmers and barges) were mobilized in response to the release.

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 shortly after the spill event and began to collect environmental data and information for the NRDA process. On September 3, 2003, Unified Command completed cleanup operations specified under its May 23, 2003 Immediate Response Action: Treatment and Completion Guidelines Plan (IRATCGP) and subsequent response actions were conducted by the LSP and GeoInsight under a September 15, 2003 Immediate Response Action (IRA) plan prepared in accordance with the MCP.

2.0 RELEASE INFORMATION

The precise information on the time, location, and volume of the release is currently unknown because of the federal government on-going investigation. The information provided below is considered to be the best available at the time this report was prepared. The release occurred on the afternoon of April 27, 2003 shortly after Barge B120, operated by Bouchard, entered Buzzards Bay. Between 22,000 and 98,000 gallons of No. 6 fuel oil leaked from a hole approximately 12 feet by 2 feet in the bottom of starboard tank 2-S. 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. Bouchard notified the USCG of the release when the crew observed a slick trailing the Barge B120 on the afternoon of April 27. The spill area and approximate grounding location of Barge B120 are depicted in Figure 1. 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 the B120, both barges proceeded to the Mirant facility in Sandwich, Massachusetts.

Winds and currents drove the released oil primarily to the north, northwest, and northeast in the days following the spill. The municipalities where shorelines were oiled included Westport, Dartmouth, New Bedford, Fairhaven, Gosnold, Mattapoisett, Marion, Wareham, Bourne, and Falmouth. The dispersion of oil by wind and current resulted in spotty and varying degrees of shoreline oiling, ranging from trace to relatively heavy amounts. 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 the Elizabeth Islands and Rhode Island (e.g., Little Compton and Block Island). In total, varying degrees of sporadic oiling stretched across approximately 84 miles of the Massachusetts shoreline, and most areas where oiling occurred were only lightly or very lightly oiled. Dozens of miles of shoreline within the general spill area were documented to be unoiled.

2.1 GENERAL PROPERTIES OF NO. 6 FUEL OIL

No. 6 oil, like other hydrocarbons, is created through distilling crude oil. No. 6 is commonly referred to as a heavy fuel since it is primarily composed of the petroleum hydrocarbons that remain after the lighter hydrocarbons (e.g., gasoline or No. 2 diesel) are distilled from the crude oil. While there may be some overlap in the molecular weight of the individual hydrocarbons that comprise No. 6 and lighter fuels, the differences in general composition significantly influence their transport, fate, and impacts when released into the environment.

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. Standard No. 6 oil has the following properties according to the database for Environment Canada (2004), NOAA's Adios model, and NOAA's database for the Type A model.

♦ Solubility [1,2] (22-25°C)	0.4 to 6.3 milligrams per liter (mg/L)
♦ Oil-seawater surface tension[1,2] (22°C)	27 to 40 dynes per centimeter (dyne/cm)
♦ Dynamic Viscosity[1,2] (25°C)	3,180 centiposes (cP)
♦ Dynamic Viscosity[1] (10°C)	28,700,000 cP
♦ Vapor pressure[2] (25°C)	0.00038 atmosphere (atm)
♦ Volatile fraction[2] (boiling pt <340°C)	38.9 percent of oil
♦ Volatile aromatic fraction[2]	28.3 percent of oil
♦ Percent of oil ultimately evaporated[3]	6 to 7 percent of oil
♦ Partition coefficient[2] for volatile aromatics for adsorption/desorption to suspended solids	3,650 (dimensionless)

1 – Environment Canada (Jokuty et al. 2000)

2 – NOAA's CERCLA Type A Technical Documentation (French et al. 1996)

3 – NOAA/HAZMAT Adios Model ver. 2.0

2.2 PROPERTIES OF THE B120 OIL

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

2.2.1 Physical Characteristics

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 degree these two blends were specifically 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 origins and specific characteristics of the individual blends carried by the B120 barge are unknown.

The specific physical properties of the Buzzards Bay seawater and No. 6 oil carried in the B120 barge are as follows.

Temperature	
Oil in barge	140ºF (60ºC)
Ambient seawater	45ºF (7.3ºC)
API gravity of oil	9.2 (at 60ºF [15.7ºC])
Specific gravity	
Oil in barge	973.6 kilograms per cubic meter (kg/m³)(at 60ºC)
Oil in ambient seawater	1011.8 kg/m³ (at 7.3ºC)
Ambient seawater	1027.4 kg/m³ (at 7.3ºC)
Pour point of oil	6°C to 15°C

The API gravity value of the oil was measured by the cargo inspectors at Intertek-Caleb Brett for calculating the volumes on board the B120 and B10 barges following the spill. Specific gravity estimates of the oil under various temperatures were made using an extrapolation from two sets of values provided by Environment Canada (Jokuty et al., 2000). A linear regression was made for data referenced by the Environmental Emergencies Technology Division of Environment Canada (1988), and by Mackay and Zagorski (1982). The measured API gravity of 9.2 is equivalent to a specific gravity of 1005.7 kg/m³ at 15.67°C (60°F). Assuming the slopes are the same, the y-intercepts of the linear regression curves were adjusted to meet 1005.7 kg/m³ at 15.67°C. This resulted in two equations (expressed in kg/m³ and °C): SG = -0.7T +1016.67 and SG = -0.7557T + 1017.54. The average specific gravity from these two datasets is 1011.8 kg/m³ at 7.3°C compared to the specific gravity of 1027.4 kg/m^3 for ambient seawater.

The oil carried by the B120 barge was heated during transport (typically No. 6 oil is heated above 130°F to facilitate transport and transfer). The average temperature of the oil after loading was recorded to be 139.6°F. However, the grounding of the barge disabled the heating system 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 oil temperature, and seawater temperature and salinity. No. 6 oil, when heated, will typically float on seawater over a range of liquid temperatures when the salinity is at or above 15 parts per thousand (average salinity of seawater is typically 35 parts per thousand). Once the released B120 oil cooled to ambient temperatures, it would continue to float based on its physical properties (additional environmental factors that could influence floating are discussed in Sections 3.2 and 4.2.3).

2.2.2 Chemical Characteristics

On April 30, 2003, a total of eight source oil samples were collected by the USCG from tanks 2-P (4 samples total) and 2-S (4 samples total) on the B120 barge for laboratory analysis of polynuclear aromatic hydrocarbons (PAH). Tank 2-P is adjacent to the starboard tank 2-S, where the oil was released. These samples were analyzed by B&B Laboratories, Inc. (B&B), and the analytical results are presented graphically in Figure 2.

The laboratory analytical results indicate that the total petroleum hydrocarbons in the B120 oil were mostly composed of aliphatic hydrocarbons, such as alkanes or cycloalkanes. The most common PAH in the B120 oil were alkylated naphthalenes and phenanthrenes that composed approximately 57% of the PAH in the B120 oil. The B120 oil contained lesser amounts of fluoranthenes, pyrenes, anthracenes, and chrysenes. The relatively "heavy" (i.e., 5-ringed) PAH, such as benzo(a)pyrene, benzo(b)fluoranthene, benzo(k)fluoranthene, and indeno(1,2,3-c,d)pyrene, were detected at very low concentrations. This PAH fingerprint is generally consistent with standard No. 6 oil, and is valuable in assessing the potential behavior and persistence of the oil in the environment as well as distinguishing the B120 oil from other petroleum hydrocarbons and non-petroleum hydrocarbon sources in the environment (such as pyrogenic sources). Section 4.3.5 of this report discusses identification of B120 oil and distinguishes between petrogenic and pyrogenic sources of PAH detected in sediment samples.

2.3 RELEASE VOLUME

The B120 barge was carrying approximately 4,000,000 gallons of No. 6 fuel oil at the time of the release, and the oil was divided into 10 tanks, each containing between approximately 300,000 gallons and 450,000 gallons of fuel oil. The oil was released from a portion of the cargo contained in one of the 10 tanks on the barge - tank 2-S. The exact volume of the release from this tank may never be determined, but independent consultants and the USCG have estimated the release to be between 22,000 gallons and 98,000 gallons. Attempting to precisely determine the volume of the release has been the subject of separate reports by Independent Marine Consulting and Dr. Joe Costa of the Buzzards Bay Project. Costa (2004) evaluated the publicly available records and reported that the best conservative volume was 97,000 gallons (with a range from 14,400 to 98,000 gallons). Based on Costa (2004), the USCG recognizes that the volume could have been as high as 98,000 gallons. Subsequently, Independent Marine Consulting re-evaluated the pertinent information including previous records not reviewed by Costa or possibly the USCG, and provided a response to Dr. Costa. The resulting report concludes, using both hydrostatic and hydrodynamic analyses, that the best estimate of the spill volume is approximately 50,000 gallons based on weather conditions, navigation and barge movements, and oil properties (Hall, 2004). This total volume represents about 1 percent of the cargo in the barge at the time of grounding and highlights the difficulties in attempting to refine more precisely volume estimate.

It is important to recognize that the estimated volume of the release did not and does not affect response actions conducted during the cleanup or under the MCP, because these response actions are based upon degree of impacts to specific media. For the purposes of this report, the oil volume does not play a critical role in evaluating the potential media that were or could be impacted, especially in light of the clean-up activities that immediately followed the release and continued for several months and extensive field surveys that have continued to date. Therefore, the oil volumes that are presented in this report should only be considered as the best available estimates at this time, recognizing that these estimates may be revised in the future based on consultation with the NRDA Trustees and the USCG, and that these estimates are not critical in evaluating potential impacts as part of this CSM.

For comparative purposes, the volume of the B120 oil spill was less than 1 percent the volume of the *Exxon Valdez* (approximately 10.8 million gallons of crude oil). In addition, the volume of the B120 oil spill was approximately an order of magnitude less than other high-profile oil spills that have occurred in the general vicinity of the B120 spill including the 1969 *Florida* oil spill in Buzzards Bay and the 1996 *North Cape* spill in Rhode Island.

2.4 RELEASE AREA DESCRIPTION

The precise grounding site and initial release area are currently unknown, but are estimated by the involved agencies to be within a ½-mile radius of Buoy G-1, offshore and to the south of Gooseberry Point in Westport. The barge was in transit at the time of the release, and after the crew of the barge became aware of the release, the vessel temporarily stopped at marker BB on the evening of April 27. At the direction of the USCG, the barge proceeded that evening to Anchorage Lima, located approximately 3 miles south-southeast of West Island in Fairhaven. The barge anchored at Anchorage Lima, and the barge operators transferred cargo from tank 2-S into tank 1-S to attempt to achieve hydrostatic equilibrium in order to reduce the fuel loss. On

April 28 and 29, the water and oil mixture from tanks 1-S and 2-S on B120 were transferred to Bouchard Barge B10, and then both barges proceeded to the Mirant facility in Sandwich, Massachusetts. Refer to Figure 1 for the estimated track of barge B120 on April 27, 2003.

2.4.1 Spill Area

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 spill area was divided into a total of 149 segments, as listed in Table 1 and shown on Figure 3.

Evaluation of the degree of oiling at the individual segments indicated that 29 of the 149 segments were not oiled by the release and are not considered to be part of the disposal site, as defined in the MCP. Table 2 includes the shoreline segments that are not part of the disposal site and additional information regarding these segments is presented in the February 10, 2004 IRA Status Report.

The segments presented in Table 2 are categorized conservatively based on the maximum degree of oiling observed within a particular segment. 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 designation of oiling categories was based upon the observed distribution of oil during SCAT surveys as well as the width of the area of oiling on the shoreline, in accordance with the matrix presented below.

Oil Distribution (% Cover)	**Width of Oiled Band**			
	≤ 3 feet	**3 feet to ≤ 6 feet**	**6 feet to ≤ 9 feet**	**> 9 feet**
≤ 1	Very Light	Very Light	Very Light	Light
1 to ≤ 10	Light	Light	Moderate	Moderate
10 to ≤ 50	Moderate	Moderate	Moderate	Heavy
50 to ≤ 90	Moderate	Heavy	Heavy	Heavy
90 to 100	Heavy	Heavy	Heavy	Heavy

The maximum degree of relative oiling recorded on the Buzzards Bay shoreline by field observations is presented on Figures 4 through 7.

After the degree of oiling was determined from the field surveys, each segment was given a ranking value based upon the degree of oiling over the entire segment. Heavily oiled shorelines were 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 for each 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 percent of the segment) was mostly very light, with only a small area near the tip of Mishaum Point (3 percent of the segment) with heavy oiling; therefore the ranking for Mishaum Point East is much lower:

$[(1 \times 97\%) + (4 \times 3\%) = 1.09]$

Individual shoreline segments were also classified according to shoreline type, which was determined by the substrate type and public use. Unified Command classified the shoreline in the spill area using the scheme presented below.

Shoreline Classification	Shoreline Type
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 responding to and assessing oil spills. Shoreline substrates in the intertidal zone of Buzzards Bay are shown on Figures 8 through 11.

2.4.2 Sensitive Receptors

Potential sensitive receptors identified in the spill area include water resources (aquifers, public and private water supply wells), critical habitats, threatened and endangered species, and humans. Information was obtained and reviewed to evaluate potential sensitive receptors in the Buzzards Bay area from the Natural Heritage & Endangered Species Program (NHESP) and Massachusetts Geographic Information Systems (MassGIS).

Review of information provided by MassGIS 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 may be present in certain areas of Buzzards Bay. The primary species of concern are two bird species that utilize the intertidal zone of the shoreline for foraging habitat in this area; 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 (part of the chain of 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. Maps from MassGIS and NHESP showing sensitive receptor information were included in the May 3, 2004 Phase I/CSM report.

In addition to wildlife utilization, residents and visitors also use portions of the shoreline. Buzzards Bay is comprised of various public and privately owned shoreline types, including sand beaches, mixed sand/gravel beaches and rocky shorelines. In general, most public sand beaches are 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 LITERATURE-BASED FATE AND TRANSPORT OF OIL RELEASES

The fate and transport of oil releases is documented in the technical literature for several spills, as discussed below. Some of the information from these releases is applicable to the B120 oil spill and can be useful in evaluating both oil transport and degradation. The applicability of the data obtained from these other historical spills is dependent upon several characteristics, including the type of oil released, volume released, shoreline substrate, degree of oil exposure, ambient air and water temperatures, storm activity, waves, tides, currents, and biological activity.

3.1 HISTORIC OIL RELEASES

Pertinent literature on the general fate and transport of oil during oil spills has been described in a variety of scientific articles and reports that illustrate the primary considerations for understanding potential exposure and persistence including Ganning et al. (1984), Neff (1990), Sell et al. (1995), NOAA (1997), National Research Council (1999), Yender (2002), and the National Research Council (2003) among others. The most well studied oil spill is the 1989 *Exxon Valdez* oil spill in Alaska. For considering potential fate of oil on the B120 oil spill, the *Exxon Valdez* should be viewed as a worst-case scenario because the volume of release was over two orders of magnitude greater than the B120 release, and the Alaskan climate and shoreline types are less conducive to clean-up activities and some natural weathering processes. Therefore, data collected from the *Exxon Valdez* spill may not be comparable to Buzzards Bay but some aspects of the fate and transport provide useful insight. Similarly, data from other oil spills may provide useful insight due to either similarities or dissimilarities. A summary of historical spills is presented in Table 3.

3.2 INITIAL FATE AND TRANSPORT OF OIL RELEASES

While incident-specific factors may influence the specific fate and transport of spilled oil, the general processes are consistent among spills especially those of similar oil types and in generally similar habitats. If the heavy oil (or crude oil) floats, a portion of the volatile fraction will evaporate, some of the soluble fraction will dissolve into the water column, and the majority of the volume will initially be transported as a surface slick. A small portion of the oil may absorb onto suspended sediment and sink to the seafloor, but this component is typically very low, as it is dependent upon the amount of suspended solids, which are typically low in seawater. The oil that evaporates will readily dissipate into the ambient air environment within minutes to hours of the spill. The oil that dissolves into the water column in open waters will dissipate within minutes to days depending on the total volume, proportion that dissolves, and the hydrodynamic characteristics of the spill site. A schematic of the initial pathways of spilled oil is depicted graphically in Figure 12.

While No. 6 oil is commonly referred to as a heavy fuel, the term does not mean that the oil would sink in seawater. In 1999, the National Research Council (NRC, 1999) analyzed available information on heavy oil spills that occurred between 1991 and 1996, in part, to determine which oils did sink and what factors influenced that behavior. The primary factor that influences whether or not the oil sinks is relative gravity. Specifically, NRC concluded that the oil will sink when the specific gravity of the oil is greater than the specific gravity of the receiving water. If

the specific gravity of the oil is less than that of the receiving water, it will float except under unfavorable environmental conditions (e.g., certain storm events)

NRC (2004) reports that released oil floated in 80 percent of heavy oil spills they reviewed. They identified that oil sinking into the water column depends on high current speeds and/or the amount of sand in the water column (silt or clay concentrations may also influence sinking but substantially higher concentrations are necessary). Therefore, oil with a specific gravity less than seawater does not typically sink into the water column, except under extremely stormy weather conditions where the currents or wave activity causes direct mixing of the surface oil slick with the water column. An extreme example, the 1993 *Braer* crude oil spill in the Shetland Islands, was over twice the volume of the *Exxon Valdez* and virtually the entire spilled volume dispersed into the water column due to heavy sea conditions. Very high concentrations of total PAH in the parts per thousand range were measured immediately following the spill, and the concentrations decreased to background concentrations within a month, which is similar to the findings on the *Exxon Valdez* oil spill where oil concentrations decreased to background concentrations within one to two months (Kingston et al., 1999). More importantly, Short and Harris (1996) analyzed over 500 water samples over a 3-year period associated with the *Exxon Valdez* oil spill and report that all PAH concentrations were well below levels that would be acutely toxic to marine fauna including samples collected within a few days of the release.

Except under the unfavorable conditions identified above, most of the volume of a heavy oil spill will be transported as a surface slick by the prevailing winds and currents and become stranded on the shoreline (NRC, 1999). Within the intertidal zone, oil will generally be deposited in the upper intertidal zone since subsequent tidal action will tend to redeposit the oil in the upper tidal zone even if the slick comes ashore during lower tides. Once onshore, the stranded oil may be removed by clean-up efforts or continue to weather and decay naturally. Subsequent tidal action may redistribute some of the oil along the shoreline, especially if there is no clean-up effort. On the shoreline, heavy oils tend to adhere to the surface of the substrate, continue weathering, and degrade naturally.

3.3 NATURAL DEGRADATION

Natural degradation is the reduction in the mass, toxicity, mobility, and volume of a contaminant over time through naturally occurring physical, chemical, and biological processes. Short-term physical processes include evaporation and dissolution, and longer-term attenuation occurs through biodegradation, photo-oxidation, and continued dissolution and dispersion.

The process of biodegradation can begin within the first days of a spill but is considered a longer-term process. Microbes in the water and sediment partially or completely degrade oil to water soluble compounds. The water-soluble compounds are ultimately returned to the environment as carbon dioxide and oxygen. There are several factors affecting the efficiency of biodegradation: the ratio of surface area to volume, nutrient levels in the water (nitrogen and phosphorous), water temperature, and dissolved oxygen. Physical, chemical, and biological processes are influenced by relative surface area since the surface layer of the oil is primarily where these processes occur. As a result, thin layers of residual oil will naturally attenuate relatively rapidly compared to thicker tarmats or tar patties.

Photo-oxidation can also begin within the first days of the spill, but is considered a longer-term process. Through photo-oxidation, oil reacts with oxygen breaking down into soluble products or forming persistent compounds called tars. This process is promoted by sunlight and depends on the viscosity of the oil. The tars are formed by oxidation of thick layers of high viscosity oil, which mixes with sand and water, and forms tarballs. Warm air and water temperatures as well as sunlight will tend to increase the viscosity of the oil, which can result in increased photo-oxidation and biodegradation of oil. The Buzzards Bay shoreline does not often experience hot weather, but water and air temperatures increased for several months from the time of the spill in April through the summer of 2003, which served to increase natural degradation of residual oil.

In addition to warmer weather, natural degradation can be greatly influenced by inclement weather such as ice and storm events. Ice may be very effective at scouring oiled substrate. During the winter of 2003-2004, a significant amount of ice was present along the Buzzards Bay shoreline due to the unusually cold weather. Field observations indicated that the ice scoured the intertidal habitat, especially the rocky habitat. Storm events, especially severe storms such as nor'easters or hurricanes, can significantly reduce intertidal sediment concentrations by reworking the sediment, and redistributing the intertidal substrate. Shoreline erosion is typically associated with storm events, but it is a perpetual process associated with daily tidal action, and seasonal accretion and deposition of intertidal sediments. Thus, sediments on Buzzard Bay beaches in April 2003 would, for the most part, not be the same sediments present on these beaches in subsequent years.

As a result, the oil concentration in intertidal sediments will decrease over time by the erosion and dispersion of those sediments. Probably the most comprehensive study of this process was conducted on the *Exxon Valdez* oil spill by O'Clair et al. (1996). They sampled sediments at five depths between the lower intertidal zone and subtidal depths of 100 meters on the seafloor in 45 different areas over a three-year period. They found that oil concentrations in the lower intertidal zone decreased by 93 percent within two years of the spill. Oil concentrations substantially decreased with water depth. O'Clair et al. (1996) concluded that oil concentrations in the subtidal zone were confined to the shallow subtidal areas off heavily oiled beaches, and that the elevated concentrations in the shallow subtidal sediments were transient due to continued erosion of residual oil that had adhered to intertidal sediments and been re-deposited in shallow subtidal areas. They documented that naturally occurring PAH concentrations unrelated to the oil spill were highly variable in deeper waters, and oil concentrations in these areas were absent or negligible throughout the study. More importantly, they did not find PAH concentrations in the lower intertidal or subtidal areas that exceeded NOAA's Effects Range-Low (ERL) benchmark for protection of aquatic life throughout the study (NOAA, 1999). These ERLs are based on analyses of individual and total PAH concentrations in "whole sediment" samples (i.e., samples that include both the surface sediment itself and the pore water that fills the interstitial spaces of the sediment). The resulting ERLs are a set of conservative screening criteria found within NOAA's Screening Quick Reference Tables (SquiRTs) to evaluate the potential risk from organic and inorganic contaminants in sediment. These benchmark values are suggested under the MCP as a screening tool for assessing sediment quality.

3.4 OIL PERSISTENCE

NOAA (1997) reports that oil type and substrate type are two of the critical factors that influence the persistence of spilled oil in the intertidal environment, in addition to tidal energy, shoreline slope, and clean-up efforts.

During the 2003 Point Wells oil spill (No. 6 oil) near Seattle, intertidal sediment concentrations in sand and mixed sand-gravel beaches were shown to be below Washington State sediment standards in at least 98 percent of the sampling locations in primarily heavily oiled areas during the initial comprehensive survey, which was conducted approximately 6 months after the spill (ENTRIX, 2004). Sediment chemistry results from the 2000 Chalk Point (Maryland) oil spill (a mixture of No. 6 and No. 2 fuels) documented sediment PAH concentrations below NOAA ERL benchmarks at over 90 percent of the beach locations that were lightly, moderately and heavily oiled within four months of the spill, and all samples were below ERLs within 18 months of the spill (ENTRIX, 2000; ENTRIX, 2001). Subsequently, the Chalk Point natural resource trustees determined that oiled beaches fully recovered by the time clean-up endpoints were satisfied (i.e., there was no risk when there was no visible oil; Michel et al., 2002). In this context, "full recovery" not only means that there would no longer be a risk of exposure, but the ecological communities would have recovered to baseline conditions. On the 1996 *SS Cape Mohican* bunker oil (equivalent to No. 6 oil) spill, the natural resource trustees determined that not only was there no longer a risk to ecological resources, but that ecological communities on beaches had fully recovered within three months (CDFG, 1997). On the 1996 *North Cape* oil spill, there was no physical trace of oil on the beaches, within five months (NOAA, 1999). On the B120 oil spill, over 275 sediment samples have been analyzed after the spill and the only samples approaching NOAA's ERLs concentrations due to petroleum were those that were reported as definitively or likely to have visible oil present based on visual inspections in the field.

Sell et al. (1995) analyzed the recovery of rocky shoreline and marsh habitat following dozens of accidental and experimental oil spills. They report that rocky shorelines generally recover within three years, and concluded biological recovery required three years whether the loss of the biota was due to an oil spill or just physical removal (e.g., scoured by ice). On the 1996 *SS Cape Mohican* oil spill, full recovery of rocky shorelines was determined to be complete within five years (CDFG, 1997). On the 1989 *Exxon Valdez* oil spill, visible oil was reported along cobble shorelines 12 years after the spill (Short et al., 2004). However these results are not comparable to the B120 oil spill since the persistence is reported to be due to limited weathering in a subarctic environment, some shorelines were not cleaned of gross oiling during emergency clean-up activities (and were documented to be moderately or heavily oiled years after the spill), and oiling was associated with substrate conditions that are not representative of conditions in Buzzards Bay. In addition, the *Exxon Valdez* results are based on visual documentation of oiling, and visual surveys of the Buzzards Bay shoreline a year after the B120 spill have documented that not only are there no shorelines that would still be categorized as moderately or heavily oiled, but the oil remaining primarily consists of sporadic, weathered splatter or stains on rocks in a few locations.

NOAA (1997) concluded that oil will tend to be most persistent in low energy marshes and mudflats relative to other habitat types. It reports that duration of oil in these habitats following an oil spill is greatly influenced by the type of oil, the depth the oil penetrates the sediments, whether the oiling occurs to fringe habitat or interior marsh habitat, and the intrusiveness of

clean-up methods. In general, the report states that persistence and impacts of oiling are reduced if the oil does not significantly penetrate the sediment (such as with heavy oils which are less likely to penetrate than lighter oils such as gasoline and diesel), and/or oiling is largely limited to the outer fringe of the marsh habitat, and/or clean-up methods are relatively non-intrusive (which avoids forcing or driving the oil into the sediments). These conclusions were developed by field studies on oil spills as well as experimental oiling of marsh habitat. For example, NOAA used both intrusive and non-intrusive methods to clean marsh habitat during the 1991 Fidalgo Bay oil spill (Hoff, 1995). The study found that test plots where intrusive clean-up methods were employed had more persistent oil concentrations, oil penetrated the sediment to a greater degree, and there was less vegetative recovery compared to test plots using non-intrusive methods. After the first year, the study found that non-intrusive methods resulted in vegetative growth returning to baseline, oil concentrations in sediment decreased by 90 percent, and oil weathering was three times faster compared to test plots where standard intrusive methods were used.

Due to the variability in persistence, the literature for individual spills provides a wide range of information on persistence of oil in marshes. For example, the 1969 *Florida* spill in Buzzards Bay has been widely reported as an example of how persistent oil can be in marsh habitat. However, it should be noted that the *Florida* oil spill was a No. 2 oil spill in an interior marsh habitat where highly intrusive clean-up methods were used (Sell et al., 1995). The *1996 North Cape* oil spill had a comparable oil type and volume to the 1969 *Florida* spill. However, marsh clean-up was largely avoided on the *North Cape* oil spill and marsh sediment concentrations were reported to be below NOAA's ERLs for protection of aquatic life within months of the spill (NOAA, 1997).

3.5 LITERATURE SUMMARY

Based on the existing literature and knowledge of the ambient conditions in Buzzards Bay, the large majority of No. 6 oil would be expected to float upon release. Small fractions of the released volume may evaporate or dissipate, but the large majority of the released oil would be expected to form a slick or slicks on the water surface that would be carried by the prevailing wind and tides until being stranded in the upper intertidal zone along the shoreline. Oil that evaporated into the atmosphere or dissolved into the water column would be readily dissipated by winds and/or currents. Some oil may adhere to suspended solids on the water surface and sink into the water column as oil globules or sink to the seafloor as tarballs. If there were little suspended solids in the water, there would be limited oil globule or tarball formations. Oil globules or tarballs, if they were created, would be dispersed by the prevailing currents.

Heavy oil, such as a No. 6, on the shoreline would tend to thickly adhere to the substrate, and there would be minimal evaporation or dissolution in the weeks following the release since the readily dissolvable fraction or volatile fraction would have already dissolved or volatilized prior to coming ashore. Thus, there would be no expected impacts to air quality or ground water, and minimal penetration of the substrate.

Assuming cleanup actions were implemented, the large majority of the stranded oil could be collected because it would tend to adhere thickly to the substrate. While this adherence would improve cleanup efficiency by somewhat immobilizing the oil until it could be cleaned, it would also make the removal of stain or "bath-tub ring" on hard substrate difficult.

Natural degradation and natural attenuation over the ensuing months or possibly years would decrease the amount of oil remaining in the environment, and the residual oil that did remain would weather into an immobile crust or pavement that would be dry to the touch and generally not biologically-available. Natural attenuation would be greatest along exposed shorelines. Oil would tend to persist the longest in areas that were (1) initially heavily oiled; (2) not exposed to high energy scouring or flushing; and/or (3) not cleaned, or cleanup activities resulted in driving oil into the substrate.

4.0 FIELD OBSERVATIONS AND DATA

The incident-specific field observations and sampling efforts conducted in Buzzards Bay provide definitive information on the extent and magnitude of oil in Buzzards Bay over time. In addition, these data can be used to provide a framework for evaluating and enhancing the numerical model results. Specific information on field activities conducted prior to April 27, 2004 is also included in the May 3, 2004 Phase I Initial Site Investigation and Conceptual Site Model Report.

4.1 AERIAL OVERFLIGHTS

Beginning on the day of the spill, aerial overflights were conducted several times a day by the USCG to document the location of the spilled oil on the open water of Buzzards Bay, and later along the shorelines of Buzzards Bay. On the evening of the spill (April 27, 2003), the aerial overflights reported a surface slick up to ten miles long and up to two miles wide extending from approximately Gooseberry Point in Westport toward the northeast, which coincides with the approximate grounding site and the initial path of the barge. Sheening was also observed off of West Island in Fairhaven.

Over the next few days, the daily aerial overflights indicated the bulk of the oil had come ashore, primarily along the exposed portions of the western shore of Buzzards Bay including Barney's Joy in Dartmouth, and Sconticut Neck and West Island in Fairhaven. In addition, discontinuous sporadic oiling and surface sheen were observed along the eastern shore of Buzzards Bay near Scraggy Neck and Nye's Neck and then near some of the Elizabeth Islands (Naushon and Penikese Islands). By the end of the first week following the spill (May 4), sporadic shoreline oiling was reported with little oil observed on the water (primarily adjacent to the shorelines). The most affected areas were south facing shorelines along the western shore of Buzzards Bay.

4.2 SUBTIDAL EVALUATION

Submerged areas offshore of affected shorelines were assessed to evaluate the potential presence of oil and, if gross oiling were present, consideration of clean-up efforts. Periodic re-oiling of a few shoreline segments in the vicinity of Barney's Joy and West Island during the first month after the release prompted field investigations to evaluate whether submerged oil was present offshore of these segments. Theoretically, oil in the subtidal sediments could initially be due to (1) a pool (bulk) of oil on the seafloor bottom; 2) tarballs sinking to the seafloor; and (3) dissolved oil in the water column infiltrating the seafloor. It is important to note that, based upon the expected behavior of No. 6 oil in general, the literature from previous spills, the properties of the released oil, and the results of the numerical modeling (Section 5), areas of pooled oil on the seafloor bottom would not be expected. Although pooled oil was not expected to be present, it was recognized that subtidal pooled oil was a concern and, therefore, field investigations were conducted to evaluate the potential for this scenario. The field evaluation mechanisms for the two potential scenarios of subtidal oiling are listed below.

Possible Scenario of Subtidal Oiling	Field Evaluation Mechanisms
Pooled (bulk) oil on the seafloor bottom	Lobster pot surveys, chain drags, dive surveys, and absorbent pad swipes.
Sand-sized oil particles in subtidal sediment	Shellfish bed evaluations, dive surveys, and subtidal sediment sampling.

As described below, subtidal surveys were initiated immediately following the spill to assess the potential occurrence of subtidal oiling, especially between the grounding location and heavily oiled shorelines (Barney's Joy and West Island). Qualitative and quantitative surveys conducted within two months after the release included lobster pot, chain drag, absorbent pad, shellfish chemistry, and water and sediment chemistry surveys. Additional subtidal surveys were conducted in 2004 to assess potential longer-term persistence of B120 oil in the subtidal environment, especially adjacent to shoreline segments that were previously moderately and heavily oiled. These surveys included chain drag, absorbent pad, dive, shellfish chemistry, and water and sediment chemistry surveys.

4.2.1 Lobster Pot Surveys

On May 2 and May 14, 2003 the Massachusetts Division of Marine Fisheries (MADMF) conducted initial lobster pot surveys. Four lobster traps loaded with snare were deployed and left for 12 days on the seabed just offshore of Barney's Joy Point, north of West Island (between West Island and Ram Island) and Southwest of West Island (between Wilbur Point and West Island - east of Long Island). Lobster pot surveys were generally conducted at a distance of 1,100 feet to 7,500 feet offshore. 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 small spots of oil on it. NOAA, MADMF, and the RP agreed to conduct additional investigations for potential subsurface oil.

Additional lobster pot surveys were conducted between May 30 and June 13, 2003 to further assess the potential occurrence of mobile oil in the subtidal habitat, especially offshore of heavily oiled segments experiencing periodic occurrence of tarballs. Sampling was conducted at a total of six locations in the vicinity of Hen and Chickens Rock, Barney's Joy, and West Island. No oiling of snare within lobster pots was observed at five of the six locations, with the lone exception being Barney's Joy. According to MADMF, anecdotal reports from lobstermen who were fishing in the late spring and early summer of 2003 indicated that there was essentially no oiling of their pots; only one fisherman reported minor oiling of some equipment in early May, and that was likely due to surface oil contacting the equipment as the pots were raised.

Approximately 40 percent of the lobster pots deployed in the vicinity of Barney's Joy (11 out of 27) had light staining indicating there was some movement of tarballs along the seafloor in this area, which agrees with the intertidal shoreline observations that the greatest magnitude of tarball occurrence was at Barney's Joy. It is important to note that the snare in the oiled pots referenced above was only very lightly stained with oil, indicating the subtidal oiling was only present as small, sporadic tarballs versus a pool of oil. Heavy staining that would be indicative of a pool of submerged oil was not observed on any of the recovered snare. A summary of these lobster pot surveys is included in Table 4.

4.2.2 Chain Drags

Chain drag surveys were conducted in May and June 2003, April 2004, and July-September 2004 to assess the potential occurrence of subtidal oiling in the vicinity of the grounding site and adjacent to moderately and heavily oiled segments. Chain drags were comprised of an approximate ten-foot section of heavy chain with three to four snares attached. The chain, with snare, was deployed from a boat and dragged along the seafloor bottom to evaluate the potential presence of oiling on the substrate surface. Chain drag surveys were conducted between approximately 1,100 to 2,600 feet offshore.

In May and June 2003, a total of 30 chain drag surveys were conducted in the general vicinity of Black Rock, Barney's Joy, and West Island which were the most heavily oiled areas. Refer to Figures 13 and 14 for the survey locations. No oiling was observed at any location except Barney's Joy. At Barney's Joy, 29 percent of the chain drag passes (five out of 17) documented light oiling and there was no oiling observed during the latter two surveys. This indicated that there was some light oiling in the subtidal habitat adjacent to Barney's Joy within approximately one month of the spill, but there was no evidence of oiling except near Barney's Joy, and the oiling at Barney's Joy was minimal.

In April 2004, additional chain drag surveys were conducted in the vicinity of the grounding site at the request of the NRDA Trustees. The surveys were intended to document whether oil had instantaneously sunk upon grounding on April 27, 2003. A total of eight chain drag surveys were conducted within 0.5 miles of Buoy 1 near Gooseberry Point. Drag lengths ranged from 0.4 to 1.1 miles. No oiling was observed. Refer to Figure 15 for the approximate locations of the April 2004 chain drag survey locations.

Between July and September 2004, additional chain drags surveys were conducted in the nearshore subtidal habitat immediately adjacent to, or down-current of, six shoreline segments previously categorized as heavily oiled to assess the potential occurrence of oiling in the nearshore subtidal. In part, the additional surveys were conducted in response to concerns raised by an unconfirmed report of sediment oiling in the nearshore subtidal habitat at Hoppy's Landing located on Long Island in the town of Fairhaven by the Fairhaven Police Department. Additional information on other types of surveys conducted at Long Island in response to this report is presented in Section 4.2.4.

A total of 13 chain drags were conducted on the east and west sides of the southern point of Long Island in response to the subtidal oil reported in July 2004 by the Fairhaven Police Department. No sheen was observed on the water surface during the chain drag passes, nor was oil or oil staining observed on the sorbent material upon retrieval of the chain. In August and September, additional chain drags were conducted in the subtidal areas along Long Island, Pope's Beach, Sconticut Neck West, Demarest Lloyd State Park beach and marsh, and Barney's Joy. After each pass, the chain was retrieved and the attached snare was visually inspected for oil. Additionally, the chain was wiped with a sorbent pad and the pad was inspected for the presence of visible oil. No sheen or oil was observed on the water surface, the attached snare or on the chain.

In summary, a total of 37 chain drag tows were conducted throughout the survey area between July and September 2004, and no oiling was observed during the surveys including those surveys conducted in the exact area of the reported oil at Long Island by the Fairhaven Police

Department. The results of the chain drag surveys conducted between July and September 2004 are presented in Table 5 and chain drag locations are depicted in Figures 16 through 20.

4.2.3 Absorbent Pad Swipes

Absorbent pad swipe surveys were conducted in the lower intertidal and shallow subtidal area in 2003 and 2004. Between May 5 and 21, 2003, absorbent swipe surveys were conducted at shellfish sampling stations during low tide. At each station, absorbent pads were swabbed along the exposed surface within an approximate 20-foot diameter area. Presence/absence of oiling on the pads was noted. For subtidal bed sampling, absorbent pads were individually wrapped around the heads of clam rakes and secured with adhesive tape. The absorbent pad surveys were conducted between the lower intertidal zone of the shore and 770 feet offshore. 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 recorded. The used absorbent pads were placed in labeled plastic bags for future reference. Oil (minor spotting) was observed on one absorbent pads collected at the Fairhaven Hacker Street and Sconticut Neck shellfish sample locations. No oil was observed on any other intertidal or subtidal swipes. The locations of the absorbent pad surveys are included in Figure 21 and a summary of the absorbent pad swipe surveys is included as Table 6. Additional surveys were conducted in 2004 as part of the evaluation of shellfish beds, as described in Section 4.2.5.2.

4.2.4 Underwater Dive Surveys

In the month after the release, small amounts of fresh tarballs came ashore on occasion at Barney's Joy. The lobster pot and chain drag surveys described above did not indicate the presence of submerged oil at sampling locations other than off Barney's Joy Point. By mid-summer there were few observations of sporadic tarballs at Barney's Joy. This suggested that residual oil was either no longer present in the subtidal areas offshore of Barney's Joy, or had become immobile.

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 theoretically most likely to be present based on proximity to heavily oiled shorelines, currents, and bathymetry (e.g., Barney's Joy Point and West Island). A total of six dive surveys were conducted and included visual assessment and collection of sediment samples. The dive survey locations are depicted in Figure 22.

There were no tarballs, oil pancakes, or other observations of oil at the dive sites. In addition, there was no staining observed on sampling gear, including gloves and air hoses (which were dragged along the seafloor). A total of 29 sediment samples were collected. PAH concentrations in samples were below NOAA ERLs for protection of aquatic life, and these results are discussed further in Section 4.2.6.

On July 14, 2004, GeoInsight received a phone call from representatives from the Town of Fairhaven who indicated that oil was enountered by a police dive team practicing evidence recovery searches off Hoppy's Landing on Long Island (segment W2A-10). According to one of the divers and the Fairhaven Police Chief, the team was practicing in shallow water (approximately 4 to 5 feet deep) about 30 to 50 feet offshore, between a public boat ramp and the

causeway. Refer to Figure 23 for the approximate location of the reported oil. As part of their evidence recovery practice, the team manually sifted through subtidal surface sediments and reported obeservations of sand-sized oil particles entrained in the water column. During the training exercise, the dive team did not encounter oil patties or pooled oil on the seafloor. The divers also said they observed an oil sheen on the water surface; although it is unknown if the observed oil sheen was associated with the oil particles observed by the dive team or from boat activity in the vicinity.

In August 2004, additional dive surveys were conducted by representatives of MADEP and MADMF at Long Island to attempt to re-create the oil conditions encountered by the police dive team. Additional underwater dive surveys were conducted offshore in subtidal areas adjacent to selected shoreline segments. The purpose of these additional surveys was to evaluate whether residual oil was present on the seafloor and if this oil would be encountered by individuals harvesting shellfish. The segments were selected based upon the degree of oiling and at locations where oiled rocks were tossed into the subtidal zone after wiping the oil ("wipe and toss"), which was conducted during the initial cleanup activities overseen by Unified Command. The dive inspection consisted of three divers from MADMF who swam 20 to 50 feet apart along the bottom of the seafloor approximately 100 to 50 feet offshore of the selected segments. During the inspections any suspect rocks were retrieved and brought to the surface for closer inspection by MADEP.

In segment W2A-10, MADEP reported that they dived at the same approximate area and disturbed the sediment in the same manner of the police dive team, but did not observe oil and were unable to replicate the oil conditions reported by the police dive team. Oil was also not observed at the other locations investigated by the MADEP/MADMF dive team. Information provided by MADEP on their dive surveys, as well as maps showing the locations of the dive surveys (based upon the coordinates provided by MADEP) is attached in Appendix A.

In July and August 2004, subtidal sediment samples were collected from the area of the police dive survey to further characterize the potential for B120 oil to be present in nearshore subtidal sediments. A total of 20 sediment samples were collected from 9 locations around Long Island. All samples were below NOAA's ERL benchmark for total PAH, and specific results are discussed in Section 4.2.7.

4.2.5 Shellfish Bed Evaluations

Evaluations of shellfish beds, and shellfish tissues in particular, are useful surrogates for assessing the potential presence of oil in the lower intertidal/shallow subtidal zone. Shellfish are sessile, benthic organisms that typically filter large volumes of water and associated entrained sediment during feeding. Shellfish are not able to readily metabolize PAH, so PAH that are present in water and sediment tend to bioaccumulate in shellfish tissues. Therefore, analysis of PAH in shellfish tissue is a useful indicator for the presence of oil in the nearshore environment.

4.2.5.1 Tissue Sampling

Between May 2003 and May 2004, seven shellfish chemistry surveys were conducted at a total of 33 locations in the lower intertidal/shallow subtidal zone around Buzzards Bay. Specifically, two surveys were conducted in May 2003, and one survey in each of June, July, August, and October 2003, and May 2004. Species of bivalves targeted for sampling based on their

recreational and commercial importance and abundance were: blue mussels (*Mytilus edulis*), oysters (*Crassostrea virginica*), quahogs (*Mercenaria mercenaria*), scallops (*Argopecten irradians*) and softshell clams (*Mya arenaria*). The laboratory results indicated that most shellfish adjacent to oiled shorelines had total PAH concentrations above background one to two weeks after the spill. Within four months after the release, only four locations had concentrations above concentrations found in shellfish beds that were not oiled. The four locations included one location in Sconticut Neck (mouth of Nakata Creek), two in Fairhaven (Hacker Street and West Island-Bass Creek), and one location in Dartmouth (Cow Yard). Within six months after the release, only one location was above background concentration (Long Island), and the shellfish in the vicinity of Long Island were documented to be within background concentrations during the subsequent survey in May 2004 (approximately 12 months after the spill). Not only does this indicate recovery of the biological resources, but these data also indicate that there is virtually no evidence of oil in the lower intertidal/shallow subtidal zone by October 2003. The results of shellfish sampling are summarized in Table 7. The shellfish sampling locations are depicted in Figures 24 through 28.

4.2.5.2 Field Inspections

Field inspections of selected lower intertidal/shallow subtidal areas were conducted in August 2004 adjacent to 15 shoreline segments to assess the potential occurrence of residual oil in nearshore areas that remained closed to shellfish harvesting at that time due to undocumented concerns about residual oil. Along each segment, clam rakes were used to disturb the substrate at multiple locations. Absorbent pads were tied to the ends of the rakes, which were scraped along the substrate. Clam raking was conducted at a total of 110 locations in these segments and there was no evidence of oiling on the pads or rakes or observation of sheening associated with disturbance of the substrate. Results of the absorbent pad surveys are presented in Table 8 and the locations are depicted in Figures 29 through 34.

In August 2004, MADEP and MADMF conducted intertidal and subtidal inspections of selected shoreline segments in conjunction with their underwater dive surveys described above in Section 4.2.4. Also ss part of these inspections, MADMF waded in the shallow subtidal area equipped with clamrakes to pick up rocks and shellfish from the seafloor. A representative number of rocks were collected and brought to the surface and examined by MADEP and MADMF for evidence of oil. Wards Rocks, Fish Island, Brandt Island East and Brandt Island West (including Howard's Beach) were inspected by foot. No oiled rocks or shells were observed at the time of the inspection but a significant portion of the rocks had black algae on the surface. However, minor amounts of residual oil were observed on Wards Rocks and Brandt Island West. The inspection team observed two tar patties on the north side of Wards Rock and limited buried oil between the jetty and creek in the intertidal zone of the Howard's Beach portion of Brandt Island West.

The residual oil observed on Howard's Beach was located below the top layer of sand in the grey sediments. The oiling scenario (i.e., the lateral and vertical extent of oil and type of residual oil) described at Howard's Beach by MADEP is consistent with previous and on-going inspections and is described further in Section 4.3.4. The subtidal inspection on Brandt Island West including the portion of the subtidal area in the vicinity of Howard's Beach was conducted approximately four to six feet offshore form the intertidal zone of the shoreline. Rocks were retrieved and inspected and no oil or sheening was observed.

Surveys were initiated by MADEP and MADMF on August 12, 2004 and completed on August 30, 2004. The results from the surveys are summarized in the table below and the survey locations are presented in Appendix A.

Survey Area	Date	Results
Scraggy Neck South (E1-11)	8/12/04	No oiled rocks or shells observed.
Seal Rocks	8/12/04	No oiled rocks or shells observed.
Nyes Neck (E1-13)	8/12/04	No oiled rocks or shells observed.
Wild Harbor	8/12/04	No oiled rocks or shells observed.
Long Island (W2A-10)	8/13/04	No oiled rocks or shells observed.
Wards Rocks	8/13/04	Two tar patties observed on north side.
Fish Island	8/13/04	No oiled rocks or shells observed.
Barney's Joy East (W3C-04)	8/17/04	No oiled rocks or shells observed.
Mishaum Point (WB-02)	8/17/04	No oiled rocks or shells observed.
Brandt Island East (W1F-03)	8/30/04	No oiled rocks or shells observed.
Brandt Island West (W1F-02)	8/30/04	Buried oil observed in the intertidal zone between the channel and the jetty.

4.2.6 Subtidal Sediment Sampling

Subtidal sediment sampling was conducted in May 2003, July-August 2003, and July-August 2004. In May 2003, initial subtidal sediment sampling was conducted in the nearshore zone along oiled shorelines along both the western and eastern shores of Buzzards Bay. Sample results were at least an order of magnitude below NOAA's ERL benchmark for protection of aquatic life, and the chemistry results did not have a source oil signature. Additional details on these results are provided in the Phase I/CSM (GeoInsight, 2004).

During the underwater dive surveys in July and August 2003, a total of 29 sediment samples were collected (additional information on the dive survey and locations is provided in Section 4.2.4). Four of the 29 samples were not analyzed because samples consisted largely of rock. Samples were analyzed for total petroleum hydrocarbons (TPH), total organic content (TOC), and PAH. 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 fallout) sources. The analytical results are presented in Table 9.

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. PAH concentrations were below NOAA's ERLs for total PAH ranging from less than 0.1 ppm to 2.0 ppm. In addition, detected concentrations were below NOAA's ERLs for individual PAH except one analyte in one sample (acenaphthene in sample 2N). Geochemical evaluation of this sample indicates that the B120 oil is not the potential PAH source based on the overall PAH fingerprint and relative weathering behavior of individual PAH compounds.

In July and August 2004, additional sediment sampling was conducted to assess the potential for natural shoreline erosion processes to result in redeposition of oiled sediments in the nearshore subtidal zone adjacent to heavily oiled shorelines (as had been documented following the *Exxon Valdez* oil spill albeit at very low concentrations). Subtidal sediment samples were collected using a Ponar sediment sampler. In general, two transects were established at each segment parallel to the shoreline. Sample stations were then established along the transects and consisted of four nearshore subtidal stations (water depths ranged from approximately three to 10 feet) and four deeper subtidal stations (water depth ranged from approximately 10 to 25 feet).

A total of 61 sediment samples were collected in the nearshore subtidal habitat in July and August 2004 (Figures 35 through 40). Twenty sediment samples were collected from nine locations around Long Island (W2A-10 and W2A-16). The remaining 41 samples were collected from subtidal areas along Pope's Beach (W2A-03), Sconticut Neck West (W2A-07), Demarest Lloyd State Park Beach (W3C-05), Demarest Lloyd marsh (W3C-06), and Barney's Joy East (W3C-04). These segments were initially categorized as heavily or moderately oiled, with the exception of the two Demarest Lloyd segments which were categorized as very light, and were sampled to assess whether heavy oiling from Barney's Joy may have been transported down-current to Demarest Lloyd State Park.

No visible oil or sheen was observed nor was a hydrocarbon odor detected in sediment samples collected in 2004 with one exception. The exception was collected from Hoppy's Landing on Long Island to assess the subtidal oiling reported by the police dive team at this location (see Section 4.2.4). The sampling location was approximately 25 feet from the public boat ramp, between the floating dock and the causeway. Two samples were collected from this location. Upon sample retrieval from this location, a trace rainbow sheen, less than about a millimeter in size, was observed in the sample jar.

The 2004 samples were analyzed for EPH fractions and PAH. Selected samples were also analyzed for PAH fingerprint to assess the source. EPH results indicated that concentrations in the 61 samples were below the MCP Method 1 Standards. In addition, concentrations of EPH fractions were below the detection limit, with the exception of the two samples from the public boat ramp at Hoppy's Landing on Long Island [W2A10-ST-S07 and W2A10-ST-XXX (duplicate)].

PAH analytical results revealed that most samples were below the detection limit. PAH concentrations detected in 16 of the 61 samples ranged from less than one part per billion (ppb) to two ppb. The composition of PAH in the two samples with detectable EPH concentrations was comparable to B120 oil. The results of subtidal sediment sampling are summarized in Table

10. All 61 samples were below NOAA's ERL for total PAH. In addition, 59 of the 61 samples were below NOAA's ERLs for individual PAH with the exceptions being the two samples collected adjacent to the floating dock at Long Island.

4.2.7 Summary of Subtidal Evaluation

Theoretically, B120 oil could have occurred in subtidal areas as a pool of oil (if the oil was heavier than seawater), tarballs (if there were naturally high suspended solid concentrations in the water column at the time of the release), or a dissolved component transferred from the water column to the subtidal sediments (if there was a substantial dissolved component proximal to the seafloor). Integration of the results from the literature (Section 3.0), the field investigations summarized above, and the incident-specific modeling (Section 5.0) agree that there was no pool of oil, no widespread tarball formation, nor impacts to subtidal sediments associated with a dissolved component of the oil.

Field surveys in 2003 indicated that there was some limited tarball occurrence in the immediate vicinity of Barney's Joy, and, to a lesser degree, near West Island. Various field surveys conducted in 2004 confirmed that there was no qualitative nor quantitative evidence of oil in the subtidal areas that would theoretically have been the most impacted by the spill. With the exception of one sampling location, subtidal sediment samples collected in 2003 and 2004 satisfied NOAA's ERL benchmarks for protection of aquatic life. The exception was a sampling location immediately adjacent to a boat ramp on Long Island, and the sample satisfied the NOAA ERL for total PAH, but not for a few of the individual PAH. As reported in section 4.4, surface water chemistry results have documented that samples collected associated with the B120 oil spill (April 2003 through August 2004) were below NOAA Ambient Water Quality Criteria.

Shellfish tissue analyses conducted in the weeks and months following the release found that there were initially elevated hydrocarbon concentrations in some shellfish tissues, but by the end of 2003, there was only one shellfish location with potentially elevated concentrations. By the spring of 2004, shellfish chemistry samples satisfied appropriate standards according to the Massachusetts Department of Public Health.

These results agree with the expected results from pertinent literature (Section 3.0) and the incident-specific modeling (Section 5.0) that conclude that there would not be a pool of oil or widespread tarballs on the seafloor nor a substantial dissolved component in the water column that could impact the subtidal sediments.

4.3 INTERTIDAL EVALUATION

A wide variety of intertidal surveys have been conducted since April 27, 2003 including qualitative and quantitative surveys. Qualitative (visual) surveys have included SCAT surveys, Immediate Response Action Completion (IRAC) and IRA inspections, buried oil surveys, and response to public concerns. Quantitative surveys have included initial sediment sampling and sediment chemistry sampling conducted as part of the Phase I investigation and initial Phase II characterization under the MCP. It should be noted that exact tidal elevations were not determined during the shellfish surveys, and it is likely that those survey results are applicable to both the nearshore subtidal zone and lower intertidal zone.

4.3.1 SCAT Surveys

SCAT surveys were conducted under the response effort from April 28 through June 6, 2003. SCAT surveys were conducted by the USCG, MADEP, ENTRIX (on behalf of the RP), and occasionally USFWS, NOAA, MADMF, Clean Harbors, and the affected municipalities. Under the direction of Unified Command, 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 of Unified Command 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 were used to determine the degree of oiling within each segment. The degree of oiling was measured by the following estimated 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. The total shoreline length and area by initial oiling category are summarized below.

Oiling Category	Length of Oiled Shoreline (miles)	Average Width of Oiled Shoreline (ft)	Percent of the Total Oiled Area
Very Light	35.7	2.8	15
Light	21.9	10.9	36
Moderate	18.8	6.2	17
Heavy	8.0	26.9	32

Based on ESI maps, the Massachusetts shoreline within the spill area totaled 215 miles. Shoreline survey results revealed that segments totaling approximately 84 miles of shoreline in Massachusetts were sporadically oiled to varying degrees. Less than ½ of the Massachusetts shoreline in the spill area was oiled. Oil was primarily surficial and observed in the upper intertidal zone, just below or at the wrack line. Almost ¾ of the oiled shoreline (68 percent) was categorized as light or very light oiling (but only comprised about half of the total oiled area due to the narrower widths of light and very light oiled shorelines). As previously stated, the maximum extent and degree of oiling by shoreline segment is presented in Figures 4 through 7.

4.3.2 IRAC Evaluation

IRAC evaluations were conducted between June 10 and September 3, 2003 as part of the emergency response efforts under the May 23, 2003 IRATCGP developed by the Unified Command. The purpose of the IRAC surveys were to determine if individual segments satisfied clean-up criteria, determine if additional clean-up was warranted, and document remaining oiling conditions. IRAC teams were composed of representatives from USCG, MADEP, the RP, and

the corresponding town. IRAC criteria were developed by the Unified Command and are presented below.

Substrate Classification	Substrate Description	IRAC Criteria
A	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.
B	Less-utilized Semi-public and Private Sand Beaches	• No visible surface, subsurface oil to trace, to the maximum extent possible.
C	Mixed Sand and Gravel, Gravel (pebble to boulder) and Rip Rap Groins (jetties)	• No sheen • Surface: Oil does not come off on the finger when touched • Subsurface: Trace
D	Rip Rap Seawalls, Bulkheads, Piers, Docks and Pilings	• No sheen • Oil does not come off on the finger when touched
E	Rocky Shorelines	• No sheen • Oil does not come off on the finger when touched
F	Salt Marshes	• No sheen

The IRAC criteria were intended to document when the emergency clean-up was complete based on comprehensive visual inspections and test-pit trenching of oiled shoreline segments throughout Buzzards Bay. It is important to note that IRAC closure only satisfied the criteria established by Unified Command and did not necessarily meet the cleanup criteria established by the Commonwealth of Massachusetts. Final closure (a "Permanent Solution," as defined in the MCP) under Massachusetts regulations is achieved through the submittal of a Class A or B Response Action Outcome Statement.

The IRAC teams classified each segment as either:

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

In general, segments that were classified as not meeting IRAC criteria with further work feasible were cleaned further, although IRAC surveys were not conducted after September 3, 2003. Shorelines that did not meet IRAC criteria generally failed due to very localized small areas of residual oil on rocks that came off to the touch in the summer of 2003.

The status of the IRAC inspections at the completion of the emergency response efforts on September 3, 2003 is provided in Table 11 and summarized as follows.

Category	Number of Segments
Met 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

A total of 91 segments out of a total of 120 initially oiled segments were documented to satisfy IRAC criteria as of September 3, 2003 (Table 11; Figure 41). At the conclusion of the IRAC surveys (September 3, 2003), 15 segments failed IRAC criteria, and 14 segments had not been surveyed. There were a total of 29 additional segments in the general spill area that were documented to be unoiled.

4.3.3 MCP Reconnaissances

After September 3, 2003, additional inspections and evaluations were conducted as part of the MCP IRA activities to evaluate whether IRA criteria were satisfied for those segments that had not passed IRAC criteria.

The objectives of the IRA efforts were to address potential Imminent Hazards (as defined in the MCP), if present, and to assess the release, threat of release, or site conditions specific to time-critical release migration and, where appropriate, contain, isolate, remove or secure a release or threat of release of oil. Therefore, IRA activities, to date, included reconnaissance to assess site conditions, and small-scale remedial actions to remove oil, where necessary.

The reconnaissance activities conducted as part of the MCP IRA activities found that Imminent Hazard conditions did not exist at the inspected segments. Reconnaissance activities at sandy shoreline segments observed small amounts of oil at only two locations: Little Beach (less than 500 ml of oil) and Barney's Joy East (small "pinhead-size" tarballs less than 1/8-inch diameter). Reconnaissance at mixed sand and gravel and rocky shores between September 2003 and September 2004 found residual consisting of minor, sporadic oil, which was immobile and moderately to highly weathered. Through weathering processes such as photo-oxidation, remaining residual oil on the shoreline is expected to continue to degrade naturally over time.

Surveys were conducted in 2003 and 2004 of segments that had not passed IRAC criteria by September 2003. Additional surveys were conducted in response to public and agency notification of potential oiling conditions, and site assessments are ongoing. Post-IRAC small-scale clean-up operations were conducted in 2004 and 2005 along several shoreline segments including Long Island, Brandt Island West (Howard's Beach), West Island West, Harbor View, Fort Tabor, Naushon Island, Strawberry Cove/Point, Mattapoisett Harbor North, and Planting Island Causeway. The efforts typically consisted of removing isolated tarballs or wrack patties, wiping tacky oil from rocks and limited removal of oil-saturated sediments and small rocks.

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500 ml of oil) and Barney's Joy East (small "pinhead-size" tarballs less than 1/8-inch diameter) Reconnaissances at mixed sand and gravel and rocky shores in 2003 and 2004 found residual consisting of minor, sporadic oil, which was immobile and moderately to highly weathered. Through natural weathering processes, remaining residual oil on the shoreline is expected to continue to degrade naturally over time.

By September 2004, all of the 120 oiled segments satisfied IRA endpoints (e.g., no Imminent Hazard or time-critical release conditions). At least 115 of the 120 segments satisfied IRAC endpoints (e.g., no mobile oil) with the possible exceptions being limited residual oiling on Long Island, West Island, Howard's Beach, Strawberry Point, and Barney's Joy (Figure 42).

In the spring of 2005, portions of shoreline at 20 segments were inspected to assess the current residual oiling conditions and determine if further clean-up was warranted and/or feasible or if the segments satisfied MCP criteria. In general, where oil was observed at these segments the oil consisted of only trace amounts of sporadic dried splatter or oil staining. Residual oil was not observed at many of these segments. The segments with relatively more residual oil observed included W2A-10 (Long Island/Hoppy's Landing), W1F-02 (Brandt Island West-Leisure Shores/Howard's Beach), W2A-11 (West Island West), W1E-03 (Strawberry Point West), W2A-02 (Harbor View) and W2A-03 (Pope's Beach).

Limited small scale clean-up efforts were conducted at some segments where more residual oil was observed based on the results of the visual inspections and where previous small scale clean-up activities were conducted in 2004. Previous clean-up activities and subsequent inspections at Strawberry Point and Howard's Beach revealed a decrease in the extent and degree of residual oil, however oil was present but in limited amounts and areas. Therefore, in May 2005, clean-up activities were conducted at Strawberry Point West. Clean-up efforts consisted of manual removal of residual oil in several areas with sticky splatter and tarmats (pavement) mixed in the sand and cobbles. Clean-up activities were also conducted at Howard's Beach, West Island West and Harbor View.

In July 2005, clean-up activities were conducted at Howard's Beach and consisted of mechanically overturning the top six to 12 inches of sediment in the intertidal zone utilizing Roto Tiller machines to overturn the sediments and oil absorbent materials to remove the exposed oil. A more detailed description of the type of residual oil observed and previously removed at Howard's Beach is presented in Section 4.3.4. Clean-up activities at West Island West entailed manually removing impacted sediments in the intertidal zone. Impacted sediments consisted of sand-size sediment with oil present on the particle surfaces and a small amount of oil in the interstitial pore spaces. The impacted sediment was not visible on the surface and was covered with approximately one inch of unoiled sediment.

In August 2005, clean-up efforts at Harbor View consisted of manually removing surficial tarballs and pavement from the sandy beach portion of the shoreline. Residual oil at Pope's Beach consisted of small, discontinuous patches of oil, in localized areas in the salt marsh. Additionally, samples were collected at Pope's Beach and Harbor View, and the data will be presented in future IRA Status Reports. In total, IRA clean-up activities have resulted in removal and disposal of over 13 tons of solid waste between September 3, 2003 and June 30, 2005.

4.3.4 Sediment Sampling

Initial intertidal sediment surveys were conducted at a total of ten locations between May 7 and May 9, 2003. At each location, a sample was collected in the upper intertidal zone and the lower intertidal zone. Oil was observed in the vicinity of all sampling locations except one (Wings Neck). Two of the 20 samples had concentrations above NOAA's ERLs for protection of aquatic life (total PAH), and each of these samples was confirmed or suspected to have oiling within the sample upon collection. Conversely, the majority of the samples that did not exceed NOAA ERLs were not suspected to have visible oil present. Additional details on these results are provided in the Phase I/CSM (GeoInsight, 2004).

In January and March 2004, GeoInsight and ENTRIX field personnel collected over 200 sediment samples from the intertidal zone of selected shoreline segments to evaluate concentrations of EPH hydrocarbon fractions and target analytes 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 (heavy. moderate, light, and very light). To be conservative, the samples were collected from the areas within the most heavily oiled segments that were reported to have 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 12 and depicted in Figure 43.

At each segment selected for sampling, sediment samples were collected from three to four locations to evaluate oil distribution in the segment. At each location, samples were collected from the upper and lower portions of the intertidal zone. Sediment samples were also collected from the middle portion of the intertidal zone at a subset of locations. Samples within a particular tidal elevation 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. The sample aliquots for the specific intertidal zone at a sampling location were composited together by the laboratory. After compositing, the residual sediment in the individual aliquots was frozen and archived at B&B Laboratories. The latitude and longitude coordinates of each sampling location was recorded at each sampling area. A schematic of the sampling points at a typical sampling location is attached as Figure 44.

The samples were analyzed by Groundwater Analytical, Inc. (GAI) for EPH using MADEP Methodology, and PAH using USEPA method 8270 with selected ion monitoring (SIM) to achieve low-level detection limits. Analytical results are summarized in Table 13. EPH results showed all samples were below MCP Method 1 Standards. In fact, all samples were below detection limits for EPH fractions with the exception of two individual samples from shoreline segments that were previously lightly or very lightly oiled: Wings Neck in Wareham (E107-UIT-02) and East Cove in Fairhaven (W2A13-M-02).

All samples were below NOAA's ERLs for total PAH except one individual sample from Town Beach in Mattapoisett (W1E06-UIT-03). All samples were below NOAA's ERLs for individual PAH except the Town Beach sample and one from Pope's Beach in Fairhaven (W2A03-UIT-02). The maximum degree of oiling at both of these segments was initially classified as "moderate." These samples were assessed further to evaluate the extent of potential oiling at these locations

and to assess whether the PAH detected were B120 oil. The re-analysis of the individual aliquots that were composited to create these samples, were chemically analyzed. The analytical results are summarized in Table 14. For both samples, the aliquot analysis indicated that the elevated concentrations were due to isolated particles that were not homogeneously distributed in the sediment. In the Town Beach analyses, only one of the three aliquots contained elevated concentrations of PAH. For the Pope's Beach sample, none of the aliquots had elevated concentrations indicating that the initial concentration was likely due to an individual "piece" of hydrocarbon in an aliquot that was not uniformly distributed within the sample or the sampling area.

As discussed in Section 2.2.3, PAH are ubiquitous in Buzzards Bay and throughout most of the world, and can be derived from vegetation, combustion products (i.e., pyrogenic), and other petroleum products. PAH analyses have indicated that the PAH in some samples are from sources not associated with the B120 release and, therefore, do not require response actions. PAH derived from coal, coal ash, or wood ash (excluding wood ash from treated wood) are specifically exempt from notification under the MCP (310 CMR 340.0317(9)). The PAH distribution in both the Pope's Beach sample and the Town Beach sample were dominated by pyrogenic PAH. Specifically, the percentages of individual PAH detected in the Town Beach sample (W1E06-UIT-03-A) were compared to the percentages of the same PAH fractions in samples of B120 oil collected for fingerprint analysis in April 2003, September 2003, and August 2004 (which are described in Section 7.2). In order to make a consistent comparison between samples, the PAH percentages in the B120 oil samples (which were analyzed for the full suite of PAH fractions) were normalized to the 17 target PAH in the EPH analysis. A graphical summary of the relative PAH percentages are presented as Figure 45. In particular, the W1E06-UIT-03-A sample shows anomalously elevated concentrations of anthracene and fluoranthene, and lower concentrations of benzo(a)anthracene and chrysene compared to the B120 oil samples. Anthracene and fluoranthene are considered to be indicative of pyrogenic sources (Stout et al., 2004), and the elevated concentrations of these PAH suggest a pyrogenic component is present, unrelated to the B120 spill. Therefore, the only two samples that exceeded NOAA ERLs during the 2004 Phase I investigation and initial Phase II characterization were not dominated by B120 oil. Additional information on the petroleum hydrocarbon sources is presented in Section 4.3.5.

Overall, the results of this comprehensive survey show that sediments along shoreline segments that were initially lightly and very lightly oiled do not pose a significant risk to humans or the environment due to the B120 oil spill. In addition, existing sediment sampling data from moderate and heavily oiled segments indicates there is no significant risk to human health or the environment remaining in these segments associated with the B120 spill based on MCP standards. Additional sampling will be conducted as part of the Phase II characterization.

Shoreline surveys of marsh habitat were conducted in July and August 2004 to qualitatively and quantitatively assess the potential human and environmental risks associated with residual oiling in marsh habitat. Visual surveys were conducted along seven marsh segments previously categorized as heavily or moderately oiled to determine if there was visible oiling or readily apparent harm associated with previously oiled marsh vegetation. These shorelines included Long Island, Harbor View, Sunset Beach, Brandt Island Cove, Planting Island Causeway, Mattapoisett Neck West, and Pine Creek to North Point (West Island). No readily apparent harm was observed in the marsh segments except possibly at Long Island, which is also the only marsh where residual oiling was observed and marsh vegetation appeared stressed. However, the

observations of stressed vegetation were not visually associated to visible oiling in this marsh area. Trace residual oil (i.e., splatter) was also observed at Strawberry Cove and Brandt Island East; however vegetation was healthy and robust at these locations. Sediment samples were collected to generally assess sediment concentrations in these marshes and to specifically assess the potential that oil was stressing the vegetation at Long Island. A total of eight surface sediment samples were collected from six of the seven segments (all segments except Long Island), and four sediment core samples were collected at Long Island from the patchy vegetation that appeared stressed. Sediment and marsh sample locations are shown on Figures 46 and 47. All hydrocarbon concentrations in sediment samples were below NOAA's ERL for total PAH and MCP Method 1 Standards for EPH (Tables 15 and 16).

In September 2004, a small amount of oil was encountered in the lower intertidal zone at the Leisure Shores Beach (located in shoreline segment W1F-02) in an area bounded by a rock groin to the west (with a small stream crossing the groin), and a smaller groin to the east, near a grill in the shape of a torpedo. The oil consisted primarily of small particles ranging in size from approximately 1 millimeter (mm) to 7 mm in diameter. These small particles were found as either discrete particles in the intertidal sediment, adhered to small rocks or shells, or floating on the water surface in trenches excavated by the inspection team. Initial evaluation indicated that the oil distribution appeared to be discontinuous, with some areas of the beach containing oil particles and other areas apparently free of oil particles.

In general, oil was encountered in less than half of the trenches excavated. The observed oiling conditions ranged from small "pinhead" to "pepper flake" size particles, measuring approximately 1 mm to 2 mm in diameter. These smaller oil particles were observed floating on the water surface within the trench and were often surrounded by a rainbow sheen. Slightly larger oil particles termed "globules," measured 5 mm to 7 mm in diameter and were found in a smaller proportion of the oiled trenches. The number of oil particles observed in the individual trenches was generally low, ranging from 1 to 6 oil particles per trench. Clean-up activities, consisting of digging and turning over the beach sediment using rakes and shovels to expose residual oil, were conducted at the end of September 2004. Oil exposed in the trenches was removed using oil absorbent material. A post-clean-up inspection conducted on October 20, 2004 indicated that small amounts of oil (pepper flakes) were still present in the sediment in the lower intertidal zone. Additional inspections at this location were conducted in the spring and summer of 2005 and additional clean-up, consisting of turning the sediment using rototillers and removing exposed oil with absorbent pads was conducted in July 2005 and are discussed in Section 4.3.3. Additional information regarding these cleanup activities will be presented in an upcoming IRA Status Report.

On December 9, 2004, post-cleanup sediment sampling was conducted at Leisure Shores Beach/Howard's Beach to assess the effectiveness of clean-up efforts in September 2004. A total of 21 sediment samples were collected at nine locations from the affected intertidal area of Howard's Beach during low tide. These samples were collected within a ten to 20-foot radius of each other where the oil was initially encountered in September. The sample locations are depicted in Figure 48. Double volume was collected at each sample location because analyses were conducted by two laboratories. One complete set of samples was shipped to B&B for PAH analysis, and one set was delivered to GAI for analysis of EPH hydrocarbon fractions.

The analytical results are summarized in Table 17. Analytical results indicated that all samples were below the detection limit for EPH and subsequently were below the Method 1 Standards. All samples also had PAH concentrations below NOAA's ERL for total PAH and individual PAH.

4.3.5 PAH Fingerprint Analyses and Natural Oil Degradation

There are a wide variety of hydrocarbons, including petroleum hydrocarbons, in the general spill area that are unrelated to the B120 spill. Prior to the B120 spill, virtually all shellfish, water, and surface sediments in Buzzards Bay (and most of the world) had concentrations of PAH that could be measured with the high resolution laboratory analyses that was regularly conducted to assess the extent of B120 oil in the environment for this project. Therefore, the presence of measurable PAH concentrations are not necessarily indicative of B120 oil. Sources of non-petroleum hydrocarbons include terrestrial vegetation and the combustion of carbon associated with power plants, automobiles, and even firewood that result in atmospheric transport and deposition into the marine environment, which are detectable through sampling and analysis. These are referred to as pyrogenic hydrocarbons. It is possible to determine whether detected PAH are primarily related to oil or non-petroleum hydrocarbons based on the relative proportion of certain PAH. Some PAH, such as anthracene or fluoranthene are indicative of pyrogenic sources. As mentioned above, the dominant PAH in No. 6 oil, including the B120 oil, are naphthalenes, especially C-2 naphthalene.

Similarly, it is possible to chemically distinguish certain types of petroleum from other petroleum types based on the chemical composition of the petroleum hydrocarbons in a sample. This is possible based on the relative proportions of hydrocarbons in a sample. For example, a gasoline sample would have a greater proportion of lower molecular weight hydrocarbons, and a heavy oil sample would have a greater proportion of heavy molecular weight hydrocarbons. Therefore, they can be distinguished by looking at the relative proportion of specific hydrocarbons in a sample. In addition, some petroleum products contain compounds or biomarkers that other petroleum products do not contain. For example, asphalt typically contains relatively high concentrations of dibenzothiopenes compared to No. 6 oil.

Because pyrogenic hydrocarbons primarily enter into the Buzzards Bay environment via atmospheric deposition, transport and run-off, these hydrocarbons are not usually visible in a sediment sample. However, they are detectable in PAH analyses. As discussed in Section 5.3.4, the highest concentrations of PAH measured in any intertidal sediments collected since June 2003 were in single samples from Pope's Beach and Town Beach in Mattapoisett (other samples collected from the same segment during the same survey, did not have elevated concentrations). These samples were the only intertidal samples collected since the spring of 2003 to have total PAH concentrations over 1 ppm, and the PAH in these samples were dominated by non-petroleum (i.e., pyrogenic) hydrocarbons.

At least two reports of oil have been due to the presence of asphalt-like substances in the intertidal zone (Gooseberry Neck and Holly Woods). Visually, the asphalt can often be distinguished from the B120 oil based on appearance since it tends to be highly weathered, and have embedded stones of relatively uniform size that may not naturally occur in the area where the oil is found. Chemically, it is possible to distinguish asphalt from the B120 oil based on the relatively high concentrations of dibenzothiopenes and specific biomarkers that occur in some non-B120 petroleum products (e.g., ions 191, 217, or 218). Other petroleum hydrocarbons have

been documented in the field associated with boat traffic, boat maintenance, lube oil, historic oil spills, and runoff from area roadways.

One factor that is not possible to accurately quantify is the natural degradation of B120 oil. Residual oil is exposed to a number of natural processes, including photo-oxidation, biodegradation, and mechanical abrasion. If volatile or soluble fractions still remain, evaporation and dissolution would also be occurring. The overall effect of these processes is to reduce the overall residual mass of oil over time, with generally the oil present on exposed surfaces undergoing the most degradation, with lesser amounts of degradation for oil present in interstitial spaces that are relatively unexposed to sunlight, wave action, or biodegradation. Due to the complex nature of natural degradation, it is not possible to realistically estimate the mass of oil lost to natural processes, but it is important to recognize that these are ongoing processes where oil is present. In general, the most common degradation processes selectively remove the light-end hydrocarbons (e.g., naphthalenes), while the heavy-end hydrocarbons (e.g., chrysenes) are typically more resistant to degradation and therefore the residual oil over time tends to be comparatively more enriched in heavy-end hydrocarbons as the light-ends weather away. As the residual oil in the environment weathers, it hardens and becomes immobile and increasingly unavailable to the environment and associated biological community.

To evaluate natural degradation of the B120 oil, samples of B120 tarballs were collected on September 5, 2003 and August 25, 2004 in the vicinity of Brandt Island in Mattapoisett for fingerprinting analysis and comparison to the original samples collected from the B120 barge on April 30, 2004.

Graphical comparisons of the hydrocarbon components in the tarball samples relative to the B120 sample are included in Figures 49 and 50. Figure 49 compares the concentrations of the individual hydrocarbon fractions; please note that because some of the tarball samples may have contained non-petroleum material (e.g., sand), the actual concentrations of these components may be lower than a sample containing only oil. Figure 50 compares the relative percentage of each hydrocarbon component, and this figure shows the percentages of the light-end hydrocarbons, such as naphthalenes, decreasing over time as these fractions are degraded. The relative percentages of the heavy-end hydrocarbons increase over time as the light-end fractions are selectively degraded.

4.3.6 Summary of Intertidal Evaluation

There was obvious initial oiling along intertidal shorelines and the extent and magnitude decreased relatively rapidly during the spring and summer of 2003 due to clean-up activities and natural attenuation. By September 2003, over 75 percent of the previously oiled shoreline segments were documented to satisfy clean-up criteria, and most remaining residual oil was spotty and localized residual in a few specific intertidal areas.

Comprehensive visual assessments and sediment analyses of previously oiled shorelines were conducted in 2004. Visual assessments in 2004 found that over 99 percent of the previously oiled shoreline had no visible oil remaining. Comprehensive Phase I investigations in early 2004 documented that PAH concentrations in sediment samples collected from shoreline segments that were previously classified as moderately oiled (beaches only), lightly oiled, or very lightly oiled were below applicable MCP Method 1 risk characterization and NOAA SQuiRT standards. The results of additional sampling and characterization subsequent to the Phase I investigation

found that sediment concentrations along representative shorelines that were initially heavily and moderately oiled also satisfied applicable MCP Method 1 risk characterization and NOAA SQuiRT standards. Hundreds of sediment samples have been collected along previously oiled shorelines and there has been no exceedance of MCP Method 1 risk characterization or NOAA SQuiRT standards. Additional investigation is warranted along a few shorelines including Long Island (W2A-10), West Island (W2A-15), Strawberry Point (W1E-03), Howard's Beach (W1F-02), and Barney's Joy (W3C-03). The oil remaining along these shorelines is generally highly weathered and only present in isolated, localized areas, but additional sampling is necessary to assess whether residual oil poses a risk to humans or the environment.

4.4 SURFACE WATER EVALUATION

Surface water sampling was conducted in April-May 2003, June 2004, and August 2004. As described in the Phase I report, water column sampling was initiated within 48 hours of the spill. 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 51. Water column samples were sent to Woods Hole Group (WHG) for analysis of PAH, EPH hydrocarbon fractions and target analytes, and volatile petroleum hydrocarbons (VPH) fractions and target analytes. Results of water column sampling are summarized in Table 18. Total PAH detected in the water samples were below 1 ppb with one exception, which was a sample collected at Barney's Joy within 48 hours of the spill (where the PAH concentration was 2.7 ppb). EPH and VPH hydrocarbon fractions were below the detection limit.

In June 2004, IRA clean-up operations were conducted at Hoppy's Landing on Long Island (segment W2A-10) to remove residual oil "pavement." As part of the clean-up operations, the clean-up crews manually removed exposed "pavement" and uncovered relatively unweathered oil that was also removed. During these clean-up operations, absorbent boom and snare were deployed along the perimeter of operations to minimize movement of the exposed oil into surface water. A slight sheen was observed on the surface of standing water during clean-up operations as the oil was removed and three surface water samples, labeled W2A10-SW1 through W2A10-SW3, were collected on June 9, 2004 to evaluate dissolved oil in the water column. Samples W2A10-SW1 and W2A10-SW2 were collected adjacent to work areas on the west side of Long Island and sample W2A10-SW3 was collected on the eastern side away from the clean-up operations; refer to Figure 52 for the locations of these surface water samples. The samples were analyzed for EPH fractions and PAH; the analytical results are summarized in Table 19. Analytical results were compared to NOAA SQuiRTs Ambient Water Quality Criteria Maximum Concentrations (CMCs) for marine water. Like the ERLs, the CMCs are listed in the SQuiRTs and are a conservative set of criteria to screen PAH concentrations for the protection of aquatic organisms.

The two samples that were collected proximal to the active work area had low concentrations of PAH below NOAA CMCs, with the exception of phenanthrene detected in one of the samples. EPH fractions were detected in both samples collected proximal to the active work area, but not in the sample collected outside the work area

In August 2004, five surface water samples were collected in intertidal areas that were considered to be representatives of worst-case conditions (i.e., initial heavy oiling, low-energy marsh habitat). Samples were collected from tidal pools or small intertidal ponds in marsh habitat along four shoreline marsh segments that were initially categorized as heavily oiled (Mattapoisett Neck West, Planting Island Causeway, Harbor View, and Brandt Island Cove West) and one shoreline segment initially categorized as moderately oiled (Blankenship Cove). Refer to Figure 53 for locations of surface water samples collected in August 2004. Samples were analyzed for EPH fractions and PAH. The analytical results and screening criteria are provided in Table 20. EPH fractions and PAH were not detected above the laboratory detection limits.

5.0 NUMERICAL MODELING

5.1 NUMERICAL MODEL INTRODUCTION

Due to the complexity and difficulty of comprehensive field surveys, mathematical models can augment field results to simulate the fate and transport of oil. A well-constructed model integrates all relevant phenomenon, yet maintains a degree of simplicity in order to be useful. As such, there are a myriad of models that could describe a specific aquatic system and the interactions between the water and the pollutant of concern. The process of modeling involves a number of steps, including identification of the driving factors of a system, development of a quantitative tool to simulate the system, and calibration of the model to empirical data. Initially, the NOAA Type A model was examined as a screening tool for a quick and simple assessment of the spill. Thereafter, the COSIM model, a state-of-the-art fate and transport model used to represent the "best available technology," was utilized to simulate the Buzzards Bay oil spill.

The COSIM model is an oil-specific component of the Generalized Environmental Modeling System for Surface waters (GEMSS). GEMSS is an integrated three-dimensional hydrodynamic and transport model that is capable of being modified to incorporate site-specific conditions. The goal of the COSIM fate and effects modeling is to provide an assessment of the distribution of the oil across time and space starting from the estimated time of the release. COSIM simultaneously simulates physical processes including dispersion, spreading, advection, evaporation, entrainment and resurfacing, dissolution, emulsification, re-suspension, photo-oxidation, biodegradation, partitioning to suspended solids, sinking and sedimentation, volatilization from the water column, shoreline deposition, and shoreline/surface slick evaporation. This is accomplished by tracking thousands of particles over space representing the various phases of the oil (surface, entrained, and dissolved oil) and determining the fate of each particle over time. With each time step, the model tracks the location, oil mass (divided into various constituents comprising the oil), and phase of each particle. Calculation of oil removal by clean-up activities was deactivated in the model, thereby simplifying the model run and producing conservative results (i.e., biased towards overestimates of environmental concentrations).

The GEMSS model has been used on dozens of hydrodynamic projects across the U.S, and is widely accepted by regulatory agencies and the scientific community. These projects have included a wide array of issues associated with 316(a) and (b) permitting, total maximum daily loads (TMDL), water withdrawals, salinity intrusion, water quality simulations, and oil spills.

5.2 INPUT PARAMETERS

Specific input parameters to the COSIM model are presented in Appendix B. A summary of the input categories and general parameters is presented below.

5.2.1 Weather

Hourly wind speed and direction were obtained from NOAA's Buoy BUZM3 near the mouth of Buzzards Bay. These values were corrected for daylight savings time and elevation. Air and water temperatures were also collected from the Buoy BUZM3, and averaged over the initial 72 hours (April 27-30, 2003). The resulting average water temperature of 45.1°F (7.3°C) and average air temperature of 49.6°F (9.8°C) were used as constants in the model.

5.2.2 Tides and Currents

Tidal propagation is estimated by the model. The tidal model was calibrated using a comprehensive set of tide and subsurface current harmonics (Signell, 1987) and tidal measurements from the NOAA Woods Hole, MA and Montauk, NY stations (www.co-ops.nos.noaa.gov).

5.2.3 Total Suspended Solids

Total suspended solid (TSS) concentrations were determined to estimate particle sorption, especially as it relates to the potential for the oil to sink. Laboratory analyses of surface water samples collected from 18 stations in Buzzards Bay in June 2004 indicate that concentrations ranged from approximately 1.0 to 5.8 mg/L. As described in Section 3.2, this concentration is several orders of magnitude below the concentrations necessary to cause significant sinking based on NRC (2004).

5.2.4 Shoreline Substrate

Shoreline substrate data were derived from NOAA's ESI atlas (NOAA, 1997).

5.2.5 Oil Properties

The chemical and physical oil properties specific to the B120 oil, as described in Sections 2.2.1 and 2.2.2 were used in the model.

5.2.6 Release Scenario

One of the primary inputs required by the model is the release scenario. As typical with most spills, it is difficult to derive the exact time, location, and amount of oil spilled over time. The release scenario was constructed for Buzzards Bay based on best currently available observations, measurements, and engineering calculations. Descriptions of initial field observations and fate and transport modeling results are provided in Sections 4.0 and 5.5, respectively.

A simplified estimate of the release scenario was used based on field observations from the aerial overflights and distribution of shoreline oiling. In this scenario, 90 percent of the oil was released over the first hour (3:30 PM to 4:30 PM). At this point, the barge reached Buoy BB near the Elizabeth Islands and headed toward anchoring at Lima. The remaining 10 percent was released over the next 2.75 hours (4:30 PM to 7:15 PM).

5.3 MODEL RESULTS

One of the factors to consider when reviewing the model results, particularly near the end of the model run, is that while the model can be used to predict movement and concentrations in environmental media, the model does not incorporate the shoreline clean-up activities that occurred as the oil moved ashore. The model predicts oil stranding and then estimates weathering and re-suspension of the shoreline oil, but does not incorporate the fact that significant quantities of oil were removed from the shoreline and on-water recovery totaled approximately 3,500 gallons within 24 hours of the release. Therefore, the model accuracy is limited to the first five to 10 days after the release event.

In addition, the model is not capable of predicting the relatively small and minor tarball events that tend to occur in association with No. 6 fuel oil spills. Tarballs tend to be carried by surface and/or subsurface currents towards the shoreline and the frequency of tarballs appearing on the shoreline tends to decrease after the first few months.

For this CSM, the model is used to describe initial transport of the oil in Buzzards Bay and identify the approximate amounts of oil that evaporated, dissolved, stranded on the shoreline, and sank to the seafloor.

The model output is described in detail in Appendix A and the accompanying CD-ROM in Appendix C graphically displays the oil movement over time and space. Figure 54 shows that the large majority of the spilled oil would form a surface slick until deposited on the shoreline. Small quantities of oil evaporate, dissolve, biodegrade, and emulsify into the water column.

5.3.1 Surface Slick

Modeling results are consistent with USCG overflight observations, which indicate that the bulk of the spilled volume initially formed a surface slick along the track of the B120 barge from the grounding location and extending toward the anchorage point. Over the next three to six hours, the model predicted that the slick was carried northeast by the prevailing winds and incoming tide. Throughout the evening of April 27 and into the morning of April 28, the modeled slick oscillated on the tides and was driven somewhat north by generally light winds. Consistent with SCAT observations made on April 28, the model suggests that, on the afternoon of April 28, strong northerly winds began to drive the slick north to northeast, and shorelines between Barney's Joy and West Island were impacted. By the morning of the April 29, Barney's Joy, Long Island, and West Island were heavily impacted and the northern extent of the slick was in the vicinity of Scraggy Neck along the eastern shore of Buzzards Bay. On April 30 and May 1, the remainder of the slick broke up and came ashore.

By the afternoon of May 2, approximately 99 percent of the slick was predicted to have come ashore and was no longer present as a surface slick. The model could continue to simulate oil re-suspension and weathering. However these simulations do not incorporate on-water and shoreline clean up activities. As such, from this time forward, simulations of shoreline oil locations and oil re-released from the shoreline cannot be considered as accurate due to these gross overestimations.

Figure 55 shows the modeled movement of the surface oil slick and impacts to the shoreline at discrete hourly time intervals from April 27 to May 1, 2003. A movie file showing the oil transport over time is included as a ". avi" file on the CD-ROM included in Appendix B.

5.3.2 Oil Evaporation

Model output indicates that approximately four percent of the spilled mass (that was not cleaned up on water or on the shoreline) would evaporate, and over 90 percent of the evaporation would occur within three days of the release. The oil remaining after three days would have a very low volatile fraction resulting in only 0.75 percent of the original spill mass evaporating over the next 28 days. Beyond 28 days, evaporation from residual oil is insignificant.

5.3.3 Dissolution

The model indicates that very little of the No. 6 oil (that was not cleaned up on water or on the shoreline) would dissolve into the water column (at most approximately 0.9 percent of the total mass). The oil that did dissolve would be proximal to the surface slick, and with total monoaromatic and PAH concentrations less than 16 ppb, as shown on Figure 56. Note that this does not account for dissolved components that may have sorbed onto suspended solids.

The COSIM modeling shows that the maximum concentrations of dissolved hydrocarbons in the water column decrease to less than 1 ppb within five days of the release. The model indicates these very low concentrations persist so long as the model continues to show oil on the water surface, including the resuspension of oil from the shoreline. However, it is important to note that the model does not account for the mass of hydrocarbons removed by the on-water and shoreline clean-up activities; if the model included the actual on-water recovery of oil or the gross oil removal from the shoreline, the dissolved concentrations would be even lower. There could have been very limited, short-term elevations in water concentrations associated with active clean-up efforts that exposed unweathered oil to the water column; however modeling such elevations would require an unreasonably high level of resolution in COSIM. Based on the modeling, there is no expectation of measurable concentrations of B120 oil in the open water from normal exposure after May 2003. A movie file showing maximum dissolved hydrocarbon concentrations over time is included as a ". avi" file on the CD-ROM included in Appendix B.

5.3.4 Oil Sinking

The model output documents that no oil would sink due to density, and very little oil would settle to the seafloor. Oil that occurred as either a portion of the dissolved fraction or entrained droplets could have adsorbed or adhered to TSS. It is expected that TSS concentrations in April 2003 were low, which would minimize adherence or adsorption. Using the average TSS concentration from the June 2004 survey (2.3 mg/L) as an estimate of TSS concentrations in April 2003, a maximum of approximately 0.2 percent of the oil volume could have adhered to TSS in the water column. The oil that would have adhered or adsorbed to TSS would have formed particulates primarily within the first four days after the spill, which may have floated, remained entrained in the water column, or sunk as isolated particulates to the seafloor. Therefore, the model results indicate that any sinking would have resulted in negligible concentrations in subtidal sediments, and there would be no pool of oil on the subtidal substrate. This is supported by the field observations during dive surveys, absorbent pad swipes, and chain drags described in Section 4.2.

5.3.5 Shoreline Stranding

The model predicts that the large majority of the oil spilled (approximately 94 percent) would be carried as a surface slick and become stranded on the shorelines of Buzzards Bay. The surface slick would have started coming ashore within the first 24 hours after the release. Within five days, virtually all of the surface slick would have come ashore. Based on the degree of oiling and the type of intertidal substrate, some oiling along the shoreline could become remobilized on subsequent high tides. Theoretically, minor re-oiling could have continued for weeks after the spill if no clean-up was conducted.

The model predicts that natural attenuation and weathering of residual oil would occur in the intertidal zone. The natural decay of the oil, primarily driven by biodegradation, would be

approximately two to three percent of the original mass stranded on the shoreline per month for the first several months after the spill.

A substantial proportion of the gross, potentially mobile oil was actively removed from the shoreline within the first one to two weeks of the spill, and the majority of the shoreline had no mobile oil approximately five months after the release. Thus, there is virtually no gross oiling remaining to model further fate after the emergency clean-up phase ended in September 2003.

5.4 NUMERICAL MODEL SUMMARY AND CONCLUSIONS

The numerical model results indicate that the oil released from the B120 barge formed a floating surface slick on the waters of Buzzards Bay. The specific gravity of the oil was lighter than seawater, and the water surface conditions were gentle (i.e., low waves and slow currents), so the oil did not sink into the water column and create a pool or pools of oil on the seafloor bottom. Relatively small components of the released oil evaporated or dissolved into the water column (approximately 4 percent and 0.9 percent, respectively). The impacts to these media were insignificant less than one week after the release.

A very small proportion of the spill volume (likely less than 0.2 percent) may have adsorbed or adhered to the low concentrations of suspended sediment in the water column, floated, remained entrained in the water column or sank to the seafloor as small particles. The large majority of the released oil (94 percent) floated on the water surface and stranded in the intertidal zone of the Buzzards Bay shoreline. The model indicates that waves, winds, and currents moved the released oil primarily to the northeast, resulting in the greatest degree of impacts on southwest-facing exposed shorelines and peninsulas. The accuracy of the model begins to decline after the first five to 10 days after the release because the model does not take into account the volume of oil removed from the shoreline during clean-up activities. The modeling indicates that the rate of natural biodegradation for the first few months after the release would be approximately two to three percent (by weight) per month for the first several months after the spill. These modeling results agree with the expected fate and transport of spilled No. 6 oil reported in the literature, the results of the extensive field observations and surveys conducted in response to the B120 oil spill, and the current modeling results conducted by NOAA representatives for the B120 oil spill.

6.0 SUMMARY OF CLEAN-UP OPERATIONS

Clean-up activities were initiated by Unified Command shortly after the release occurred, and these initial clean-up activities continued until September 3, 2003, when the Incident Command Post was deactivated. Clean-up activities were continued after September 3, 2003 at the direction of the LSP as part of IRA activities and in accordance with the IRA Plan approved by MADEP.

6.1 UNIFIED COMMAND CLEAN-UP OPERATIONS

Detailed information on clean-up efforts is provided in the Phase I/CSM including clean-up methods and efforts employed during the initial phase of the project. In general, emergency response and clean-up operations included utilizing skimming boats, deployment of boom and sorbent material, power-washing and other manual techniques. At some locations, Unified Command chose not to remediate small volumes of oil during the emergency phase, particularly on rock surfaces or in marshes where effective clean-up technologies could result in substantial environmental damage to the surrounding ecosystem. Approximately 5,341 tons of material was removed during the emergency response phase. Additional small-scale clean-up activities have been conducted since September 2003 as described below.

6.2 MCP IMMEDIATE RESPONSE ACTIONS

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 IRA reconnaissance teams during periodic shoreline inspections. Larger-scale clean-up operations, involving clean-up crews from Fleet Environmental Services, Inc. (Fleet), GeoInsight, and ENTRIX, were also conducted at several segments, including Naushon Island, Brandt Island West (Howards Beach), Hoppy's Landing (Long Island), and Strawberry Point West. As part of these operations, IRA clean-up activities removed a total of approximately 13 tons of material between September 3, 2003 and June 30, 2005. Specific information on IRA clean-up activities is summarized in IRA Status Reports dated February 10, 2004, September 16, 2004, and March 23, 2005.

7.0 CONCEPTUAL SITE MODEL

The objectives of the CSM are to identify: 1) oil release and transport mechanisms, 2) areas where residual oil could potentially be located, and the expected condition of residual oil at these potential locations if such oil exists, 3) potential exposure pathways that may exist in areas where residual oil is present, and 4) potential human and environmental receptors associated with these potential exposure pathways. A CSM flow chart illustrating the transport of oil, potentially affected media, and potentially-affected receptors is presented as Figure 57. The initial oil distribution after the release occurred and areas of current residual impacts are based upon a combination of visual observations, field studies and model results as previously presented in this report.

Primary Transport Mechanisms: The Primary Transport Mechanisms focus upon the short-duration movement of oil at the time of the actual release. Oil was initially released into the water column from a hole in the barge below the waterline of the B120 barge. Based upon characterization data (Section 4) and modeling results (Section 5), oil released into Buzzards Bay initially formed a surface slick on the water surface. Characterization data and modeling results indicate that the amount of oil settling on the seafloor would be less than 0.2 percent of the total release volume. The distribution of oil during the release is shown under the Primary Transport Mechanisms heading in Figure 57.

Secondary Transport Mechanisms: After the release occurred, on-water clean-up operations recovered approximately 3,500 gallons of No. 6 oil. Small fractions of the oil slick evaporated into the air, dissolved into seawater, became entrained in the water column, or settled on the seafloor. The remaining surface oil slick was transported by winds, waves, tides, and currents toward the shoreline. Oil entrained in the water column or settled on the seafloor surface would also tend to be transported by waves, tides, and currents, or dissolved into the ocean, or naturally degraded. The numerical modeling results and supporting characterization data indicate that nearly all (approximately 94 percent) of the released oil that was not removed by the on-water cleanup operations would have stranded in the intertidal zone. The modeling results indicate that approximately 4 percent of the total volume evaporated into ambient air. A small amount (approximately 0.9 percent of the total) dissolved into the water column, of which a portion (less than 0.2 percent of the total) sorbed onto particles in the water column and possibly sank to the seafloor. Hydrocarbon fractions dissolved in the water column were also subject to uptake by aquatic organisms (e.g., clams). These transport mechanisms are shown as Secondary Transport Mechanisms on Figure 57.

Potentially Impacted Media: The Potentially Impacted Media depicted on Figure 57 show media that may have been impacted by the secondary transport of the released oil. The media primarily impacted by the initial stranding of oil were sediment and solid surfaces in the intertidal zone. Other media that may have been initially exposed to stranded oil include subtidal sediment, surface water, and ambient air. Ground water is not anticipated to have been impacted by the release. The natural action of waves, tides, and currents also could have caused localized transport of small amounts of oil between the intertidal and nearshore subtidal zones. For example, oil present on solid surfaces in the intertidal zone may have been abraded and re-deposited in the intertidal zone or nearshore subtidal zone by wave action. Dissolved oil in surface water was also subject to decay and biodegradation, as well as potential uptake by

aquatic organisms. However, numerical modeling and analytical data indicate that surface water approximated background concentrations in May 2003 and surface waters would not be currently impacted. Oil concentrations in air would have dissipated to background within hours of the release. This type of release is unlikely to adversely impact ground water because the hydraulic gradient expected to be toward the ocean.

Tertiary Transport Mechanisms: As represented by the Tertiary Transport Mechanisms in Figure 57, the oil present in these media was subjected to additional cleanup, decay, and transport mechanisms. The oil initially present in the intertidal zone was the focus of clean-up actions conducted by Unified Command and as part of IRA activities under the MCP (Section 6). Unified Command and the MCP IRA clean-up activities removed a total of 5,354.26 tons of oiled material as of December 31, 2004. This oiled material included: bulk oil removed from beaches; individual tarballs removed by inspection teams; oiled snare and other absorbent material; oiled personal protective equipment; oiled seaweed/wrack; and oiled rocks and sediment. Because non-oil waste materials (e.g., personal protective equipment) were also removed with the oiled material, the exact percentage of oil in this removed material is unknown. Oil in the intertidal zone was also subject to natural decay and biological uptake and degradation. The Tertiary Transport Mechanisms depicted in Figure 57 illustrate that residual oil would only be expected to be present in some highly localized intertidal areas, and one specific nearshore subtidal location. A summary of the media where oil is and is not expected to be present is discussed below.

7.1 MEDIA WHERE OIL IS NOT EXPECTED TO BE PRESENT

Based upon the information presented above, oil impacts are not expected to be present in surface water, ground water, or ambient air.

7.1.1 Dissolved Fractions

The numerical model indicates that less than 1 percent of the released oil dissolved into the water column, and that the dissolved hydrocarbons would be present primarily in the first two days after the release. The maximum concentrations of dissolved hydrocarbons predicted by the model are also relatively low (approximately 16 parts per billion of total aromatic hydrocarbons) and occur on the day after the release. These model results were confirmed by laboratory analysis of surface water samples.

7.1.1.1 Surface Water

People contact surface water through recreational activities, such as swimming, or commercial activities, such as fishing. Because of its salinity, marine surface water is not used as a potential source of drinking water. Surface water provides habitat for aquatic organisms such as marine mammals (e.g., harbor seals), fish (e.g., striped bass, cod, shark) and marine invertebrates (e.g., horseshoe crabs), and feeding areas for waterfowl (e.g., loons, eiders, razorbills).

Surface water is not expected to be impacted by the release based on analytical data, model results and literature review. The model results indicate that very little oil (less than 1 percent of the total release) dissolved into the water column. Field surveys and model results document that oil concentrations in surface water were insignificant (less than 2 parts per billion total aromatic hydrocarbons) within a few days after the release (May 1, 2003). Surface water samples

collected after the release indicated that dissolved hydrocarbons were at ambient concentrations within one month after the release confirming the results of the analytical model. Additional surface water sampling conducted in August 2004 proximal to segments where the degree of oiling was initially characterized as heavy or moderate also did not detect dissolved hydrocarbons in surface water. Dissolved hydrocarbons were detected in one surface water sample collected off Long Island (W2A-10) during active IRA clean-up operations. The absence of dissolved hydrocarbons in a water sample collected at the same time in an area not affected by clean-up operations indicates that the dissolved oil components were highly localized and limited to the area proximal to active clean-up operations. These data indicate that surface water is an incomplete exposure pathway.

7.1.1.2 Ground Water

Ground water impacts are not expected to be present for several reasons. The released oil had a relatively low soluble fraction, and the soluble fraction would have tended to dissolve into the seawater in Buzzards Bay when the initial surface oil slick was being carried by waves and tides onto the shore. Most of the remaining soluble fraction in the oil that stranded ashore would have also dissolved into seawater, as the waves and tides washed over the stranded oil. Surface water sampling conducted after the release indicated that dissolved hydrocarbons were at background concentrations within one month after the release. In addition, the detected surface water concentrations in surface water samples were below applicable GW-1, GW-2, GW-3, and drinking water standards.

It is important to note that ground water hydraulics would prevent inland ground water from becoming impacted from a release in Buzzards Bay. Inland areas function as a zone of ground water recharge, and potentiometric head levels in inland areas are higher than the surface water elevations in Buzzards Bay. This potentiometric head difference causes ground water to flow from inland locations towards the Buzzards Bay. Therefore, even if dissolved concentrations in seawater were to permeate into the subsurface sediment, these hydrocarbons would be expected to flow back into the bay and not flow upgradient. Although there may be salt water located beneath the overlying fresh water lens in inland areas that are proximal to the shore, this salt water is not expected to receive significant recharge from the ocean (because this water is not typically extracted by wells) and this salt water is not a drinking water source.

Another factor to consider is that clean-up operations removed virtually all of the visible oil stranded on the shoreline, and the small amounts of current residual oil are mostly weathered with little or no soluble fraction. Therefore, the small mass of residual soluble hydrocarbons is not expected to produce dissolved concentrations above detection limits in water underlying these shorelines. Ground water is therefore considered to be an incomplete exposure pathway.

7.1.2 Volatilized Fractions

The chemical and physical properties of No. 6 oil and the literature from previous oil spills support the model results in that the volatile fraction of the released oil is relatively low and most of the volatile fraction would evaporate in the first few days after the release. The numerical model indicates that approximately 4 percent of the released oil evaporated into the atmosphere and over 90% of this evaporation occurred within 48 hours after the release. Therefore, ambient air is not expected to be currently impacted by the release and is considered to be an incomplete exposure pathway.

7.2 MEDIA WHERE OIL MAY POTENTIALLY BE PRESENT

Based upon the data presented above, small amounts of discontinuous residual oil are expected to be potentially present at a few intertidal locations and theoretically could be present in highly localized nearshore subtidal locations.

7.2.1 Intertidal Shoreline Segments

The following sections describe the current intertidal oil status at potentially affected shoreline types along with potential receptors. Note that intertidal zones have been divided into different shoreline types based upon the classification scheme established by Unified Command in the IRATCGP. The potentially impacted habitat and species that are commonly associated with these shoreline types are shown in Figure 57.

7.2.1.1 Public/Private Sand Beaches (1A/1B)

Public and private sand beaches are commonly used by people for recreational activities. In addition to human use, sand beaches provide wildlife habitat and foraging areas for terrestrial mammals (e.g., raccoons, foxes) and shorebirds (e.g., sandpipers, piping plovers).

Field observations and numerical modeling indicate the majority of oil floated on the water surface and was stranded on the shoreline resulting in highly variable and sporadic initial shoreline oiling. Some sand beaches, such as Barney's Joy in Dartmouth, had a relatively heavy degree of oiling after the spill. Intensive clean-up activities were conducted on sand beaches and these segments had the most stringent clean-up criteria in the IRAC process. IRA reconnaissance activities, in part, focused on sandy beaches where buried oil was potentially present. In general, oil was not detected at these sandy beaches, with the exception of Barney's Joy (on October 22, 2003) and Little Beach (on May 28, 2004) in Dartmouth. However, it is important to note that inspections at Barney's Joy in 2004 found no buried oil, and the small amount of tarballs at Little Beach (less than 500 ml) were removed as part of the IRA process.

Although the initial degree of oiling may have been relatively heavy at some sandy beach segments in the beginning of the release, the intensive clean-up operations conducted at these shoreline segments removed most of the visible oil. In the spring of 2004, the Phase I characterization documented that sand beaches that were initially categorized as moderately, lightly, and very lightly oiled satisfied MCP risk characterization criteria for human health and the environment. These segments were closed out with a Partial Class A-2 RAO Statement. Subsequent field surveys and laboratory results from representative sand beaches that were initially categorized as heavy oiling were also below MCP Method 1 S-1 soil standards and NOAA ERLs. Additional characterization of these shoreline types (e.g., Barney's Joy) will be performed during Phase II field activities.

7.2.1.2 Mixed Sand and Gravel Beaches and Rip Rap Groins (1C)

This shoreline type is less commonly used recreationally by people (compared to sandy beaches), but is utilized by certain organisms, including marine invertebrates (e.g., barnacles, snails) and shorebirds (e.g., terns).

Access limitations and oiling of rocks reduced the success of clean-up operations along these shoreline types relative to sand beaches. Many of the shoreline segments that did not pass IRAC

inspections in 2003 were comprised of this shoreline type. Additional clean-up was conducted in 2004 at a couple of mixed sand and gravel beaches as part of the IRA process, specifically Strawberry Point and Howard's Beach. As a result, mixed sand and gravel beaches subsequently satisfied MCP IRA criteria. Currently, residual oil along this shoreline type is highly localized, and primarily consists of sporadic stains on rock surfaces. At Leisure Shores Beach (located in segment W1F-02) small (1 mm to 7 mm diameter) tarballs or globules were also observed in sediment in the lower intertidal zone. Additional cleanup efforts at Leisure Shores in 2004 and 2005 have substantially reduced the extent and magnitude of residual oil in the intertidal sediment.

By the spring of 2004, the Phase I characterization determined that these shoreline types that were initially categorized as lightly or very lightly oiled satisfied MCP risk criteria for human health and the environment. Hydrocarbon concentrations in sediment samples collected from representative segments of these shoreline types that were initially categorized as moderate or heavy oiling were below MCP Method 1 S-1 soil standards. The majority of these samples also were below NOAA ERLs, except for two sediment samples: one collected at Pope Beach in Fairhaven and the other collected at Town Beach in Mattapoisett. The PAH detected in these samples contained non-B120 hydrocarbons derived from other sources. Additional characterization of these mixed sand and gravel beaches (e.g., Strawberry Point and Howard's Beach) will be performed during Phase II field activities.

7.2.1.3 Rip Rap Seawalls, Bulkheads, and Piers (1D)

This intertidal shoreline type is not heavily used recreationally by people, but may provide habitat for organisms, including barnacles and snails. The majority of oil stranded on hard structures associated with this shoreline type was removed using hot water/high pressure washes during the initial clean-up. In general, these shoreline types are located in high energy environments, where wave energy tends to scour and abrade remaining oil. Therefore, the amount of residual oil at this shoreline type is low. Residual oil on this shoreline type typically consists of sporadic stains on rocks and other exposed surfaces.

In the spring of 2004, the Phase I characterization determined that these shoreline types that were initially categorized as lightly and very lightly oiled satisfied MCP risk characterization criteria for human health and the environment. Subsequent surveys observed small amounts (generally isolated "splatter" less than 1-inch diameter) of residual oil that was present as a discontinuous film and was continuing to degrade due to scouring. Additional characterization of this segment type (e.g., Salter's Point and Fort Taber) will be performed during Phase II field activities.

7.2.1.4 Rocky Shorelines (1E)

This shoreline type is occasionally visited by people and provides habitat for marine invertebrates (e.g., barnacles, snails) and waterfowl (e.g., loons, cormorants).

This shoreline type is comprised of bedrock headlands exposed to the ocean. This shoreline type is similar in physical characteristics to 1D shorelines (rip rap seawalls, bulkheads, and piers) and similar clean-up techniques were employed. Approximately 1.2 miles of rocky shoreline were reported to have been initially oiled, and 90 percent of this oiled shoreline was categorized as lightly or very lightly oiled. Rocky shorelines are typically located in higher energy

environments, where wave energy scours and abrades residual oil and residual oil, where present, is expected to be significantly weathered.

In the spring of 2004, rocky shorelines that were initially categorized as lightly or very lightly oiled were determined to satisfy MCP risk characterization criteria for human health and the environment. Subsequent surveys revealed minor amounts of weathered oil (e.g., sporadic splatter) along this shoreline type that was initially categorized as having moderate oiling. There was no rocky shoreline reported to initially have heavy oiling. Currently, there is approximately 0.1 mile of this shoreline type that was not included in the May 2004 Partial RAO because these areas are located in segments where the maximum degree of initial oiling was characterized as moderate or heavy. Additional characterization of this shoreline type (e.g., Strawberry Point) will be performed during Phase II field activities.

7.2.1.5 Salt Marshes (1F)

Salt marshes are only occasionally used by people, but are home to many organisms, including marsh grasses (e.g., *Spartina alterniflora*, *Spartina patens*, *Juncus gerardii*), waterfowl (e.g., geese, dabbling ducks), and marine invertebrates (e.g., fiddler crabs, snails).

Buzzards Bay salt marshes are generally located in quiescent waters and generally received less oil than some of the more exposed shorelines of Buzzards Bay. However, a few fringing salt marshes on exposed shorelines were initially categorized as having moderate or heavy oiling (e.g., Strawberry Point, Brandt Island, Long Island). Initial clean-up activities in these marshes were limited by Unified Command because the potential damage caused by intrusive, aggressive clean-up operations exceeded the potential benefits of removing the oil (based on historic case studies). Additional small-scale clean-up operations were later conducted under the MCP IRA in salt marshes at Long Island, Howard's Beach, and Strawberry Point.

In the spring of 2004, the Phase I characterization determined that salt marshes that were initially categorized as lightly or very lightly oiled satisfied MCP risk characterization criteria for human health and the environment. Hydrocarbon concentrations in sediment samples collected from representative marshes of moderate or heavy oiling were below MCP Method 1 S-1 soil standards and NOAA ERLs for total PAH. Additional characterization of this shoreline type (e.g., Long Island and Strawberry Point) will be performed during Phase II field activities.

7.2.2 Subtidal Sediment

Typically, people do not come into contact with subtidal sediments. There may be limited contact with subtidal sediment in the nearshore subtidal zone during swimming or nearshore clamming activities. Sediment in the deep intertidal zone is generally only contacted by people during fishing operations (where very small amounts of sediment may be present on the fishing equipment). The subtidal zone provides habitat for marine organisms, including fish (e.g., flounder) and invertebrates (e.g., mussels, lobsters, and quahogs).

Modeling results indicate that very little oil would sink to the seafloor following the release. Subtidal surveys conducted in 2003 indicated that there may have been sporadic tarballs on the seafloor offshore off Barney's Joy (based on oiling of absorbent material in lobster pot surveys), but by 2004 no subtidal oiling was documented. The literature indicates that a small amount of oil may have abraded from oil stranded in the intertidal zone and re-deposited into the nearshore

subtidal zone at insignficant levels. Surveys conducted during 2004 found no evidence of visible oiling in the subtidal, and subtidal sediment concentrations were not significant. Only one sediment sampling location off Long Island in Fairhaven was found to exceed NOAA-ERL benchmarks for some individual PAHs. However, the sample was collected immediately adjacent to an active boat ramp that may have other petroleum inputs and therefore the results may not be representative of oil from the B120 release.

The literature and incident-specific modeling indicate that there would be no significant subtidal oiling associated with a No. 6 oil spill. Field surveys and chemistry analyses of subtidal sediments and shellfish tissues for the B120 oil spill document that there is no evidence of remaining B120 oil in subtidal areas except possibly near Long Island. However, additional nearshore subtidal sampling will be conducted during Phase II field activities. Areas that will be the focus of Phase II field activities include:

1. Areas where the original slick was primarily present (i.e., nearshore subtidal off Barney's Joy);
2. Adjacent to moderately or heavily oiled shorelines where natural processes scoured the oil from intertidal surfaces (e.g., Long Island and Leisure Shores/Howard's Beach); and
3. Quiescent areas adjacent to moderately oiled or heavily oiled areas where sand-sized particles would be expected to be deposited (e.g. Demarest Lloyd State Park).

7.3 SUMMARY

Most of the oil from the release washed ashore during the first week and became stranded in the intertidal zone. This oil was mostly removed during aggressive initial cleanup operations conducted by Unified Command or in subsequent response actions conducted under the ongoing MCP IRA. Under current conditions, residual oil is highly weathered, discontinuous, and extremely limited in extent. Virtually all residual oil is located in the intertidal zone as "splatter," stains on rock surfaces, or minute tarballs, and intertidal oiling locations have been delineated and monitored during over two years of field surveys and sampling. The small amount of remaining oil in the intertidal zone is expected to be present as sporadic, discontinuous, "stains" on hard surfaces along a few mixed sand and gravel (1C) shorelines. Significant amounts of oil are not expected to be present at sandy beaches (1A and 1B) due to aggressive initial cleanup operations and natural erosional processes at these segments. In addition, oil is not expected to be significantly present at shorelines composed primarily of hard substrates (1D and 1E) due to high-energy wave action and associated scouring. Small tarballs and oil patches may be present in small areas of a couple of salt marshes (1F) that were moderately to heavily oiled during the initial release.

In general, B120 oil is not present in the subtidal zone, although additional characterization is warranted in some localized areas of the nearshore subtidal zone adjacent to mixed sand and gravel shorelines that were moderately to heavily oiled (e.g., Long Island). The numerical model indicates that only a very small fraction (less than 0.02 percent) of the released oil sank to the seafloor. The initial volume of this oil is expected to be very small, and minute amounts that did initially sink or subsequently re-deposited from the intertidal zone have been subjected to ongoing natural degradation processes for over two years.

Residual oil impacts are not present in ambient air, surface water, or ground water. The numerical model indicates that relatively small amounts, approximately 4 percent and 1 percent, respectively, were released to air and surface water, and these concentrations decreased significantly shortly after the release. Ground water is not expected to be adversely impacted, primarily because dissolved concentrations in surface water were relatively low and ground water is expected to flow from inland areas towards the ocean.

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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	Saconesset 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	Sconticut Neck West	Fairhaven
W2A-08	Wilbur Point	Fairhaven
W2A-09	Sconticut 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	Sconticut Neck Northeast (Marsh)	Fairhaven
W2A-18	Little Bay (Marsh)	Fairhaven

TABLE 1
SHORELINE SEGMENT SUMMARY
B120 RELEASE
BUZZARDS BAY, MASSACHUSETTS

Segment	Segment Name	Town
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
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	Saconesset 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 2
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 2
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)	Unoiled	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 3
Summary of Representative Oil Spills
B120 Release
Buzzards Bay, Massachusetts

Incident Name/ Vessel Name	Date	Location	Source	Gallons Spilled	Type of Oil/Product	Resources of Concern
Unknown	1940s	Western Buzzards Bay, Westport, Buzzards Bay, MA	NA	NA	No. 2 Fuel Oil	NA
Unknown	1963	Near Nyes Neck (North Falmouth), Buzzards Bay, MA	NA	NA	No. 2 Fuel Oil	NA
Florida	September 16, 1969	Fassets Point (West Falmouth), Buzzards Bay, MA	Barge	189,000	No. 2 Fuel Oil	NA
Barge B65	October 9, 1974	Cleveland Ledge (near canal entrance), Buzzards Bay, MA	Barge	11,000 to 37,000	No. 2 Fuel Oil	Shoreline
Barge B65	January 28, 1977	Cleveland Ledge, Buzzards Bay, MA	Barge	81,144	No. 2 Fuel Oil	NA
Valdez	March 24, 1989	Bligh Reef, Prince William Sound, AK	Tanker	11,000,000	Crude	Shoreline, Wildlife
World Prodigy	June 23, 1989	Narragansett Bay, RI	Tanker	294,000	No. 2 Fuel Oil	Shoreline
Presidente Rivera	June 24, 1989	Delaware River Marcus Hook, PA	Tanker	300,000	No. 6 Fuel Oil	Shoreline, Wetlands, Wildlife
Bayway	January 2, 1990	New York, NY	Pipeline	567,000	No. 2 Fuel Oil	Wildlife
American Trader	February 7, 1990	Huntington Beach, CA	Tanker	417,000	Alaskan Light Crude	Wildlife, Beach use
Mega Borg	June 9, 1990	Gulf of Mexico (92 km offshore TX)	Tanker explosion/ fire	5,000,000	Light Crude	Shoreline (most oil burned or evaporated)
Bermuda Star	June 10, 1990	Cleveland Ledge, Buzzards Bay, MA	Cruise ship grounding	7,500	No. 6 Fuel Oil	Shoreline
Apex Galveston	July 28, 1990	Galveston Bay, TX	Barge Collision	700,000	Catalytic Feed Oil	NA
Fidalgo Bay	February 22, 1991	Anacortes, WA	Terminal	130,000	Crude	Shoreline, Wildlife, Wetlands, Eelgrass, Waterfowl, Shorebirds, Fish

Table 3
Summary of Representative Oil Spills
B120 Release
Buzzards Bay, Massachusetts

Incident Name	Date	Location	Source	Gallons Spilled	Type of Oil/Product	Resources of Concern
Tenyo Maru	July 22, 1991	32 km off Neah Bay, WA	Vessel Collision	173,000	Intermediate Fuel Oil	Shoreline; Wildlife
Unocal Pipeline	August 3, 1992	Avila Beach, CA	Pipeline	14,700	San Joaquin Crude	Wildlife, Beach use
Greenhill Petroleum Blowout	September 29, 1992	Timbalier Bay, LA	Oil Well Blowout	483,000	Crude	Wetlands
Braer	January 12, 1993	Shetland Islands, Scotland	Tanker	26,040,000	Norwegian Light Crude	Aquatic Wildlife
Colonial Pipeline	March 28, 1993	Potomac River, VA	Pipeline	407,000	No. 2 Fuel Oil	Shoreline, Wildlife
Tampa Bay Collision	August 10, 1993	Tampa Bay, FL	Vessel collision	333,000	No. 6 Fuel Oil	Shoreline, Wildlife
Morris J. Berman	January 7, 1994	San Juan, PR	Barge Grounding	789,000	Heavy No. 6 Fuel Oil (low API gravity)	Shoreline, Wetlands, Offshore & Subtidal Resources
San Jacinto	October 20, 1994	San Jacinto River, Houston, TX	Floods ruptured several Pipelines	541,000 gallons; 820,000 gallons; 245,000 gallons; 10,000 gallons	No 2 Fuel Oil; Crude Oil; Gasoline; Jet Fuel	NA
North Cape	January 19, 1996	Block Island Sound, RI	Barge Grounding	828,000	No. 2 Fuel Oil	Wildlife, Fish, Bivalves, Invertebrates, Lobsters
Julie N	September 27, 1996	Portland Harbor, ME	Tanker collision	93,198 86,436	IFO 380h heavy Fuel Oil (IFO) No. 2 Fuel Oil	Shoreline, Wetlands, Fish, Shellfish,
SS Mohican	October 28, 1996	San Francisco Bay, CA	Vessel Dry Dock Transfer	40,000	Intermediate Fuel Oil (IFO 180)	Shoreline, Beaches, Wetlands
Lake Barre Oil Spill	May 16, 1997	Lake Barre, LA	Pipeline	275,562	South Louisiana Crude Oil	Shoreline, Wetlands, Wildlife

Table 3
Summary of Representative Oil Spills
B120 Release
Buzzards Bay, Massachusetts

Incident Name	Date	Location	Source	Gallons Spilled	Type of Oil/Product	Resources of Concern
Barge B145	June 18, 1990	Cleveland Ledge, Buzzards Bay, MA		100 to 200	Diesel oil or heating oil	NA
Queen Elizabeth II	August 7, 1997	Sow and Pigs Reef, Cuttyhunk, Buzzards Bay, MA	Cruise ship grounding	50	Fuel Oil	NA
Chalk Point	April 7, 2000	Aquasco, MD	Pipeline rupture	126,000	No. 6 and No. 2 Fuel Oil	Shoreline, Wetlands, Shellfish, Birds,
Point Wells	December 30, 2003	Point Wells, WA	Barge	6,000	Intermediate to Heavy Fuel Oil	Shoreline, Wetlands

Note: NA – Information not available

Table 4
Summary of Lobster Pot Surveys
B120 Release
Buzzards Bay, Massachusetts

Area	Dates	Number of Pots Deployed/Retrieved	Number of 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
Total		**55**	**11**

TABLE 5
CHAIN DRAG SURVEY SUMMARY
B120 RELEASE
BUZZARDS BAY, MASSACHUSETTS

Segment ID	Segment Name	Date	Total Number of Chain Drags	Chain Drag Results
W2A-10	Long Island South-West Side	8/11/2004	3	No oil observed
W2A-03	Pope's Beach	8/11/2004	5	No oil observed
W2A-07	Sconticut Neck - West	8/12/2004	4	No oil observed
W3C-05/06	Demarest Lloyd	8/12/2004	5	No oil observed
W3C-04	Barneys Joy	9/2/2004	7	No oil observed

TABLE 6
ABSORBENT PAD SWIPE SUMMARY 2003
B120 RELEASE
BUZZARDS BAY, MASSACHUSETTS

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
Mattapoisett 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
Mattapoisett, Outer Nasketucket Bay	5/7/03	No oil observed

TABLE 7
SHELLFISH TISSUE SAMPLING SUMMARY
B120 RELEASE
BUZZARDS BAY, MASSACHUSETTS

Shellfish	Site ID	Location	Collection Dates/Total PAH (ppb)						
			2003						2004
			May 5 - May 7	May 19 - May 21	June 9 - June 10	July 8 - July 10	August 27 - August 28	October 23 - October 24	May 13
Oyster	SLOC-A,B, and C	Slocum	1093		438	117			
	STAR-A and B	Star of the Sea	70.9						
	EEHH-N	Eastern mouth of Eel Pond	3674		812	282	188	121	
	EEHH-N (Dup)	Eastern mouth of Eel Pond	3849						
	MDWI-A,B, and C	Meadow Island in Sippican Harbor	865		118				
	BASS-A,B, and C	Bass Creek, East side of West Island of Nasketucket Bay	2343			172			
	FHHS-A,B, and C	Fairhaven Hacker Street Upper reach of New Bedford/Fairhaven Bay, not in New Bedford Harbor	11893			2189	606	164	97.2
	FHIN-A,B, and C	Fairhaven Inner Harbor in Nasketucket Bay, north of West Island	1156		540	324	28.7		
	WFHRS-A,B, and C	West Falmouth Harbor, Ref. Site	70.1						
	BIMT-A,B, and C	Brant Island, Mattapoisett		3799	1733	297	158		
	NRCV-A,B, and C	North Cove		202					
	Brook-A and B	Great Island, Northeastern part of Great Island - Ref. Site	82.1						
	MHRS-A and B	Megansett Harbor - Ref. Site	96.8						
	PPBR-A,B, and C	Plow Penny Road, Back River - Ref. Site	34.0						
Blue Mussel	BASS-A,B, and C	Bass Creek, East side of West Island of Nasketucket Bay	4580			143			
	Rt88-A and B	Route 88 Bridge at Westport Point in Westport Harbor - Reference Site	206						
Quahog	APPB-A and B	Apponaganset Beach, Dartmouth	38.4						
	BRFF-A and B	Birchfield Farms, Dartmouth	34.4						
	COWY-A,B, and C	Cow Yard, Dartmouth	2241		407	68.8			
	MDWI-A,B, and C	Meadow Island in Sippican Harbor	995		66.6			11.5	
	MDWI-A,B, and C (Dup)	Meadow Island in Sippican Harbor	890						
	MHHH-A,B, and C	Mattapoisett Harbor	564		131				
	BASS-A,B, and C	Bass Creek, East side of West Island of Nasketucket Bay	3145			57			
	FHHS-A,B, and C	Fairhaven Hacker Street Upper reach of New Bedford/Fairhaven Bay, not in New Bedford Harbor	8110			384	173		45
	FHSB-A, B, and C	Fairhaven Sandy Beach, Northeastern side of Sconticut Neck near Little Bay of Nasketucket Bay	114						
	MNHH-A	Mouth of Nakata Creek, Southeast side of Sconticut Neck	7626			318	138		26
	CCRS-A,B, and C	Clark's Cove Rogers Street		107					
	CCWRF-A,B, and C	Clark's Cove West Rodney French		150					
	NBOHFR-A,B,C,D, and E	New Bedford Outer Harbor Frederick Street		236		65.3			
	BIMT-A,B, and C	Brant Island, Mattapoisett		1905	722	105			

TABLE 7
SHELLFISH TISSUE SAMPLING SUMMARY
B120 RELEASE
BUZZARDS BAY, MASSACHUSETTS

Shellfish	Site ID	Location	Collection Dates/Total PAH (ppb)						
			2003						2004
			May 5 - May 7	May 19 - May 21	June 9 - June 10	July 8 - July 10	August 27 - August 28	October 23 - October 24	May 13
Quahog	LHWA-A,B, and C	Little Harbor, Wareham		33.8					
	MPDA-A,B, and C	East of Michum Point		1368	378	104			
	NEWI-A,B, and C	Northeast side of West Island		532					
	NRCV-A,B, and C	North Cove		202					
	PCMA-A,B, and C	Near Angelica Point, Mattapoisett		1020	168				
	SHCV-A,B, and C	Shaw's Cove, Fairhaven		842	178				
	Swift-A,B, and C	Swift's Beach, Wareham		67.1					
	WHBR-A,B, and C	Wild Harbor Basin, Falmouth		1071	741	252	104		
	WRCC-A,B, and C	Wareham River, Crab Cove		42.2					
	FTPH-A,B, and C	Fort Phoenix, Fairhaven		1391		97			45.9
	SNNW-A,B, and C	Northwest side of Sconicut Neck near Hacker Street		4256					
	SWLI-A,B, and C	The Southwest side of Long Island in Fairhaven		8512		2881	1175	455	169
	SWLI-A,B, and C (Dup)	The Southwest side of Long Island in Fairhaven		8228					
	WCSN-A,B, and C	West Central side of Sconicut Neck		2099		96.9			22.4
	WFHRS-A,B and C	West Falmouth Harbor - Reference Site	79.6						
	LNGB-A and B	Long Beach Point, North side of Long Beach near Indian Neck - Reference Site	64.7						
	BRM-A,B and C	Back River Mouth - Reference Site	28.3						
	MHRS-A and B	Megansett Harbor - Reference Site	47.0						
	RI-A and B	Ram Island, South side of Big Ram Island in Eastern Branch of Westport River - Reference Site	47.2						
Scallop	FHIN-A and B	Fairhaven Inner Harbor in Nasketucket Bay, north of West Island	1768		930	538	53.6		
	MONB-A and B	Mattapoisett Outer Nasketucket Bay, Middle of mouth of Bay	1865			599	76.7		
Softshell Clam	APPB-A and B	Apponaganset Beach, Dartmouth	58.6						
	BRFF-A and B	Birchfield Farms, Dartmouth	121						
	LNGB-A and B	Long Beach Point, North side of Long Beach near Indian Neck	518		42.7				
	FHHS-A,B, and C	Fairhaven Hacker Street Upper reach of New Bedford/Fairhaven Bay, not in New Bedford Harbor	14545			818	280	154	137
	MDWI-A,B, and C	Meadow Island in Sippican Harbor	2513		87				
	MEHH-A	Mouth of East Pond in Mattapoisett Harbor	1309			145			
	BASS-A	Bass Creek, East side of West Island of Nasketucket Bay	2851			70			
	FHKB-A,B, and C	Fairhaven Knolmere Beach, Upper reach of Nasketucket	191						
	FHSB-A,B, and C	Fairhaven Sandy Beach, Northeastern side of Sconticut Neck near Little Bay of Nasketucket Bay	372			36.5			
	MNHH-A	Mouth of Nakata Creek, Southeast side of Sconticut Neck	21539				257	144	75
	BMB-A,B, and C	Buttermilk Bay		53.2					
	FCWA-A,B, and C	Cleaveland Ave. in Fisherman's Cove, Wareham		56.9					
	LBBW-A,B, and C	Little Bay, Briarwood		64.6					
	LBBW-A,B, and C	Little Bay, Briarwood		71.5					
	OBWA-A,B, and C	Onset Beach, Wareham		64.5					
	RBHI-A,B, and C	Red Brook Handy Point Side of Red Brook Harbor		131					
	MOMA-A,B, and C	27 Mooring Road, Marion		257					
	NEWI-A,B, and C	Northeast side of West Island		3416					
	SHCV-A,B, and C	Shaw's Cove, Fairhaven		3458	291	73.6			
	Swift-A,B, and C	Swift's Beach, Wareham		533	184				

TABLE 7
SHELLFISH TISSUE SAMPLING SUMMARY
B120 RELEASE
BUZZARDS BAY, MASSACHUSETTS

Shellfish	Site ID	Location	Collection Dates/Total PAH (ppb)						
			2003						2004
			May 5 - May 7	May 19 - May 21	June 9 - June 10	July 8 - July 10	August 27 - August 28	October 23 - October 24	May 13
Softshell Clam	WNMA-A,B, and C	East of Clapp Island in Wings Cove		152					
	SNNW-A,B, and C	Northwest side of Sconicut Neck near Hacker Street		5765					
	WCSN-A,B, and C	West Central side of Sconicut Neck		27423		191			64.7
	EPBR-A,B, and C	Eel Pond Back River - Reference Site	85.0						
	WFHRS-A and B	West Falmouth Harbor - Reference Site	107						
	Great-A and B	Great Island, Southeastern part of island, Island is in the middle of Eastern Branch of Westport River Reference Site	104						
	MHRS-A,B, and C	Megansett Harbor - Reference Site	100						
	MHRS-A,B, and C (Dup)	Megansett Harbor - Reference Site	87.4						
Surf Clam	BJB-A	Barneys Joy Beach 3/4 mile west	59625						
	BJB-B	Barneys Joy Beach 3/4 mile west	114529						
	BJB-A,B, and C	Barneys Joy Beach 3/4 mile west				260	48		
	Cherry-A and B	Cherry Point, Mouth of Westport Harbor	95.9						
	CWBWP-A,B, and C	Cheriann Webb Beach, Westport, approx. 300 ft. offshore		78.6					
	CWBWP-A,B, and C (Dup)	Cheriann Webb Beach, Westport, approx. 300 ft. offshore		100					

TABLE 8
SHELLFISH BED/ABSORBENT PAD SURVEY 2004
B120 RELEASE
BUZZARDS BAY, MASSACHUSETTS

Segment ID	Segment Name	Date	Results
E1-11	Scraggy Neck	7/29/2004	19 Locations/No oil observed
W1E-01	Nye's Cove	7/27/2004	7 Locations/No oil observed
W1F-01	Brandt Beach	7/27/2004	8 Locations/No oil observed
W1F-02	Brandt Island West	7/27/2004	8 Locations/No oil observed
W1F-06	Mattapoisett Neck South	7/29/2004	6 Locations/No oil observed
W1F-07	Mattapoisett Shores	7/29/2004	8 Locations/No oil observed
W3A-02	Salters Point West	7/28/2004	4 Locations/No oil observed
W3A-04	Salters Point East	7/28/2004	7 Locations/No oil observed
W3A-05	Round Hill Beach W.	7/28/2004	5 Locations/No oil observed
W3A-06	Round Hill Beach E.	7/26/2004	5 Locations/No oil observed
W3C-02	Little Beach	7/26/2004	14 Locations/No oil observed
W3C-03	Barneys Joy W.	7/26/2004	11 Locations/No oil observed
W3C-04	Barneys Joy E.	7/27/2004	8 Locations/No oil observed

TABLE 9
DIVE SURVEY SEDIMENT SAMPLING SUMMARY
B120 RELEASE
BUZZARDS BAY, MASSACHUSETTS

Site	Sample ID	Substrate	Collection Date	Total PAH (ppb)	TPH (ppb)	TOC (% Carbon)
1	1C	Sediment	07/31/03	846	93	1.66
	1E	Sediment	07/31/03	810	81	1.59
	1N	Sediment	07/31/03	821	86	1.56
	1S	Sediment	07/31/03	752	81	1.41
	1W	Sediment	07/31/03	923	89	1.64
2	2 ROCK	Rock[a]	07/31/03	1377	-	-
	2C	Sediment	07/31/03	1086	47	0.42
	2E	Sediment	07/31/03	1561	9	0.08
	2N	Sediment	07/31/03	1981	20	0.2
	2S	Sediment	07/31/03	510	19	0.23
	2W	Rock[a]	07/31/03	1040	-	-
3	3C	Sediment	08/01/03	210	17	0.3
	3E	Sediment	08/01/03	656	42	0.47
	3N	Sediment	08/01/03	1438	100	1.42
	3S	Sediment	08/01/03	203	22	0.38
	3W	Sediment	08/01/03	1516	136	2.25
4	4C	Sediment	08/02/03	979	103	1.97
	4E	Sediment	08/02/03	829	90	1.82
	4N	Sediment	08/02/03	789	78	1.78
	4S	Sediment	08/02/03	878	85	1.82
	4W	Sediment	08/02/03	728	79	1.8
5	5E3	Sediment	08/02/03	1283	79	0.63
	5E3 SMALL ROCK	Rock[a]	08/02/03	58	-	-
	5E4	Sediment	08/02/03	617	39	0.51
	5W1	Sediment	08/02/03	393	40	0.44
	5W1 LARGE ROCK	Rock[a]	08/02/03	113	-	-
	5W2	Sediment	08/02/03	330	27	0.61
6	6C	Sediment	08/04/03	16	2.1	0.04
	6E	Sediment	08/04/03	268	20	0.33
	6N	Sediment	08/04/03	76	7	0.18
	6S	Sediment	08/04/03	131	15	0.18
	6W	Sediment	08/04/03	83	8	0.04

[a] *Sample matrix was rock, therefore, TPH concentration and TOC analysis was not feasible*

TABLE 10
SUMMARY OF SUBTIDAL SEDIMENT SAMPLES
B120 RELEASE
BUZZARDS BAY, MASSACHUSETTS

								MCP Method 1 Standards			NOAA Standards Marine Sediments
Sample Identification:	W2A10-ST-S01	W2A10-ST-S02	W2A10-ST-S03	W2A10-ST-S04	W2A10-ST-S05	W2A10-ST-S06		S-1 / GW-1	S-1 / GW-2	S-1 / GW-3	ERL
Sampling Date	7/22/2004	7/22/2004	7/22/2004	7/22/2004	7/22/2004	7/22/2004	7/22/2004				
Analytical Laboratory:	GAI	GAI	GAI	GAI	GAI	GAI	B&B				
ANALYTE											
EPH											
C_9-C_{18} Aliphatic Hydrocarbons	ND(35)	ND(35)	ND(37)	ND(35)	ND(39)	ND(36)	NA	**1,000**	**1,000**	**1,000**	**NA**
C_{19}-C_{36} Aliphatic Hydrocarbons	ND(35)	ND(35)	ND(37)	ND(35)	ND(39)	ND(36)	NA	**2,500**	**2500**	**2500**	**NA**
C_{11}-C_{22} Aromatic Hydrocarbons	ND(35)	ND(35)	ND(37)	ND(35)	ND(39)	ND(36)	NA	**200**	**800**	**800**	**NA**
PAH by GC/MS-SIM by method 8270											
Naphthalene	**0.009 j**	**0.011 j**	**0.009 j**	**0.009 j**	**0.011 j**	**0.010 j**	**0.0047**	**4**	**100**	**100**	**0.160**
2-Methylnaphthalene	ND(0.012)	ND(0.012)	ND(0.012)	ND(0.012)	ND(0.013)	ND(0.012)	**0.0036**	**4**	**500**	**500**	**0.070**
Acenaphthylene	ND(0.012)	ND(0.012)	ND(0.012)	ND(0.012)	ND(0.013)	ND(0.012)	**0.0082**	**100**	**100**	**100**	**0.044**
Acenaphthene	ND(0.012)	ND(0.012)	ND(0.012)	ND(0.012)	ND(0.013)	ND(0.012)	**0.0054**	**20**	**1,000**	**1,000**	**0.016**
Fluorene	ND(0.012)	ND(0.012)	ND(0.012)	ND(0.012)	ND(0.013)	ND(0.012)	**0.006**	**400**	**1,000**	**1,000**	**0.019**
Phenanthrene	ND(0.012)	ND(0.012)	ND(0.012)	ND(0.012)	**0.032**	**0.010 j**	**0.0598**	**700**	**1,000**	**100**	**0.240**
Anthracene	ND(0.012)	ND(0.012)	ND(0.012)	ND(0.012)	ND(0.013)	ND(0.012)	**0.0154**	**1,000**	**1,000**	**1,000**	**0.085**
Fluoranthene	ND(0.012)	ND(0.012)	ND(0.012)	ND(0.012)	**0.017**	**0.023**	**0.153**	**1,000**	**1,000**	**1,000**	**0.600**
Pyrene	ND(0.012)	**0.009 j**	ND(0.012)	ND(0.012)	**0.025**	**0.021**	**0.158**	**700**	**700**	**700**	**0.665**
Benzo(a)anthracene	ND(0.012)	ND(0.012)	ND(0.012)	ND(0.012)	**0.012 j**	**0.015**	**0.127**	**0.7**	**0.7**	**0.7**	**0.261**
Chrysene	ND(0.012)	**0.012**	ND(0.012)	ND(0.012)	**0.014**	**0.022**	**0.135**	**7**	**7**	**7**	**0.384**
Benzo(b)fluoranthene	ND(0.012)	ND(0.012)	ND(0.012)	ND(0.012)	ND(0.013)	**0.014**	**0.0942**	**0.7**	**0.7**	**0.7**	**NA**
Benzo(k)fluoranthene	ND(0.012)	ND(0.012)	ND(0.012)	ND(0.012)	ND(0.013)	**0.011 j**	**0.0289**	**7**	**7**	**7**	**0.430**
Benzo(a)pyrene	ND(0.012)	**0.008**	ND(0.012)	ND(0.012)	**0.010 j**	**0.019**	**0.0908**	**0.7**	**0.7**	**0.7**	**0.430**
Indeno(1,2,3-cd)pyrene	ND(0.012)	ND(0.012)	ND(0.012)	ND(0.012)	ND(0.013)	ND(0.012)	**0.0734**	**0.7**	**0.7**	**0.7**	**NA**
Dibenzo(a,h)anthracene	ND(0.012)	ND(0.012)	ND(0.012)	ND(0.012)	ND(0.013)	ND(0.012)	**0.0144**	**0.7**	**0.7**	**0.7**	**0.063**
Benzo(g,h,I)perylene	ND(0.012)	ND(0.012)	ND(0.012)	ND(0.012)	ND(0.013)	**0.009 j**	**0.0599**	**1,000**	**1,000**	**1,000**	**NA**

NOTES:

1. Results in milligrams per kilogram (mg/kg).
2. GAI = Analysis conducted by Groundwater Analytical, Inc.
3. B&B = Analysis conducted by B&B Laboratories
4. EPH: Extractable Petroleum Hydrocarbons.
5. ND(x) = constituent not detected at practical quantitation limits noted in parentheses.
6. PAH by GC/MS-SIM: Polyaromatic Hydrocarbons with Selected Ion Monitoring.
7. j: estimated concentration/ detected below standard laboratory reporting limits.
8. NA: Not Analyzed or Not Available.
9. Shaded cells exceed applicable standards.

TABLE 10
SUMMARY OF SUBTIDAL SEDIMENT SAMPLES
B120 RELEASE
BUZZARDS BAY, MASSACHUSETTS

										MCP Method 1 Standards			NOAA Standards Marine Sediments
Sample Identification:	W2A10-ST-S07		W2A10-ST-S08		W2A10-ST-XXX		LI-DS-S01	LI-DS-S02	LI-DS-S03	S-1 / GW-1	S-1 / GW-2	S-1 / GW-3	ERL
Sampling Date	7/22/2004	7/22/2004	7/22/2004	7/22/2004	7/22/2004	7/22/2004	08/11/04	08/11/04	08/11/04				
Analytical Laboratory:	GAI	B&B	GAI	B&B	GAI	B&B	GAI	GAI	GAI				
ANALYTE													
EPH													
C_9-C_{18} Aliphatic Hydrocarbons	ND(110)	NA	ND(32)	NA	ND(92)	NA	ND(52)	ND(44)	ND(34)	**1,000**	**1,000**	**1,000**	**NA**
C_{19}-C_{36} Aliphatic Hydrocarbons	ND(110)	NA	ND(32)	NA	**130**	NA	ND(52)	ND(44)	ND(34)	**2,500**	**2500**	**2500**	**NA**
C_{11}-C_{22} Aromatic Hydrocarbons	**110**	NA	ND(32)	NA	**110**	NA	ND(52)	ND(44)	ND(34)	**200**	**800**	**800**	**NA**
PAH by GC/MS-SIM by method 8270													
Naphthalene	**0.033 j**	**0.0139**	**0.009 j**	**0.0048**	**0.031**	**0.0132**	ND(0.018)	ND(0.015)	ND(0.011)	**4**	**100**	**100**	**0.160**
2-Methylnaphthalene	**0.031 j**	**0.0113**	ND(0.011)	**0.003**	**0.023 j**	**0.0096**	ND(0.018)	ND(0.015)	ND(0.011)	**4**	**500**	**500**	**0.070**
Acenaphthylene	ND(0.035)	**0.0213**	ND(0.011)	**0.005**	ND(0.031)	**0.0235**	ND(0.018)	ND(0.015)	ND(0.011)	**100**	**100**	**100**	**0.044**
Acenaphthene	ND(0.035)	**0.007**	ND(0.011)	**0.0055**	ND(0.031)	**0.0059**	ND(0.018)	**0.016**	ND(0.011)	**20**	**1,000**	**1,000**	**0.016**
Fluorene	ND(0.035)	**0.0155**	ND(0.011)	**0.0051**	ND(0.031)	**0.0113**	ND(0.018)	ND(0.015)	ND(0.011)	**400**	**1,000**	**1,000**	**0.019**
Phenanthrene	**0.075**	**0.136**	**0.018**	**0.0439**	**0.053**	**0.0833**	ND(0.018)	ND(0.015)	ND(0.011)	**700**	**1,000**	**100**	**0.240**
Anthracene	ND(0.035)	**0.0538**	ND(0.011)	**0.0123**	ND(0.031)	**0.0311**	ND(0.018)	ND(0.015)	ND(0.011)	**1,000**	**1,000**	**1,000**	**0.085**
Fluoranthene	**0.180**	**0.275**	**0.025**	**0.109**	**0.150**	**0.216**	**0.019**	**0.017**	ND(0.011)	**1,000**	**1,000**	**1,000**	**0.600**
Pyrene	**0.230**	**0.371**	**0.023**	**0.100**	**0.170**	**0.273**	**0.019**	**0.016**	ND(0.011)	**700**	**700**	**700**	**0.665**
Benzo(a)anthracene	**0.190**	**0.467**	**0.014**	**0.0867**	**0.120**	**0.262**	ND(0.018)	ND(0.015)	ND(0.011)	**0.7**	**0.7**	**0.7**	**0.261**
Chrysene	**0.330**	**0.566**	**0.020**	**0.0933**	**0.210**	**0.302**	**0.033**	**0.018**	ND(0.011)	**7**	**7**	**7**	**0.384**
Benzo(b)fluoranthene	**0.170**	**0.150**	**0.014**	**0.059**	**0.130**	**0.164**	ND(0.018)	ND(0.015)	ND(0.011)	**0.7**	**0.7**	**0.7**	**NA**
Benzo(k)fluoranthene	**0.100**	**0.0226**	**0.011**	**0.0189**	**0.086**	**0.0501**	ND(0.018)	ND(0.015)	ND(0.011)	**7**	**7**	**7**	**0.430**
Benzo(a)pyrene	**0.220**	**0.131**	**0.018**	**0.0551**	**0.150**	**0.166**	ND(0.018)	ND(0.015)	ND(0.011)	**0.7**	**0.7**	**0.7**	**0.430**
Indeno(1,2,3-cd)pyrene	**0.056**	**0.0676**	ND(0.011)	**0.0421**	**0.039**	**0.0983**	ND(0.018)	ND(0.015)	ND(0.011)	**0.7**	**0.7**	**0.7**	**NA**
Dibenzo(a,h)anthracene	**0.033 j**	**0.0208**	ND(0.011)	**0.0081**	**0.023**	**0.0262**	ND(0.018)	ND(0.015)	ND(0.011)	**0.7**	**0.7**	**0.7**	**0.063**
Benzo(g,h,I)perylene	**0.073**	**0.0495**	**0.008 j**	**0.0295**	**0.049**	**0.0779**	**0.032**	**0.024**	ND(0.011)	**1,000**	**1,000**	**1,000**	**NA**

NOTES:

1. Results in milligrams per kilogram (mg/kg).
2. GAI = Analysis conducted by Groundwater Analytical, Inc.
3. B&B = Analysis conducted by B&B Laboratories
4. EPH: Extractable Petroleum Hydrocarbons.
5. ND(x) = constituent not detected at practical quantitation limits noted in parentheses.
6. PAH by GC/MS-SIM: Polyaromatic Hydrocarbons with Selected Ion Monitoring.
7. j: estimated concentration/ detected below standard laboratory reporting limits.
8. NA: Not Analyzed or Not Available.
9. Shaded cells exceed applicable standards.

TABLE 10
SUMMARY OF SUBTIDAL SEDIMENT SAMPLES
B120 RELEASE
BUZZARDS BAY, MASSACHUSETTS

										MCP Method 1 Standards			NOAA Standards Marine Sediments
Sample Identification:	**LI-DS-S04**	**ACD-S01**	**ACD-S02**	**ACD-S03**	**PB-SS-S01**	**PB-DS-S01**	**PB-SS-S02**	**PB-DS-S02**	**PB-SS-S03**	**S-1 / GW-1**	**S-1 / GW-2**	**S-1 / GW-3**	**ERL**
Sampling Date	08/11/04	08/11/04	08/11/04	08/11/04	08/11/04	08/11/04	08/11/04	08/11/04	08/11/04				
Analytical Laboratory:	GAI	GAI	GAI	GAI	GAI	GAI	GAI	GAI	GAI				
ANALYTE													
EPH													
C_9-C_{18} Aliphatic Hydrocarbons	ND(38)	ND(43)	ND(37)	ND(36)	ND(39)	ND(45)	ND(38)	ND(49)	ND(33)	**1,000**	**1,000**	**1,000**	**NA**
C_{19}-C_{36} Aliphatic Hydrocarbons	ND(38)	ND(43)	ND(37)	ND(36)	ND(39)	**47**	ND(38)	**78**	ND(33)	**2,500**	**2,500**	**2,500**	**NA**
C_{11}-C_{22} Aromatic Hydrocarbons	ND(38)	ND(43)	ND(37)	ND(36)	ND(39)	ND(45)	ND(38)	ND(49)	ND(33)	**200**	**800**	**800**	**NA**
PAH by GC/MS-SIM by method 8270													
Naphthalene	ND(0.012)	ND(0.014)	ND(0.012)	ND(0.011)	ND(0.013)	ND(0.015)	ND(0.013)	ND(0.016)	ND(0.011)	**4**	**100**	**100**	**0.160**
2-Methylnaphthalene	ND(0.012)	ND(0.014)	ND(0.012)	ND(0.011)	ND(0.013)	ND(0.015)	ND(0.013)	ND(0.016)	ND(0.011)	**4**	**500**	**500**	**0.070**
Acenaphthylene	ND(0.012)	ND(0.014)	ND(0.012)	**0.023**	ND(0.013)	**0.025**	ND(0.013)	ND(0.016)	ND(0.011)	**100**	**100**	**100**	**0.044**
Acenaphthene	ND(0.012)	**0.019**	ND(0.012)	**0.052**	ND(0.013)	**0.075**	ND(0.013)	**0.033**	ND(0.011)	**20**	**1,000**	**1,000**	**0.016**
Fluorene	ND(0.012)	**0.014**	ND(0.012)	**0.038**	ND(0.013)	**0.058**	ND(0.013)	**0.025**	ND(0.011)	**400**	**1,000**	**1,000**	**0.019**
Phenanthrene	ND(0.012)	**0.015**	ND(0.012)	**0.037**	ND(0.013)	**0.068**	ND(0.013)	**0.025**	ND(0.011)	**700**	**1,000**	**100**	**0.240**
Anthracene	ND(0.012)	ND(0.014)	ND(0.012)	**0.029**	ND(0.013)	**0.045**	ND(0.013)	**0.020**	ND(0.011)	**1,000**	**1,000**	**1,000**	**0.085**
Fluoranthene	ND(0.012)	**0.022**	ND(0.012)	**0.049**	ND(0.013)	**0.087**	ND(0.013)	**0.034**	ND(0.011)	**1,000**	**1,000**	**1,000**	**0.600**
Pyrene	ND(0.012)	**0.022**	ND(0.012)	**0.047**	ND(0.013)	**0.072**	ND(0.013)	**0.030**	ND(0.011)	**700**	**700**	**700**	**0.665**
Benzo(a)anthracene	ND(0.012)	ND(0.014)	ND(0.012)	ND(0.011)	ND(0.013)	ND(0.015)	ND(0.013)	ND(0.016)	ND(0.011)	**0.7**	**0.7**	**0.7**	**0.261**
Chrysene	ND(0.012)	**0.030**	ND(0.012)	**0.110**	ND(0.013)	**0.190**	ND(0.013)	**0.077**	**0.011**	**7**	**7**	**7**	**0.384**
Benzo(b)fluoranthene	ND(0.012)	ND(0.014)	ND(0.012)	ND(0.011)	ND(0.013)	ND(0.015)	ND(0.013)	ND(0.016)	ND(0.011)	**0.7**	**0.7**	**0.7**	**NA**
Benzo(k)fluoranthene	ND(0.012)	ND(0.014)	ND(0.012)	**0.027**	ND(0.013)	**0.043**	ND(0.013)	**0.019**	ND(0.011)	**7**	**7**	**7**	**0.430**
Benzo(a)pyrene	ND(0.012)	ND(0.014)	ND(0.012)	ND(0.011)	ND(0.013)	ND(0.015)	ND(0.013)	ND(0.016)	ND(0.011)	**0.7**	**0.7**	**0.7**	**0.430**
Indeno(1,2,3-cd)pyrene	ND(0.012)	ND(0.014)	ND(0.012)	ND(0.011)	ND(0.013)	ND(0.015)	ND(0.013)	ND(0.016)	ND(0.011)	**0.7**	**0.7**	**0.7**	**NA**
Dibenzo(a,h)anthracene	ND(0.012)	ND(0.014)	ND(0.012)	**0.075**	ND(0.013)	**0.067**	ND(0.013)	**0.035**	ND(0.011)	**0.7**	**0.7**	**0.7**	**0.063**
Benzo(g,h,I)perylene	ND(0.012)	**0.033**	ND(0.012)	**0.092**	ND(0.013)	**0.140**	ND(0.013)	**0.064**	ND(0.011)	**1,000**	**1,000**	**1,000**	**NA**

NOTES:

1. Results in milligrams per kilogram (mg/kg).
2. GAI = Analysis conducted by Groundwater Analytical, Inc.
3. B&B = Analysis conducted by B&B Laboratories
4. EPH: Extractable Petroleum Hydrocarbons.
5. ND(x) = constituent not detected at practical quantitation limits noted in parentheses.
6. PAH by GC/MS-SIM: Polyaromatic Hydrocarbons with Selected Ion Monitoring.
7. j: estimated concentration/ detected below standard laboratory reporting limits.
8. NA: Not Analyzed or Not Available.
9. Shaded cells exceed applicable standards.

TABLE 10
SUMMARY OF SUBTIDAL SEDIMENT SAMPLES
B120 RELEASE
BUZZARDS BAY, MASSACHUSETTS

										MCP Method 1 Standards			NOAA Standards Marine Sediments
Sample Identification:	PB-DS-S03	PB-SS-S04	PB-DS-S04	BSS-01	SN-DS-S01	SN-SS-S02	SN-DS-S02	SN-SS-S03	SN-DS-S03	S-1 / GW-1	S-1 / GW-2	S-1 / GW-3	ERL
Sampling Date	08/11/04	08/11/04	08/11/04	08/11/04	08/12/04	08/12/04	08/12/04	08/12/04	08/12/04				
Analytical Laboratory:	GAI	GAI	GAI	GAI	GAI	GAI	GAI	GAI	GAI				
ANALYTE													
EPH													
C_9-C_{18} Aliphatic Hydrocarbons	ND(48)	ND(36)	ND(40)	ND(38)	ND(37)	ND(37)	ND(36)	ND(36)	ND(34)	**1,000**	**1,000**	**1,000**	**NA**
C_{19}-C_{36} Aliphatic Hydrocarbons	**53**	ND(36)	ND(40)	ND(38)	ND(37)	ND(37)	ND(36)	ND(36)	ND(34)	**2,500**	**2,500**	**2,500**	**NA**
C_{11}-C_{22} Aromatic Hydrocarbons	ND(48)	ND(36)	ND(40)	ND(38)	ND(37)	ND(37)	ND(36)	ND(36)	ND(34)	**200**	**800**	**800**	**NA**
PAH by GC/MS-SIM by method 8270													
Naphthalene	ND(0.016)	ND(0.012)	ND(0.014)	ND(0.013)	ND(0.013)	ND(0.013)	ND(0.012)	ND(0.012)	ND(0.012)	**4**	**100**	**100**	**0.160**
2-Methylnaphthalene	ND(0.016)	ND(0.012)	ND(0.014)	ND(0.013)	ND(0.013)	ND(0.013)	ND(0.012)	ND(0.012)	ND(0.012)	**4**	**500**	**500**	**0.070**
Acenaphthylene	ND(0.016)	ND(0.012)	ND(0.014)	ND(0.013)	ND(0.013)	ND(0.013)	ND(0.012)	ND(0.012)	ND(0.012)	**100**	**100**	**100**	**0.044**
Acenaphthene	**0.025**	ND(0.012)	**0.026**	ND(0.013)	ND(0.013)	ND(0.013)	ND(0.012)	ND(0.012)	ND(0.012)	**20**	**1,000**	**1,000**	**0.016**
Fluorene	**0.021**	ND(0.012)	**0.021**	ND(0.013)	ND(0.013)	ND(0.013)	ND(0.012)	ND(0.012)	ND(0.012)	**400**	**1,000**	**1,000**	**0.019**
Phenanthrene	**0.020**	ND(0.012)	**0.020**	ND(0.013)	ND(0.013)	ND(0.013)	ND(0.012)	ND(0.012)	ND(0.012)	**700**	**1,000**	**100**	**0.240**
Anthracene	**0.017**	ND(0.012)	**0.017**	ND(0.013)	ND(0.013)	ND(0.013)	ND(0.012)	ND(0.012)	ND(0.012)	**1,000**	**1,000**	**1,000**	**0.085**
Fluoranthene	**0.028**	ND(0.012)	**0.029**	ND(0.013)	ND(0.013)	ND(0.013)	ND(0.012)	ND(0.012)	ND(0.012)	**1,000**	**1,000**	**1,000**	**0.600**
Pyrene	**0.027**	ND(0.012)	**0.026**	ND(0.013)	ND(0.013)	ND(0.013)	ND(0.012)	ND(0.012)	ND(0.012)	**700**	**700**	**700**	**0.665**
Benzo(a)anthracene	ND(0.016)	ND(0.012)	ND(0.014)	ND(0.013)	ND(0.013)	ND(0.013)	ND(0.012)	ND(0.012)	ND(0.012)	**0.7**	**0.7**	**0.7**	**0.261**
Chrysene	**0.058**	ND(0.012)	**0.050**	ND(0.013)	ND(0.013)	ND(0.013)	ND(0.012)	ND(0.012)	ND(0.012)	**7**	**7**	**7**	**0.384**
Benzo(b)fluoranthene	ND(0.016)	ND(0.012)	ND(0.014)	ND(0.013)	ND(0.013)	ND(0.013)	ND(0.012)	ND(0.012)	ND(0.012)	**0.7**	**0.7**	**0.7**	**NA**
Benzo(k)fluoranthene	ND(0.016)	ND(0.012)	**0.015**	ND(0.013)	ND(0.013)	ND(0.013)	ND(0.012)	ND(0.012)	ND(0.012)	**7**	**7**	**7**	**0.430**
Benzo(a)pyrene	ND(0.016)	ND(0.012)	ND(0.014)	ND(0.013)	ND(0.013)	ND(0.013)	ND(0.012)	**0.015**	ND(0.012)	**0.7**	**0.7**	**0.7**	**0.430**
Indeno(1,2,3-cd)pyrene	ND(0.016)	ND(0.012)	ND(0.014)	ND(0.013)	ND(0.013)	ND(0.013)	ND(0.012)	**0.015**	ND(0.012)	**0.7**	**0.7**	**0.7**	**NA**
Dibenzo(a,h)anthracene	**0.023**	ND(0.012)	**0.023**	ND(0.013)	ND(0.013)	ND(0.013)	ND(0.012)	ND(0.012)	ND(0.012)	**0.7**	**0.7**	**0.7**	**0.063**
Benzo(g,h,I)perylene	**0.050**	ND(0.012)	**0.051**	ND(0.013)	ND(0.013)	ND(0.013)	ND(0.012)	ND(0.012)	ND(0.012)	**1,000**	**1,000**	**1,000**	**NA**

NOTES:

1. Results in milligrams per kilogram (mg/kg).
2. GAI = Analysis conducted by Groundwater Analytical, Inc.
3. B&B = Analysis conducted by B&B Laboratories
4. EPH: Extractable Petroleum Hydrocarbons.
5. ND(x) = constituent not detected at practical quantitation limits noted in parentheses.
6. PAH by GC/MS-SIM: Polyaromatic Hydrocarbons with Selected Ion Monitoring.
7. j: estimated concentration/ detected below standard laboratory reporting limits.
8. NA: Not Analyzed or Not Available.
9. Shaded cells exceed applicable standards.

TABLE 10
SUMMARY OF SUBTIDAL SEDIMENT SAMPLES
B120 RELEASE
BUZZARDS BAY, MASSACHUSETTS

											MCP Method 1 Standards			NOAA Standards Marine Sediments
Sample Identification:	SN-SS-S04	SN-DS-S04	BSS-S02	DL-SS-S01	DL-DS-S01	DL-SS-S02	DL-DS-S02	DL-SS-S03	DL-SS-S04	DL-DS-S04	S-1 / GW-1	S-1 / GW-2	S-1 / GW-3	ERL
Sampling Date	08/12/04	08/12/04	08/12/04	08/12/04	08/12/04	08/12/04	08/12/04	08/12/04	08/12/04	08/12/04				
Analytical Laboratory:	GAI	GAI	GAI	GAI	GAI	GAI	GAI	GAI	GAI	GAI				
ANALYTE														
EPH														
C_9-C_{18} Aliphatic Hydrocarbons	ND(37)	ND(43)	ND(35)	ND(35)	ND(36)	ND(36)	ND(40)	ND(38)	ND(38)	ND(39)	**1,000**	**1,000**	**1,000**	**NA**
C_{19}-C_{36} Aliphatic Hydrocarbons	ND(37)	**65**	ND(35)	ND(35)	ND(36)	ND(36)	ND(40)	ND(38)	ND(38)	ND(39)	**2,500**	**2,500**	**2,500**	**NA**
C_{11}-C_{22} Aromatic Hydrocarbons	ND(37)	ND(43)	ND(35)	ND(35)	ND(36)	ND(36)	ND(40)	ND(38)	ND(38)	ND(39)	**200**	**800**	**800**	**NA**
PAH by GC/MS-SIM by method 8270														
Naphthalene	ND(0.013)	ND(0.014)	ND(0.012)	ND(0.012)	ND(0.012)	ND(0.012)	ND(0.013)	ND(0.013)	ND(0.013)	ND(0.013)	**4**	**100**	**100**	**0.160**
2-Methylnaphthalene	ND(0.013)	ND(0.014)	ND(0.012)	ND(0.012)	ND(0.012)	ND(0.012)	ND(0.013)	ND(0.013)	ND(0.013)	ND(0.013)	**4**	**500**	**500**	**0.070**
Acenaphthylene	ND(0.013)	ND(0.014)	ND(0.012)	ND(0.012)	ND(0.012)	ND(0.012)	ND(0.013)	ND(0.013)	ND(0.013)	ND(0.013)	**100**	**100**	**100**	**0.044**
Acenaphthene	ND(0.013)	**0.023**	ND(0.012)	ND(0.012)	ND(0.012)	ND(0.012)	ND(0.013)	ND(0.013)	ND(0.013)	ND(0.013)	**20**	**1,000**	**1,000**	**0.016**
Fluorene	ND(0.013)	**0.019**	ND(0.012)	ND(0.012)	ND(0.012)	ND(0.012)	ND(0.013)	ND(0.013)	ND(0.013)	ND(0.013)	**400**	**1,000**	**1,000**	**0.019**
Phenanthrene	ND(0.013)	**0.024**	ND(0.012)	ND(0.012)	ND(0.012)	ND(0.012)	ND(0.013)	ND(0.013)	ND(0.013)	ND(0.013)	**700**	**1,000**	**100**	**0.240**
Anthracene	ND(0.013)	ND(0.014)	ND(0.012)	ND(0.012)	ND(0.012)	ND(0.012)	ND(0.013)	ND(0.013)	ND(0.013)	ND(0.013)	**1,000**	**1,000**	**1,000**	**0.085**
Fluoranthene	ND(0.013)	**0.030**	ND(0.012)	ND(0.012)	ND(0.012)	ND(0.012)	ND(0.013)	ND(0.013)	ND(0.013)	ND(0.013)	**1,000**	**1,000**	**1,000**	**0.600**
Pyrene	ND(0.013)	**0.025**	ND(0.012)	ND(0.012)	ND(0.012)	ND(0.012)	ND(0.013)	ND(0.013)	ND(0.013)	ND(0.013)	**700**	**700**	**700**	**0.665**
Benzo(a)anthracene	ND(0.013)	ND(0.014)	ND(0.012)	ND(0.012)	ND(0.012)	ND(0.012)	ND(0.013)	ND(0.013)	ND(0.013)	ND(0.013)	**0.7**	**0.7**	**0.7**	**0.261**
Chrysene	ND(0.013)	**0.040**	ND(0.012)	ND(0.012)	ND(0.012)	ND(0.012)	ND(0.013)	ND(0.013)	ND(0.013)	ND(0.013)	**7**	**7**	**7**	**0.384**
Benzo(b)fluoranthene	ND(0.013)	ND(0.014)	ND(0.012)	ND(0.012)	ND(0.012)	ND(0.012)	ND(0.013)	ND(0.013)	ND(0.013)	ND(0.013)	**0.7**	**0.7**	**0.7**	**NA**
Benzo(k)fluoranthene	ND(0.013)	ND(0.014)	ND(0.012)	ND(0.012)	ND(0.012)	ND(0.012)	ND(0.013)	ND(0.013)	ND(0.013)	ND(0.013)	**7**	**7**	**7**	**0.430**
Benzo(a)pyrene	ND(0.013)	**0.015**	ND(0.012)	ND(0.012)	ND(0.012)	ND(0.012)	ND(0.013)	ND(0.013)	ND(0.013)	ND(0.013)	**0.7**	**0.7**	**0.7**	**0.430**
Indeno(1,2,3-cd)pyrene	ND(0.013)	**0.016**	ND(0.012)	ND(0.012)	ND(0.012)	ND(0.012)	ND(0.013)	ND(0.013)	ND(0.013)	ND(0.013)	**0.7**	**0.7**	**0.7**	**NA**
Dibenzo(a,h)anthracene	ND(0.013)	**0.015**	ND(0.012)	ND(0.012)	ND(0.012)	ND(0.012)	ND(0.013)	ND(0.013)	ND(0.013)	ND(0.013)	**0.7**	**0.7**	**0.7**	**0.063**
Benzo(g,h,I)perylene	ND(0.013)	**0.040**	ND(0.012)	ND(0.012)	ND(0.012)	ND(0.012)	ND(0.013)	ND(0.013)	ND(0.013)	ND(0.013)	**1,000**	**1,000**	**1,000**	**NA**

NOTES:

1. Results in milligrams per kilogram (mg/kg).
2. GAI = Analysis conducted by Groundwater Analytical, Inc.
3. B&B = Analysis conducted by B&B Laboratories
4. EPH: Extractable Petroleum Hydrocarbons.
5. ND(x) = constituent not detected at practical quantitation limits noted in parentheses.
6. PAH by GC/MS-SIM: Polyaromatic Hydrocarbons with Selected Ion Monitoring.
7. j: estimated concentration/ detected below standard laboratory reporting limits.
8. NA: Not Analyzed or Not Available.

TABLE 10
SUMMARY OF SUBTIDAL SEDIMENT SAMPLES
B120 RELEASE
BUZZARDS BAY, MASSACHUSETTS

									MCP Method 1 Standards			NOAA Standards Marine Sediments
Sample Identification:	**BJ-SS-S01**	**BJ-SS-02**	**BJ-SS-03**	**BJ-SS-04**	**BJ-DS-01**	**BJ-DS-S02**	**BJ-DS-S03**	**BJ-DS-S04**	**S-1 / GW-1**	**S-1 / GW-2**	**S-1 / GW-3**	**ERL**
Sampling Date	09/02/04	09/02/04	09/02/04	09/02/04	09/02/04	09/02/04	09/02/04	09/02/04				
Analytical Laboratory:	GAI	GAI	GAI	GAI	GAI	GAI	GAI	GAI				
ANALYTE												
EPH												
C_9-C_{18} Aliphatic Hydrocarbons	ND(37)	ND(46)	ND(36)	ND(40)	ND(40)	ND(38)	ND(38)	ND(42)	**1,000**	**1,000**	**1,000**	**NA**
C_{19}-C_{36} Aliphatic Hydrocarbons	ND(37)	ND(46)	ND(36)	ND(40)	ND(40)	ND(38)	ND(38)	ND(42)	**2,500**	**2,500**	**2,500**	**NA**
C_{11}-C_{22} Aromatic Hydrocarbons	ND(37)	ND(46)	ND(36)	ND(40)	ND(40)	ND(38)	ND(38)	ND(42)	**200**	**800**	**800**	**NA**
PAH by GC/MS-SIM by method 8270												
Naphthalene	ND(0.012)	ND(0.016)	ND(0.012)	ND(0.013)	**0.005J**	ND(0.013)	ND(0.012)	ND(0.014)	**4**	**100**	**100**	**0.160**
2-Methylnaphthalene	ND(0.012)	ND(0.016)	ND(0.012)	ND(0.013)	**0.005J**	ND(0.013)	ND(0.012)	ND(0.014)	**4**	**500**	**500**	**0.070**
Acenaphthylene	ND(0.012)	ND(0.016)	ND(0.012)	ND(0.013)	ND(0.013)	ND(0.013)	ND(0.012)	ND(0.014)	**100**	**100**	**100**	**0.044**
Acenaphthene	ND(0.012)	ND(0.016)	ND(0.012)	ND(0.013)	ND(0.013)	ND(0.013)	ND(0.012)	ND(0.014)	**20**	**1,000**	**1,000**	**0.016**
Fluorene	ND(0.012)	ND(0.016)	ND(0.012)	ND(0.013)	ND(0.013)	ND(0.013)	ND(0.012)	ND(0.014)	**400**	**1,000**	**1,000**	**0.019**
Phenanthrene	ND(0.012)	**0.007j**	ND(0.012)	ND(0.013)	**0.007J**	ND(0.013)	ND(0.012)	ND(0.014)	**700**	**1,000**	**100**	**0.240**
Anthracene	ND(0.012)	ND(0.016)	ND(0.012)	ND(0.013)	ND(0.013)	ND(0.013)	ND(0.012)	ND(0.014)	**1,000**	**1,000**	**1,000**	**0.085**
Fluoranthene	ND(0.012)	**0.007j**	ND(0.012)	ND(0.013)	**0.008J**	ND(0.013)	ND(0.012)	ND(0.014)	**1,000**	**1,000**	**1,000**	**0.600**
Pyrene	ND(0.012)	**0.011j**	ND(0.012)	ND(0.013)	**0.006J**	ND(0.013)	ND(0.012)	ND(0.014)	**700**	**700**	**700**	**0.665**
Benzo(a)anthracene	ND(0.012)	0.006j	ND(0.012)	ND(0.013)	**0.005J**	ND(0.013)	ND(0.012)	ND(0.014)	**0.7**	**0.7**	**0.7**	**0.261**
Chrysene	ND(0.012)	**0.006j**	ND(0.012)	ND(0.013)	ND(0.013)	ND(0.013)	ND(0.012)	ND(0.014)	**7**	**7**	**7**	**0.384**
Benzo(b)fluoranthene	ND(0.012)	ND(0.016)	ND(0.012)	ND(0.013)	ND(0.013)	ND(0.013)	ND(0.012)	ND(0.014)	**0.7**	**0.7**	**0.7**	**NA**
Benzo(k)fluoranthene	ND(0.012)	ND(0.016)	ND(0.012)	ND(0.013)	ND(0.013)	ND(0.013)	ND(0.012)	ND(0.014)	**7**	**7**	**7**	**0.430**
Benzo(a)pyrene	ND(0.012)	**0.005j**	ND(0.012)	ND(0.013)	ND(0.013)	ND(0.013)	ND(0.012)	ND(0.014)	**0.7**	**0.7**	**0.7**	**0.430**
Indeno(1,2,3-cd)pyrene	ND(0.012)	ND(0.016)	ND(0.012)	ND(0.013)	ND(0.013)	ND(0.013)	ND(0.012)	ND(0.014)	**0.7**	**0.7**	**0.7**	**NA**
Dibenzo(a,h)anthracene	ND(0.012)	ND(0.016)	ND(0.012)	ND(0.013)	ND(0.013)	ND(0.013)	ND(0.012)	ND(0.014)	**0.7**	**0.7**	**0.7**	**0.063**
Benzo(g,h,I)perylene	ND(0.012)	ND(0.016)	ND(0.012)	ND(0.013)	ND(0.013)	ND(0.013)	ND(0.012)	ND(0.014)	**1,000**	**1,000**	**1,000**	**NA**

NOTES:

1. Results in milligrams per kilogram (mg/kg).
2. GAI = Analysis conducted by Groundwater Analytical, Inc.
3. B&B = Analysis conducted by B&B Laboratories
4. EPH: Extractable Petroleum Hydrocarbons.
5. ND(x) = constituent not detected at practical quantitation limits noted in parentheses.
6. PAH by GC/MS-SIM: Polyaromatic Hydrocarbons with Selected Ion Monitoring.
7. j: estimated concentration/ detected below standard laboratory reporting limits.
8. NA: Not Analyzed or Not Available.

TABLE 11
IRAC INSPECTIONS SUMMARY - 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	Saconesset 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 11
IRAC INSPECTIONS SUMMARY - 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 11
IRAC INSPECTIONS SUMMARY - SEPTEMBER 3, 2003
BARGE B120 SPILL
BUZZARDS BAY, MASSACHUSETTS

Segment	Segment Name	IRAC Status (as of September 3, 2003)
W1E-05	Mattapoisett Harbor East	Pass
W1E-06	Mattapoisett 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	Mattapoisett Neck West	Pass
W1F-06	Mattapoisett Neck South	Fail - NFA
W1F-07	Mattapoisett Shores	Pass
W1F-08	Mattapoisett Neck East	Pass
W1F-09	Mattapoisett 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)	Unoiled
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 11
IRAC INSPECTIONS SUMMARY - 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	Failed IRAC, Further Action Not Feasible
Fail - FTF	Failed IRAC, Further Treatment Feasible

TABLE 12
SEGMENTS SELECTED FOR PHASE I INTERTIDAL SAMPLING
BARGE B120 SPILL
BUZZARDS BAY, MASSACHUSETTS

Segment ID	Segment Name	Oiling	Ranking
Heavy Oiling			
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
Moderate Oiling			
W1B-16	Minot Forest Beach	M	3
W1E-06	Mattapoisett 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
Light Oiling			
W1B-22	Swift's Beach	L	2
W2B-01	Round Hill to Barekneed 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	
Very Light			
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 13
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				
	E107-UIT-01	**E107-UIT-02**	**E107-UIT-03**	**E107-LIT-03**	**S-1 / GW-1**	**S-1 / GW-2**	**S-1 / GW-3**	**ERL**
EPH								
C_9-C_{18} Aliphatic Hydrocarbons	ND(32)	ND(30)	ND(32)	ND(33)	**1,000**	**1,000**	**1,000**	**NA**
C_{19}-C_{36} Aliphatic Hydrocarbons	ND(32)	**39**	ND(32)	ND(33)	**2,500**	**2,500**	**2,500**	**NA**
C_{11}-C_{22} Aromatic Hydrocarbons	ND(32)	ND(30)	ND(32)	ND(33)	**200**	**800**	**800**	**NA**
PAH by GC/MS-SIM by method 8270								
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 Adminstration Effects Range Low.
7. NA: Not Available.

TABLE 13
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				
	E210-UIT-01	**E210-LIT-01**	**E210-UIT-02**	**E210-LIT-02**	**E210-UIT-03**	**S-1 / GW-1**	**S-1 / GW-2**	**S-1 / GW-3**	**ERL**
EPH									
C_9-C_{18} Aliphatic Hydrocarbons	ND (32)	ND (35)	ND (30)	ND (30)	ND (30)	**1,000**	**1,000**	**1,000**	**NA**
C_{19}-C_{36} Aliphatic Hydrocarbons	ND (32)	ND (35)	ND (30)	ND (30)	ND (30)	**2,500**	**2,500**	**2,500**	**NA**
C_{11}-C_{22} Aromatic Hydrocarbons	ND (32)	ND (35)	ND (30)	ND (30)	ND (30)	**200**	**800**	**800**	**NA**
PAH by GC/MS-SIM by method 8270									
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: 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 Adminstration Effects Range Low.
7. NA: Not Available.

TABLE 13
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				
	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**	**S-1 / GW-1**	**S-1 / GW-2**	**S-1 / GW-3**	**ERL**
EPH													
C_9-C_{18} 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_{19}-C_{36} Aliphatic Hydrocarbons	ND(30)	ND(32)	ND(34)	ND(30)	ND(31)	ND(31)	ND(34)	ND(37)	ND(37)	**2,500**	**2,500**	**2,500**	**NA**
C_{11}-C_{22} Aromatic Hydrocarbons	ND(30)	ND(32)	ND(34)	ND(30)	ND(31)	ND(31)	ND(34)	NA	ND(37)	**200**	**800**	**800**	**NA**
PAH by GC/MS-SIM by method 8270													
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.
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 Adminstration Effects Range Low.
7. NA: Not Available.

TABLE 13
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				
	W1B14-UIT-01	**W1B14-UIT-02**	**W1B14-LIT-02**	**W1B14-UIT-03**	**W1B14-LIT-03**	**S-1 / GW-1**	**S-1 / GW-2**	**S-1 / GW-3**	**ERL**
EPH									
C_9-C_{18} Aliphatic Hydrocarbons	ND(34)	ND(33)	ND(34)	ND(33)	ND(35)	**1,000**	**1,000**	**1,000**	**NA**
C_{19}-C_{36} Aliphatic Hydrocarbons	ND(34)	ND(33)	ND(34)	ND(33)	ND(35)	**2,500**	**2,500**	**2,500**	**NA**
C_{11}-C_{22} Aromatic Hydrocarbons	ND(34)	ND(33)	ND(34)	ND(33)	ND(35)	**200**	**800**	**800**	**NA**
PAH by GC/MS-SIM by method 8270									
Naphthalene	**0.013**	**0.007 j**	**0.009 j**	**0.012**	**0.007 j**	**4**	**100**	**100**	**0.160**
2-Methylnaphthalene	ND(0.011)	ND(0.011)	ND(0.012)	ND(0.011)	ND(0.012)	**4**	**500**	**500**	**0.070**
Acenaphthylene	ND(0.011)	ND(0.011)	ND(0.012)	ND(0.011)	ND(0.012)	**100**	**100**	**100**	**0.044**
Acenaphthene	ND(0.011)	ND(0.011)	ND(0.012)	ND(0.011)	ND(0.012)	**20**	**1,000**	**1,000**	**0.016**
Fluorene	ND(0.011)	ND(0.011)	ND(0.012)	ND(0.011)	ND(0.012)	**400**	**1,000**	**1,000**	**0.019**
Phenanthrene	ND(0.011)	ND(0.011)	ND(0.012)	ND(0.011)	ND(0.012)	**700**	**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**	**1,000**	**0.085**
Fluoranthene	ND(0.011)	ND(0.011)	ND(0.012)	ND(0.011)	ND(0.012)	**1,000**	**1,000**	**1,000**	**0.600**
Pyrene	ND(0.011)	ND(0.011)	ND(0.012)	ND(0.011)	ND(0.012)	**700**	**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**	**0.7**	**0.261**
Chrysene	ND(0.011)	ND(0.011)	ND(0.012)	ND(0.011)	ND(0.012)	**7**	**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**	**0.7**	**NA**
Benzo(k)fluoranthene	ND(0.011)	ND(0.011)	ND(0.012)	ND(0.011)	ND(0.012)	**7**	**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**	**0.7**	**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**	**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**	**0.7**	**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**	**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 Adminstration Effects Range Low.
7. NA: Not Available.

TABLE 13
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
	Upper Intertidal Zone	Lower Intertidal Zone	Upper Intertidal Zone	Lower Intertidal Zone	Upper Intertidal Zone	Lower Intertidal Zone				
	W1B16-UIT-01	**W1B16-LIT-01**	**W1B16-UIT-02**	**W1B16-LIT-02**	**W1B16-UIT-03**	**W1B16-LIT-03**	**S-1 / GW-1**	**S-1 / GW-2**	**S-1 / GW-3**	**ERL**
EPH										
C_9-C_{18} Aliphatic Hydrocarbons	ND(31)	ND(33)	ND(31)	ND(37)	ND(37)	ND(35)	**1,000**	**1,000**	**1,000**	**NA**
C_{19}-C_{36} Aliphatic Hydrocarbons	ND(31)	ND(33)	ND(31)	ND(37)	ND(37)	ND(35)	**2,500**	**2,500**	**2,500**	**NA**
C_{11}-C_{22} Aromatic Hydrocarbons	ND(31)	ND(33)	ND(31)	ND(37)	ND(37)	ND(35)	**200**	**800**	**800**	**NA**
PAH by GC/MS-SIM by method 8270										
Naphthalene	**0.009 j**	**0.010 j**	**0.008 j**	**0.011 j**	**0.010 j**	**0.011 j**	**4**	**100**	**100**	**0.160**
2-Methylnaphthalene	ND(0.010)	ND(0.011)	**0.006 j**	ND(0.012)	**0.007 j**	ND(0.012)	**4**	**500**	**500**	**0.070**
Acenaphthylene	ND(0.010)	ND(0.011)	ND(0.010)	ND(0.012)	ND(0.012)	ND(0.012)	**100**	**100**	**100**	**0.044**
Acenaphthene	ND(0.010)	ND(0.011)	ND(0.010)	ND(0.012)	ND(0.012)	ND(0.012)	**20**	**1,000**	**1,000**	**0.016**
Fluorene	ND(0.010)	ND(0.011)	ND(0.010)	ND(0.012)	ND(0.012)	ND(0.012)	**400**	**1,000**	**1,000**	**0.019**
Phenanthrene	ND(0.010)	ND(0.011)	ND(0.010)	ND(0.012)	ND(0.012)	ND(0.012)	**700**	**1,000**	**100**	**0.240**
Anthracene	ND(0.010)	ND(0.011)	ND(0.010)	ND(0.012)	ND(0.012)	ND(0.012)	**1,000**	**1,000**	**1,000**	**0.085**
Fluoranthene	ND(0.010)	ND(0.011)	ND(0.010)	ND(0.012)	ND(0.012)	**0.009 j**	**1,000**	**1,000**	**1,000**	**0.600**
Pyrene	ND(0.010)	ND(0.011)	ND(0.010)	ND(0.012)	ND(0.012)	**0.008 j**	**700**	**700**	**700**	**0.665**
Benzo(a)anthracene	ND(0.010)	ND(0.011)	ND(0.010)	ND(0.012)	ND(0.012)	ND(0.012)	**0.7**	**0.7**	**0.7**	**0.261**
Chrysene	ND(0.010)	ND(0.011)	ND(0.010)	ND(0.012)	ND(0.012)	ND(0.012)	**7**	**7**	**7**	**0.384**
Benzo(b)fluoranthene	ND(0.010)	ND(0.011)	ND(0.010)	ND(0.012)	ND(0.012)	ND(0.012)	**0.7**	**0.7**	**0.7**	**NA**
Benzo(k)fluoranthene	ND(0.010)	ND(0.011)	ND(0.010)	ND(0.012)	ND(0.012)	ND(0.012)	**7**	**7**	**7**	**0.430**
Benzo(a)pyrene	ND(0.010)	ND(0.011)	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(0.010)	ND(0.011)	ND(0.010)	ND(0.012)	ND(0.012)	ND(0.012)	**0.7**	**0.7**	**0.7**	**NA**
Dibenzo(a,h)anthracene	ND(0.010)	ND(0.011)	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(0.010)	ND(0.011)	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.
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 Adminstration Effects Range Low.
7. NA: Not Available.

TABLE 13
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
	Upper Intertidal Zone	Lower Intertidal Zone	Upper Intertidal Zone	Lower Intertidal Zone	Upper Intertidal Zone	Lower Intertidal Zone				
	W1B22-UIT-01	**W1B22-LIT-01**	**W1B22-UIT-02**	**W1B22-LIT-02**	**W1B22-UIT-03**	**W1B22-LIT-03**	**S-1 / GW-1**	**S-1 / GW-2**	**S-1 / GW-3**	**ERL**
EPH										
C_9-C_{18} Aliphatic Hydrocarbons	ND(31)	ND(34)	ND(30)	ND(35)	ND(34)	ND(36)	**1,000**	**1,000**	**1,000**	**NA**
C_{19}-C_{36} Aliphatic Hydrocarbons	ND(31)	ND(34)	ND(30)	ND(35)	ND(34)	ND(36)	**2,500**	**2,500**	**2,500**	**NA**
C_{11}-C_{22} Aromatic Hydrocarbons	ND(31)	ND(34)	ND(30)	ND(35)	ND(34)	ND(36)	**200**	**800**	**800**	**NA**
PAH by GC/MS-SIM by method 8270										
Naphthalene	**0.008 j**	**0.010 j**	**0.009 j**	**0.011 j**	**0.010 j**	**0.011 j**	**4**	**100**	**100**	**0.160**
2-Methylnaphthalene	ND(0.010)	**0.006 j**	**0.006 j**	**0.006 j**	ND(0.011)	**0.006 j**	**4**	**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**	**100**	**0.044**
Acenaphthene	ND(0.010)	ND(0.011)	ND(0.010)	ND(0.012)	ND(0.011)	ND(0.012)	**20**	**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)	**400**	**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)	**700**	**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**	**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**	**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**	**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**	**0.7**	**0.261**
Chrysene	ND(0.010)	ND(0.011)	ND(0.010)	**0.012**	ND(0.011)	ND(0.012)	**7**	**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**	**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**	**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**	**0.7**	**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**	**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**	**0.7**	**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**	**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 Adminstration Effects Range Low.
7. NA: Not Available.

TABLE 13
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				
	W1D01-M-01	**W1D01-M-02**	**W1D01-M-03**	**S-1 / GW-1**	**S-1 / GW-2**	**S-1 / GW-3**	**ERL**
EPH							
C_9-C_{18} Aliphatic Hydrocarbons	ND(30)	ND(42)	ND(30)	**1,000**	**1,000**	**1,000**	**NA**
C_{19}-C_{36} Aliphatic Hydrocarbons	ND(30)	ND(42)	ND(30)	**2,500**	**2,500**	**2,500**	**NA**
C_{11}-C_{22} Aromatic Hydrocarbons	ND(30)	ND(42)	ND(30)	**200**	**800**	**800**	**NA**
PAH by GC/MS-SIM by method 8270							
Naphthalene	**0.008 j**	**0.011 j**	**0.009 j**	**4**	**100**	**100**	**0.160**
2-Methylnaphthalene	ND(0.010)	ND(0.014)	ND(0.010)	**4**	**500**	**500**	**0.070**
Acenaphthylene	ND(0.010)	ND(0.014)	ND(0.010)	**100**	**100**	**100**	**0.044**
Acenaphthene	ND(0.010)	ND(0.014)	ND(0.010)	**20**	**1,000**	**1,000**	**0.016**
Fluorene	ND(0.010)	ND(0.014)	ND(0.010)	**400**	**1,000**	**1,000**	**0.019**
Phenanthrene	ND(0.010)	ND(0.014)	ND(0.010)	**700**	**1,000**	**100**	**0.240**
Anthracene	ND(0.010)	ND(0.014)	ND(0.010)	**1,000**	**1,000**	**1,000**	**0.085**
Fluoranthene	ND(0.010)	ND(0.014)	ND(0.010)	**1,000**	**1,000**	**1,000**	**0.600**
Pyrene	ND(0.010)	ND(0.014)	ND(0.010)	**700**	**700**	**700**	**0.665**
Benzo(a)anthracene	ND(0.010)	ND(0.014)	ND(0.010)	**0.7**	**0.7**	**0.7**	**0.261**
Chrysene	ND(0.010)	ND(0.014)	ND(0.010)	**7**	**7**	**7**	**0.384**
Benzo(b)fluoranthene	ND(0.010)	ND(0.014)	ND(0.010)	**0.7**	**0.7**	**0.7**	**NA**
Benzo(k)fluoranthene	ND(0.010)	ND(0.014)	ND(0.010)	**7**	**7**	**7**	**0.430**
Benzo(a)pyrene	ND(0.010)	ND(0.014)	ND(0.010)	**0.7**	**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**	**0.7**	**NA**
Dibenzo(a,h)anthracene	ND(0.010)	ND(0.014)	ND(0.010)	**0.7**	**0.7**	**0.7**	**0.063**
Benzo(g,h,I)perylene	ND(0.010)	ND(0.014)	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 Adminstration Effects Range Low.
7. NA: Not Available.

TABLE 13
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 Marine Sediments
	Upper Intertidal Zone	Lower Intertidal Zone	Upper Intertidal Zone	Lower Intertidal Zone	Upper Intertidal Zone	Middle Intertidal Zone	Lower Intertidal Zone				
	WID04-UIT-01	**WID04-LIT-01**	**WID04-UIT-02**	**WID04-LIT-02**	**WID04-UIT-03**	**WID04-MID-03**	**WID04-LIT-03**	**S-1 / GW-1**	**S-1 / GW-2**	**S-1 / GW-3**	**ERL**
EPH											
C_9-C_{18} Aliphatic Hydrocarbons	ND (34)	ND (34)	ND (33)	ND (32)	ND (33)	ND (33)	ND (32)	**1,000**	**1,000**	**1,000**	**NA**
C_{19}-C_{36} Aliphatic Hydrocarbons	ND (34)	ND (34)	ND (33)	ND (32)	ND (33)	ND (33)	ND (32)	**2,500**	**2,500**	**2,500**	**NA**
C_{11}-C_{22} Aromatic Hydrocarbons	ND (34)	ND (34)	ND (33)	ND (32)	ND (33)	ND (33)	ND (32)	**200**	**800**	**800**	**NA**
PAH by GC/MS-SIM by method 8270											
Naphthalene	**0.008 j**	**0.008 j**	**0.007 j**	**0.009 j**	**0.008 j**	**0.008 j**	**0.008 j**	**4**	**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)	**4**	**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**	**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)	**20**	**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)	**400**	**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)	**700**	**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**	**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**	**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**	**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**	**0.7**	**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**	**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**	**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**	**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**	**0.7**	**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**	**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**	**0.7**	**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**	**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 Adminstration Effects Range Low.
7. NA: Not Available.

TABLE 13
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				
	DDD2-UIT-03	**DDD2-MID-03**	**DDD2-LIT-03**	**S-1 / GW-1**	**S-1 / GW-2**	**S-1 / GW-3**	**ERL**
EPH							
C_9-C_{18} Aliphatic Hydrocarbons	ND (33)	ND (33)	ND (33)	**1,000**	**1,000**	**1,000**	**NA**
C_{19}-C_{36} Aliphatic Hydrocarbons	ND (33)	ND (33)	ND (33)	**2,500**	**2,500**	**2,500**	**NA**
C_{11}-C_{22} Aromatic Hydrocarbons	ND (33)	ND (33)	ND (33)	**200**	**800**	**800**	**NA**
PAH by GC/MS-SIM by method 8270							
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 Adminstration Effects Range Low.
7. NA: Not Available.

TABLE 13
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				
	WIE03-UIT-01	**WIE03-UIT-02**	**WIE03-UIT-03**	**S-1 / GW-1**	**S-1 / GW-2**	**S-1 / GW-3**	**ERL**
EPH							
C_9-C_{18} Aliphatic Hydrocarbons	ND (36)	ND (33)	ND (30)	**1,000**	**1,000**	**1,000**	**NA**
C_{19}-C_{36} Aliphatic Hydrocarbons	ND (36)	ND (33)	ND (30)	**2,500**	**2,500**	**2,500**	**NA**
C_{11}-C_{22} Aromatic Hydrocarbons	ND (36)	ND (33)	ND (30)	**200**	**800**	**800**	**NA**
PAH by GC/MS-SIM by method 8270							
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 Adminstration Effects Range Low.
7. NA: Not Available.

TABLE 13
SUMMARY OF SEDIMENT ANALYTICAL RESULTS FOR PHASE I CHARACTERIZATION
BUZZARDS BAY, MASSACHUSETTS
SEGMENT: WIE-04
Crescent 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				
	WIE04-UIT-01	**WIE04-LIT-01**	**WIE04-UIT-02**	**WIE04-LIT-02**	**WIE04-UIT-03**	**WIE04-LIT-03**	**S-1 / GW-1**	**S-1 / GW-2**	**S-1 / GW-3**	**ERL**
EPH										
C_9-C_{18} Aliphatic Hydrocarbons	ND (34)	ND (36)	ND (32)	ND (30)	ND (31)	ND (30)	**1,000**	**1,000**	**1,000**	**NA**
C_{19}-C_{36} Aliphatic Hydrocarbons	ND (34)	ND (36)	ND (32)	ND (30)	ND (31)	ND (30)	**2,500**	**2,500**	**2,500**	**NA**
C_{11}-C_{22} Aromatic Hydrocarbons	ND (34)	ND (36)	ND (32)	ND (30)	ND (31)	ND (30)	**200**	**800**	**800**	**NA**
PAH by GC/MS-SIM by method 8270										
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.
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 Adminstration Effects Range Low.
7. NA: Not Available.

TABLE 13
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				
	DDD01-UIT-01	**DDD01-LIT-01**	**S-1 / GW-1**	**S-1 / GW-2**	**S-1 / GW-3**	**ERL**
EPH						
C_9-C_{18} Aliphatic Hydrocarbons	ND (31)	ND (31)	**1,000**	**1,000**	**1,000**	**NA**
C_{19}-C_{36} Aliphatic Hydrocarbons	ND (31)	ND (31)	**2,500**	**2,500**	**2,500**	**NA**
C_{11}-C_{22} Aromatic Hydrocarbons	ND (31)	ND (31)	**200**	**800**	**800**	**NA**
PAH by GC/MS-SIM by method 8270						
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.
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 Adminstration Effects Range Low.
7. NA: Not Available.

TABLE 13
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				
	WIE06-UIT-01	**WIE06-LIT-01**	**WIE06-UIT-02**	**WIE06-LIT-02**	**WIE06-UIT-03**	**WIE06-LIT-03**	**S-1 / GW-1**	**S-1 / GW-2**	**S-1 / GW-3**	**ERL**
EPH										
C_9-C_{18} Aliphatic Hydrocarbons	ND (31)	ND (31)	ND (35)	ND (37)	ND (32)	ND (37)	**1,000**	**1,000**	**1,000**	**NA**
C_{19}-C_{36} Aliphatic Hydrocarbons	ND (31)	ND (31)	ND (35)	ND (37)	ND (32)	ND (37)	**2,500**	**2,500**	**2,500**	**NA**
C_{11}-C_{22} Aromatic Hydrocarbons	ND (31)	ND (31)	ND (35)	ND (37)	ND (32)	ND (37)	**200**	**800**	**800**	**NA**
PAH by GC/MS-SIM by method 8270										
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.
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 Adminstration Effects Range Low.
7. NA: Not Available.

TABLE 13
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				
	WIF-UIT-01	**WIF-UIT-02**	**WIF-UIT-03**	**S-1 / GW-1**	**S-1 / GW-2**	**S-1 / GW-3**	**ERL**
EPH							
C_9-C_{18} Aliphatic Hydrocarbons	ND (45)	ND (44)	ND (38)	**1,000**	**1,000**	**1,000**	**NA**
C_{19}-C_{36} Aliphatic Hydrocarbons	ND (45)	ND (44)	ND (38)	**2,500**	**2,500**	**2,500**	**NA**
C_{11}-C_{22} Aromatic Hydrocarbons	ND (45)	ND (44)	ND (38)	**200**	**800**	**800**	**NA**
PAH by GC/MS-SIM by method 8270							
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 Adminstration Effects Range Low.
7. NA: Not Available.

TABLE 13
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				
	W2A03-UIT-01	**W2A03-LIT-01**	**W2A03-UIT-02**	**W2A03-LIT-02**	**W2A03-UIT-03**	**W2A13-LIT-03**	**S-1 / GW-1**	**S-1 / GW-2**	**S-1 / GW-3**	**ERL**
EPH										
C_9-C_{18} Aliphatic Hydrocarbons	ND (31)	ND (38)	ND (34)	ND (39)	ND (37)	ND (35)	**1,000**	**1,000**	**1,000**	**NA**
C_{19}-C_{36} Aliphatic Hydrocarbons	ND (31)	ND (38)	ND (34)	ND (39)	ND (37)	ND (35)	**2,500**	**2,500**	**2,500**	**NA**
C_{11}-C_{22} Aromatic Hydrocarbons	ND (31)	ND (38)	ND (34)	ND (39)	ND (37)	ND (35)	**200**	**800**	**800**	**NA**
PAH by GC/MS-SIM by method 8270										
Naphthalene	**0.009 j**	**0.014**	**0.008 j**	**0.059**	**0.014**	**0.012**	**4**	**100**	**100**	**0.160**
2-Methylnaphthalene	ND (0.010)	ND (0.013)	ND (0.011)	**0.029**	ND (0.012)	ND (0.012)	**4**	**500**	**500**	**0.070**
Acenaphthylene	ND (0.010)	ND (0.013)	ND (0.011)	**0.025**	**0.011**	ND (0.012)	**100**	**100**	**100**	**0.044**
Acenaphthene	ND (0.010)	ND (0.013)	ND (0.011)	**0.089**	ND (0.012)	ND (0.012)	**20**	**1,000**	**1,000**	**0.016**
Fluorene	ND (0.010)	ND (0.013)	ND (0.011)	**0.130**	**0.011**	ND (0.012)	**400**	**1,000**	**1,000**	**0.019**
Phenanthrene	**0.006 j**	ND (0.013)	**0.041**	**0.790**	**0.160**	**0.072**	**700**	**1,000**	**100**	**0.240**
Anthracene	ND (0.010)	ND (0.013)	**0.009 j**	**0.220**	**0.025**	**0.012**	**1,000**	**1,000**	**1,000**	**0.085**
Fluoranthene	**0.010**	ND (0.013)	**0.060**	**1.0**	**0.310**	**0.160**	**1,000**	**1,000**	**1,000**	**0.600**
Pyrene	**0.009 j**	ND (0.013)	**0.048**	**0.740**	**0.300**	**0.130**	**700**	**700**	**700**	**0.665**
Benzo(a)anthracene	ND (0.010)	ND (0.013)	**0.021**	**0.410**	**0.110**	**0.060**	**0.7**	**0.7**	**0.7**	**0.261**
Chrysene	**0.006 j**	ND (0.013)	**0.025**	**0.390**	**0.130**	**0.079**	**7**	**7**	**7**	**0.384**
Benzo(b)fluoranthene	**0.006 j**	ND (0.013)	**0.022**	**0.350**	**0.110**	**0.064**	**0.7**	**0.7**	**0.7**	**NA**
Benzo(k)fluoranthene	ND (0.010)	ND (0.013)	**0.019**	**0.310**	**0.095**	**0.061**	**7**	**7**	**7**	**0.430**
Benzo(a)pyrene	ND (0.010)	ND (0.013)	**0.029**	**0.460**	**0.170**	**0.080**	**0.7**	**0.7**	**0.7**	**0.430**
Indeno(1,2,3-cd)pyrene	ND (0.010)	ND (0.013)	**0.016**	**0.240**	**0.097**	**0.042**	**0.7**	**0.7**	**0.7**	**NA**
Dibenzo(a,h)anthracene	ND (0.010)	ND (0.013)	ND (0.011)	**0.071**	**0.019**	**0.012**	**0.7**	**0.7**	**0.7**	**0.063**
Benzo(g,h,I)perylene	ND (0.010)	ND (0.013)	**0.020**	**0.250**	**0.120**	**0.046**	**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 Adminstration Effects Range Low.
7. NA: Not Available.

TABLE 13
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				
	W2A04-UIT-01	**W2A04-LIT-01**	**W2A04-UIT-02**	**W2A04-LIT-02**	**W2A04-UIT-03**	**W2A04-LIT-03**	**S-1 / GW-1**	**S-1 / GW-2**	**S-1 / GW-3**	**ERL**
EPH										
C_9-C_{18} Aliphatic Hydrocarbons	ND (34)	ND (31)	ND (32)	ND (35)	ND (34)	ND (34)	**1,000**	**1,000**	**1,000**	**NA**
C_{19}-C_{36} Aliphatic Hydrocarbons	ND (34)	ND (31)	ND (32)	ND (35)	ND (34)	ND (34)	**2,500**	**2,500**	**2,500**	**NA**
C_{11}-C_{22} Aromatic Hydrocarbons	ND (34)	ND (31)	ND (32)	ND (35)	ND (34)	ND (34)	**200**	**800**	**800**	**NA**
PAH by GC/MS-SIM by method 8270										
Naphthalene	**0.009 j**	**0.007 j**	**0.014**	**0.007 j**	**0.007 j**	**0.008 j**	**4**	**100**	**100**	**0.160**
2-Methylnaphthalene	ND (0.011)	ND (0.010)	ND (0.011)	ND (0.012)	ND (0.011)	ND (0.011)	**4**	**500**	**500**	**0.070**
Acenaphthylene	ND (0.011)	ND (0.010)	ND (0.011)	ND (0.012)	ND (0.011)	ND (0.011)	**100**	**100**	**100**	**0.044**
Acenaphthene	ND (0.011)	ND (0.010)	ND (0.011)	ND (0.012)	ND (0.011)	ND (0.011)	**20**	**1,000**	**1,000**	**0.016**
Fluorene	ND (0.011)	ND (0.010)	ND (0.011)	ND (0.012)	ND (0.011)	ND (0.011)	**400**	**1,000**	**1,000**	**0.019**
Phenanthrene	ND (0.011)	ND (0.010)	ND (0.011)	ND (0.012)	ND (0.011)	ND (0.011)	**700**	**1,000**	**100**	**0.240**
Anthracene	ND (0.011)	ND (0.010)	ND (0.011)	ND (0.012)	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 (0.012)	ND (0.011)	**0.016**	**1,000**	**1,000**	**1,000**	**0.600**
Pyrene	ND (0.011)	ND (0.010)	ND (0.011)	ND (0.012)	ND (0.011)	**0.022**	**700**	**700**	**700**	**0.665**
Benzo(a)anthracene	ND (0.011)	ND (0.010)	ND (0.011)	ND (0.012)	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 (0.012)	ND (0.011)	**0.012**	**7**	**7**	**7**	**0.384**
Benzo(b)fluoranthene	ND (0.011)	ND (0.010)	ND (0.011)	ND (0.012)	ND (0.011)	**0.010 j**	**0.7**	**0.7**	**0.7**	**NA**
Benzo(k)fluoranthene	ND (0.011)	ND (0.010)	ND (0.011)	ND (0.012)	ND (0.011)	**0.008 j**	**7**	**7**	**7**	**0.430**
Benzo(a)pyrene	ND (0.011)	ND (0.010)	ND (0.011)	ND (0.012)	ND (0.011)	**0.009 j**	**0.7**	**0.7**	**0.7**	**0.430**
Indeno(1,2,3-cd)pyrene	ND (0.011)	ND (0.010)	ND (0.011)	ND (0.012)	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 (0.012)	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 (0.012)	ND (0.011)	**0.006 j**	**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 Adminstration Effects Range Low.
7. NA: Not Available.

TABLE 13
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				
	W2A09-UIT-01	**W2A09-LIT-01**	**W2A09-UIT-02**	**W2A09-LIT-02**	**W2A09-UIT-03**	**W2A09-LIT-03**	**S-1 / GW-1**	**S-1 / GW-2**	**S-1 / GW-3**	**ERL**
EPH										
C_9-C_{18} Aliphatic Hydrocarbons	ND (33)	ND (31)	ND (33)	ND (34)	ND (32)	ND (40)	**1,000**	**1,000**	**1,000**	**NA**
C_{19}-C_{36} Aliphatic Hydrocarbons	ND (33)	ND (31)	ND (33)	ND (34)	ND (32)	ND (40)	**2,500**	**2,500**	**2,500**	**NA**
C_{11}-C_{22} Aromatic Hydrocarbons	ND (33)	ND (31)	ND (33)	ND (34)	ND (32)	ND (40)	**200**	**800**	**800**	**NA**
PAH by GC/MS-SIM by method 8270										
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.
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 Adminstration Effects Range Low.
7. NA: Not Available.

TABLE 13
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				
	W2A11-UIT-01	**W2A11-LIT-01**	**W2A11-UIT-02**	**W2A11-LIT-02**	**W2A11-UIT-03**	**W2A11-LIT-03**	**S-1 / GW-1**	**S-1 / GW-2**	**S-1 / GW-3**	**ERL**
EPH										
C_9-C_{18} Aliphatic Hydrocarbons	ND (33)	ND (35)	ND (30)	ND (36)	ND (35)	ND (35)	**1,000**	**1,000**	**1,000**	**NA**
C_{19}-C_{36} Aliphatic Hydrocarbons	ND (33)	ND (35)	ND (30)	ND (36)	ND (35)	ND (35)	**2,500**	**2,500**	**2,500**	**NA**
C_{11}-C_{22} Aromatic Hydrocarbons	ND (33)	ND (35)	ND (30)	ND (36)	ND (35)	ND (35)	**200**	**800**	**800**	**NA**
PAH by GC/MS-SIM by method 8270										
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.
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 Adminstration Effects Range Low.
7. NA: Not Available.

TABLE 13
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 Marsh Area	Sample Location 3 Marsh Area	MCP Method 1 Standards			NOAA Standards Marine Sediments
	W2A13-M-02	W2A13-M-03	S-1 / GW-1	S-1 / GW-2	S-1 / GW-3	ERL
EPH						
C_9-C_{18} Aliphatic Hydrocarbons	ND (94)	ND (40)	**1,000**	**1,000**	**1,000**	**NA**
C_{19}-C_{36} Aliphatic Hydrocarbons	ND (94)	ND (40)	**2,500**	**2,500**	**2,500**	**NA**
C_{11}-C_{22} Aromatic Hydrocarbons	**160**	ND (40)	**200**	**800**	**800**	**NA**
PAH by GC/MS-SIM by method 8270						
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 Adminstration Effects Range Low.
7. NA: Not Available.

TABLE 13
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				
	W2A14-M-01	**W2A14-UIT-02**	**W2A14-UIT-03**	**S-1 / GW-1**	**S-1 / GW-2**	**S-1 / GW-3**	**ERL**
EPH							
C_9-C_{18} Aliphatic Hydrocarbons	ND (31)	ND (30)	ND (31)	**1,000**	**1,000**	**1,000**	**NA**
C_{19}-C_{36} Aliphatic Hydrocarbons	ND (31)	ND (30)	ND (31)	**2,500**	**2,500**	**2,500**	**NA**
C_{11}-C_{22} Aromatic Hydrocarbons	ND (31)	ND (30)	ND (31)	**200**	**800**	**800**	**NA**
PAH by GC/MS-SIM by method 8270							
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 Adminstration Effects Range Low.
7. NA: Not Available.

TABLE 13
SUMMARY OF SEDIMENT ANALYTICAL RESULTS FOR PHASE I CHARACTERIZATION
BUZZARDS BAY, MASSACHUSETTS
SEGMENT: W2A-15
West Island North, Fairhaven
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				
	W2A15-UIT-01	**W2A15-UIT-02**	**W2A15-UIT-03**	**W2A15-LIT-03**	**S-1 / GW-1**	**S-1 / GW-2**	**S-1 / GW-3**	**ERL**
EPH								
C_9-C_{18} Aliphatic Hydrocarbons	ND (34)	ND (40)	ND (35)	ND (33)	**1,000**	**1,000**	**1,000**	**NA**
C_{19}-C_{36} Aliphatic Hydrocarbons	ND (34)	ND (40)	ND (35)	ND (33)	**2,500**	**2,500**	**2,500**	**NA**
C_{11}-C_{22} Aromatic Hydrocarbons	ND (34)	ND (40)	ND (35)	ND (33)	**200**	**800**	**800**	**NA**
PAH by GC/MS-SIM by method 8270								
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.
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 Adminstration Effects Range Low.
7. NA: Not Available.

TABLE 13
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				
	W2B01-UIT-01	**W2B01-LIT-01**	**W2B01-UIT-02**	**W2B01-LIT-02**	**W2B01-UIT-03**	**W2B01-LIT-03**	**S-1 / GW-1**	**S-1 / GW-2**	**S-1 / GW-3**	**ERL**
EPH										
C_9-C_{18} Aliphatic Hydrocarbons	ND(31)	ND(35)	ND(32)	ND(37)	ND(33)	ND(34)	**1,000**	**1,000**	**1,000**	**NA**
C_{19}-C_{36} Aliphatic Hydrocarbons	ND(31)	ND(35)	ND(32)	ND(37)	ND(33)	ND(34)	**2,500**	**2,500**	**2,500**	**NA**
C_{11}-C_{22} Aromatic Hydrocarbons	ND(31)	ND(35)	ND(32)	ND(37)	ND(33)	ND(34)	**200**	**800**	**800**	**NA**
PAH by GC/MS-SIM by method 8270										
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.
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 Adminstration Effects Range Low.
7. NA: Not Available.

TABLE 13
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				
	W2B04-UIT-01	**W2B04-LIT-01**	**W2B04-UIT-02**	**W2B04-LIT-02**	**W2B04-UIT-03**	**W2B04-LIT-03**	**S-1 / GW-1**	**S-1 / GW-2**	**S-1 / GW-3**	**ERL**
EPH										
C_9-C_{18} Aliphatic Hydrocarbons	ND(35)	ND(35)	ND(35)	ND(33)	ND(30)	ND(31)	**1,000**	**1,000**	**1,000**	**NA**
C_{19}-C_{36} Aliphatic Hydrocarbons	ND(35)	ND(35)	ND(35)	ND(33)	ND(30)	ND(31)	**2,500**	**2,500**	**2,500**	**NA**
C_{11}-C_{22} Aromatic Hydrocarbons	ND(35)	ND(35)	ND(35)	ND(33)	ND(30)	ND(31)	**200**	**800**	**800**	**NA**
PAH by GC/MS-SIM by method 8270										
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)	**0.008 j**	**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 Adminstration Effects Range Low.
7. NA: Not Available.

TABLE 13
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				
	W3A02-UIT-01	**W3A02-LIT-01**	**W3A02-UIT-02**	**W3A02-LIT-02**	**W3A02-UIT-03**	**W3A02-LIT-03**	**S-1 / GW-1**	**S-1 / GW-2**	**S-1 / GW-3**	**ERL**
EPH										
C_9-C_{18} Aliphatic Hydrocarbons	ND (32)	ND (30)	ND (31)	ND (30)	ND (33)	ND (31)	**1,000**	**1,000**	**1,000**	**NA**
C_{19}-C_{36} Aliphatic Hydrocarbons	ND (32)	ND (30)	ND (31)	ND (30)	ND (33)	ND (31)	**2,500**	**2,500**	**2,500**	**NA**
C_{11}-C_{22} Aromatic Hydrocarbons	ND (32)	ND (30)	ND (31)	ND (30)	ND (33)	ND (31)	**200**	**800**	**800**	**NA**
PAH by GC/MS-SIM by method 8270										
Naphthalene	**0.006 j**	**0.006 j**	**0.006 j**	**0.007 j**	**0.007 j**	**0.006 j**	**4**	**100**	**100**	**0.160**
2-Methylnaphthalene	ND (0.011)	ND (0.010)	ND (0.010)	ND (0.010)	ND (0.011)	ND (0.010)	**4**	**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**	**100**	**0.044**
Acenaphthene	ND (0.011)	ND (0.010)	ND (0.010)	ND (0.010)	ND (0.011)	ND (0.010)	**20**	**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)	**400**	**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)	**700**	**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**	**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**	**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**	**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**	**0.7**	**0.261**
Chrysene	ND (0.011)	ND (0.010)	ND (0.010)	ND (0.010)	ND (0.011)	ND (0.010)	**7**	**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**	**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**	**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**	**0.7**	**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**	**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**	**0.7**	**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**	**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 Adminstration Effects Range Low.
7. NA: Not Available.

TABLE 13
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				
	W3A03-UIT-02	**W3A03-LIT-02**	**W3A03-UIT-03**	**W3A03-LIT-03**	**S-1 / GW-1**	**S-1 / GW-2**	**S-1 / GW-3**	**ERL**
EPH								
C_9-C_{18} Aliphatic Hydrocarbons	ND (38)	ND (37)	ND (31)	ND (30)	**1,000**	**1,000**	**1,000**	**NA**
C_{19}-C_{36} Aliphatic Hydrocarbons	ND (38)	ND (37)	ND (31)	ND (30)	**2,500**	**2,500**	**2,500**	**NA**
C_{11}-C_{22} Aromatic Hydrocarbons	ND (38)	ND (37)	ND (31)	ND (30)	**200**	**800**	**800**	**NA**
PAH by GC/MS-SIM by method 8270								
Naphthalene	**0.008 j**	**0.007 j**	**0.006 j**	**0.008 j**	**4**	**100**	**100**	**0.160**
2-Methylnaphthalene	ND (0.013)	ND (0.012)	ND (0.010)	ND (0.010)	**4**	**500**	**500**	**0.070**
Acenaphthylene	ND (0.013)	ND (0.012)	ND (0.010)	ND (0.010)	**100**	**100**	**100**	**0.044**
Acenaphthene	ND (0.013)	ND (0.012)	ND (0.010)	ND (0.010)	**20**	**1,000**	**1,000**	**0.016**
Fluorene	ND (0.013)	ND (0.012)	ND (0.010)	ND (0.010)	**400**	**1,000**	**1,000**	**0.019**
Phenanthrene	ND (0.013)	ND (0.012)	ND (0.010)	**0.006 j**	**700**	**1,000**	**100**	**0.240**
Anthracene	ND (0.013)	ND (0.012)	ND (0.010)	ND (0.010)	**1,000**	**1,000**	**1,000**	**0.085**
Fluoranthene	ND (0.013)	ND (0.012)	ND (0.010)	**0.010**	**1,000**	**1,000**	**1,000**	**0.600**
Pyrene	ND (0.013)	ND (0.012)	ND (0.010)	**0.008 j**	**700**	**700**	**700**	**0.665**
Benzo(a)anthracene	ND (0.013)	ND (0.012)	ND (0.010)	ND (0.010)	**0.7**	**0.7**	**0.7**	**0.261**
Chrysene	ND (0.013)	ND (0.012)	ND (0.010)	**0.006 j**	**7**	**7**	**7**	**0.384**
Benzo(b)fluoranthene	ND (0.013)	ND (0.012)	ND (0.010)	**0.005 j**	**0.7**	**0.7**	**0.7**	**NA**
Benzo(k)fluoranthene	ND (0.013)	ND (0.012)	ND (0.010)	ND (0.010)	**7**	**7**	**7**	**0.430**
Benzo(a)pyrene	ND (0.013)	ND (0.012)	ND (0.010)	ND (0.010)	**0.7**	**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**	**0.7**	**NA**
Dibenzo(a,h)anthracene	ND (0.013)	ND (0.012)	ND (0.010)	ND (0.010)	**0.7**	**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**	**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 Adminstration Effects Range Low.
7. NA: Not Available.

TABLE 13
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
	Upper Intertidal Zone	Lower Intertidal Zone	Upper Intertidal Zone	Lower Intertidal Zone	Upper Intertidal Zone	Lower Intertidal Zone				
	W3C01-UIT-01	**W3C01-LIT-01**	**W3C01-UIT-02**	**W3C01-LIT-02**	**W3C01-UIT-03**	**W3C01-LIT-03**	**S-1 / GW-1**	**S-1 / GW-2**	**S-1 / GW-3**	**ERL**
EPH										
C_9-C_{18} Aliphatic Hydrocarbons	ND(33)	ND(36)	ND(34)	ND(37)	ND(32)	ND(38)	**1,000**	**1,000**	**1,000**	**NA**
C_{19}-C_{36} Aliphatic Hydrocarbons	ND(33)	ND(36)	ND(34)	ND(37)	ND(32)	ND(38)	**2,500**	**2,500**	**2,500**	**NA**
C_{11}-C_{22} Aromatic Hydrocarbons	ND(33)	ND(36)	ND(34)	ND(37)	ND(32)	ND(38)	**200**	**800**	**800**	**NA**
PAH by GC/MS-SIM by method 8270										
Naphthalene	**0.009 j**	**0.011 j**	**0.010 j**	**0.011 j**	**0.010 j**	**0.013**	**4**	**100**	**100**	**0.160**
2-Methylnaphthalene	ND (0.011)	**0.009 j**	**0.008 j**	**0.007 j**	**0.0006 j**	**0.009 j**	**4**	**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**	**100**	**0.044**
Acenaphthene	ND (0.011)	ND (0.012)	ND (0.011)	ND (0.012)	ND (0.011)	ND (0.013)	**20**	**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)	**400**	**1,000**	**1,000**	**0.019**
Phenanthrene	**0.010 j**	ND (0.012)	ND (0.011)	ND (0.012)	ND (0.011)	ND (0.013)	**700**	**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**	**1,000**	**0.085**
Fluoranthene	**0.007 j**	ND (0.012)	ND (0.011)	ND (0.012)	ND (0.011)	ND (0.013)	**1,000**	**1,000**	**1,000**	**0.600**
Pyrene	**0.006 j**	ND (0.012)	ND (0.011)	ND (0.012)	ND (0.011)	ND (0.013)	**700**	**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**	**0.7**	**0.261**
Chrysene	ND (0.011)	ND (0.012)	ND (0.011)	ND (0.012)	ND (0.011)	ND (0.013)	**7**	**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**	**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**	**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**	**0.7**	**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**	**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**	**0.7**	**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**	**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 Adminstration Effects Range Low.
7. NA: Not Available.

TABLE 13
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 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				
	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**	**S-1 / GW-1**	**S-1 / GW-2**	**S-1 / GW-3**	**ERL**
EPH													
C_9-C_{18} Aliphatic Hydrocarbons	ND (32)	ND (30)	ND (31)	ND (33)	ND (31)	ND (31)	ND (31)	ND (31)	ND (31)	**1,000**	**1,000**	**1,000**	**NA**
C_{19}-C_{36} Aliphatic Hydrocarbons	ND (32)	ND (30)	ND (31)	ND (33)	ND (31)	ND (31)	ND (31)	ND (31)	ND (31)	**2,500**	**2,500**	**2,500**	**NA**
C_{11}-C_{22} Aromatic Hydrocarbons	ND (32)	ND (30)	ND (31)	ND (33)	ND (31)	ND (31)	ND (31)	NA	ND (31)	**200**	**800**	**800**	**NA**
PAH by GC/MS-SIM by method 8270													
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**	**4**	**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)	**4**	**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**	**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)	**20**	**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)	**400**	**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)	**700**	**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**	**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**	**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**	**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**	**0.7**	**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**	**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**	**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**	**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**	**0.7**	**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**	**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**	**0.7**	**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**	**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 Adminstration Effects Range Low.
7. NA: Not Available.

TABLE 13
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
	Marsh Area	Marsh Area	Marsh Area				
	W3C06-M-01	**W3C06-M-02**	**W3C06-M-03**	**S-1 / GW-1**	**S-1 / GW-2**	**S-1 / GW-3**	**ERL**
EPH							
C_9-C_{18} Aliphatic Hydrocarbons	ND(48)	ND(35)	ND(44)	**1,000**	**1,000**	**1,000**	**NA**
C_{19}-C_{36} Aliphatic Hydrocarbons	ND(48)	ND(35)	ND(44)	**2,500**	**2,500**	**2,500**	**NA**
C_{11}-C_{22} Aromatic Hydrocarbons	ND(48)	ND(35)	ND(44)	**200**	**800**	**800**	**NA**
PAH by GC/MS-SIM by method 8270							
Naphthalene	**0.018**	**0.011 j**	**0.018**	**4**	**100**	**100**	**0.160**
2-Methylnaphthalene	**0.012 j**	**0.007 j**	**0.013 j**	**4**	**500**	**500**	**0.070**
Acenaphthylene	ND(0.016)	ND (0.012)	ND (0.015)	**100**	**100**	**100**	**0.044**
Acenaphthene	ND(0.016)	ND (0.012)	ND (0.015)	**20**	**1,000**	**1,000**	**0.016**
Fluorene	ND(0.016)	ND (0.012)	ND (0.015)	**400**	**1,000**	**1,000**	**0.019**
Phenanthrene	**0.036**	ND (0.012)	**0.034**	**700**	**1,000**	**100**	**0.240**
Anthracene	**0.010 j**	ND (0.012)	ND (0.015)	**1,000**	**1,000**	**1,000**	**0.085**
Fluoranthene	**0.059**	ND (0.012)	**0.08**	**1,000**	**1,000**	**1,000**	**0.600**
Pyrene	**0.054**	ND (0.012)	**0.067**	**700**	**700**	**700**	**0.665**
Benzo(a)anthracene	**0.023**	ND (0.012)	**0.028**	**0.7**	**0.7**	**0.7**	**0.261**
Chrysene	**0.031**	ND (0.012)	**0.040**	**7**	**7**	**7**	**0.384**
Benzo(b)fluoranthene	**0.027**	ND (0.012)	**0.039**	**0.7**	**0.7**	**0.7**	**NA**
Benzo(k)fluoranthene	**0.021**	ND (0.012)	**0.035**	**7**	**7**	**7**	**0.430**
Benzo(a)pyrene	**0.031**	ND (0.012)	**0.041**	**0.7**	**0.7**	**0.7**	**0.430**
Indeno(1,2,3-cd)pyrene	**0.020**	ND (0.012)	**0.029**	**0.7**	**0.7**	**0.7**	**NA**
Dibenzo(a,h)anthracene	ND (0.016)	ND (0.012)	ND (0.015)	**0.7**	**0.7**	**0.7**	**0.063**
Benzo(g,h,I)perylene	**0.022**	ND (0.012)	**0.032**	**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 Adminstration Effects Range Low.
7. NA: Not Available.

TABLE 13
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				
	W3D03-UIT-01	**W3D03-LIT-01**	**W3D03-UIT-02**	**W3D03-LIT-02**	**W3D03-UIT-03**	**W3D03-LIT-03**	**S-1 / GW-1**	**S-1 / GW-2**	**S-1 / GW-3**	**ERL**
EPH										
C_9-C_{18} Aliphatic Hydrocarbons	ND (35)	ND (34)	ND (33)	ND (38)	ND (34)	ND (36)	**1,000**	**1,000**	**1,000**	**NA**
C_{19}-C_{36} Aliphatic Hydrocarbons	ND (35)	ND (34)	ND (33)	ND (38)	ND (34)	ND (36)	**2,500**	**2,500**	**2,500**	**NA**
C_{11}-C_{22} Aromatic Hydrocarbons	ND (35)	ND (34)	ND (33)	ND (38)	ND (34)	ND (36)	**200**	**800**	**800**	**NA**
PAH by GC/MS-SIM by method 8270										
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.
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 Adminstration Effects Range Low.
7. NA: Not Available.

TABLE 13
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				
	W3D04-UIT-01	**W3D04-LIT-01**	**W3D04-UIT-02**	**W3D04-LIT-02**	**W3D04-UIT-03**	**W3D04-LIT-03**	**S-1 / GW-1**	**S-1 / GW-2**	**S-1 / GW-3**	**ERL**
EPH										
C_9-C_{18} Aliphatic Hydrocarbons	ND (30)	ND (35)	ND (33)	ND (37)	ND (37)	ND (38)	**1,000**	**1,000**	**1,000**	**NA**
C_{19}-C_{36} Aliphatic Hydrocarbons	ND (30)	ND (35)	ND (33)	ND (37)	ND (37)	ND (38)	**2,500**	**2,500**	**2,500**	**NA**
C_{11}-C_{22} Aromatic Hydrocarbons	ND (30)	ND (35)	ND (33)	ND (37)	ND (37)	ND (38)	**200**	**800**	**800**	**NA**
PAH by GC/MS-SIM by method 8270										
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.
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 Adminstration Effects Range Low.
7. NA: Not Available.

TABLE 14
ANALYSIS OF ARCHIVED INTERTIDAL SEDIMENT GRAB SAMPLES
BUZZARDS BAY, MASSACHUSETTS
SEGMENT: WIE-06
Town Beach, Mattapoisett
Sampling Date: 10/23/04
OILING CATEGORY: MODERATE

Analyte	Sample Location			MCP Method 1 Standards			NOAA Standards Marine Sediments
	Upper Intertidal Zone	Upper Intertidal Zone	Upper Intertidal Zone				
	W1E06-UIT-03-A	**W1E06-UIT-03-B**	**W1E06-UIT-03-C**	**S-1 / GW-1**	**S-1 / GW-2**	**S-1 / GW-3**	**ERL**
EPH							
C_9-C_{18} Aliphatic Hydrocarbons	ND (33)	ND (34)	ND (34)	**1,000**	**1,000**	**1,000**	**NA**
C_{19}-C_{36} Aliphatic Hydrocarbons	ND (33)	ND (34)	ND (34)	**2,500**	**2,500**	**2,500**	**NA**
C_{11}-C_{22} Aromatic Hydrocarbons	ND (33)	ND (34)	ND (34)	**200**	**800**	**800**	**NA**
PAH by GC/MS-SIM by method 8270							
Naphthalene	**0.013**	**0.026**	**0.005 j**	**4**	**100**	**100**	**0.160**
2-Methylnaphthalene	**0.017**	**0.015**	**0.007 j**	**4**	**500**	**500**	**0.070**
Acenaphthylene	**0.015**	**0.007 j**	ND (0.011)	**100**	**100**	**100**	**0.044**
Acenaphthene	**0.042**	ND (0.011)	ND (0.011)	**20**	**1,000**	**1,000**	**0.016**
Fluorene	**0.072**	**0.007 j**	ND (0.011)	**400**	**1,000**	**1,000**	**0.019**
Phenanthrene	**0.450**	**0.035**	**0.033**	**700**	**1,000**	**100**	**0.240**
Anthracene	**0.160**	**0.010 j**	**0.010 j**	**1,000**	**1,000**	**1,000**	**0.085**
Fluoranthene	**0.540**	**0.041**	**0.069**	**1,000**	**1,000**	**1,000**	**0.600**
Pyrene	**0.400**	**0.035**	**0.056**	**700**	**700**	**700**	**0.665**
Benzo(a)anthracene	**0.210**	**0.021**	**0.033**	**0.7**	**0.7**	**0.7**	**0.261**
Chrysene	**0.180**	**0.021**	**0.034**	**7**	**7**	**7**	**0.384**
Benzo(b)fluoranthene	**0.270**	**0.029**	**0.050**	**0.7**	**0.7**	**0.7**	**NA**
Benzo(k)fluoranthene	**0.089**	**0.011**	**0.019**	**7**	**7**	**7**	**0.430**
Benzo(a)pyrene	**0.220**	**0.021**	**0.038**	**0.7**	**0.7**	**0.7**	**0.430**
Indeno(1,2,3-cd)pyrene	**0.072**	**0.009 j**	**0.016**	**0.7**	**0.7**	**0.7**	**NA**
Dibenzo(a,h)anthracene	**0.016**	ND (0.011)	ND (0.011)	**0.7**	**0.7**	**0.7**	**0.063**
Benzo(g,h,I)perylene	**0.053**	**0.007 j**	**0.012**	**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 Adminstration Effects Range Low.
7. NA: Not Available.

TABLE 14
ANALYSIS OF ARCHIVED INTERTIDAL SEDIMENT GRAB SAMPLES
BUZZARDS BAY, MASSACHUSETTS
SEGMENT: W2A-03
Pope's Beach, Fairhaven
Sampling Date: 10/23/04
OILING CATEGORY: MODERATE

Analyte	Sample Location			MCP Method 1 Standards			NOAA Standards Marine Sediments
	Lower Intertidal Zone	Lower Intertidal Zone	Lower Intertidal Zone				
	W2A03-LIT-02-A	**W2A03-LIT-02-B**	**W2A03-LIT-02-C**	**S-1 / GW-1**	**S-1 / GW-2**	**S-1 / GW-3**	**ERL**
EPH							
C_9-C_{18} Aliphatic Hydrocarbons	ND (34)	ND (35)	ND (35)	**1,000**	**1,000**	**1,000**	**NA**
C_{19}-C_{36} Aliphatic Hydrocarbons	ND (34)	ND (35)	ND (35)	**2,500**	**2,500**	**2,500**	**NA**
C_{11}-C_{22} Aromatic Hydrocarbons	ND (34)	ND (35)	ND (35)	**200**	**800**	**800**	**NA**
PAH by GC/MS-SIM by method 8270							
Naphthalene	**0.006 j**	**0.030**	**0.110**	**4**	**100**	**100**	**0.160**
2-Methylnaphthalene	**0.010 j**	**0.010 j**	**0.028**	**4**	**500**	**500**	**0.070**
Acenaphthylene	ND(0.011)	**0.006 j**	**0.006 j**	**100**	**100**	**100**	**0.044**
Acenaphthene	**0.006 j**	ND (0.011)	ND (0.012)	**20**	**1,000**	**1,000**	**0.016**
Fluorene	**0.007 j**	**0.007 j**	**0.005 j**	**400**	**1,000**	**1,000**	**0.019**
Phenanthrene	**0.061**	**0.060**	**0.043**	**700**	**1,000**	**100**	**0.240**
Anthracene	**0.018**	**0.017**	**0.010 j**	**1,000**	**1,000**	**1,000**	**0.085**
Fluoranthene	**0.091**	**0.110**	**0.080**	**1,000**	**1,000**	**1,000**	**0.600**
Pyrene	**0.083**	**0.090**	**0.072**	**700**	**700**	**700**	**0.665**
Benzo(a)anthracene	**0.044**	**0.043**	**0.039**	**0.7**	**0.7**	**0.7**	**0.261**
Chrysene	**0.045**	**0.042**	**0.036**	**7**	**7**	**7**	**0.384**
Benzo(b)fluoranthene	**0.048**	**0.060**	**0.057**	**0.7**	**0.7**	**0.7**	**NA**
Benzo(k)fluoranthene	**0.017**	**0.020**	**0.017**	**7**	**7**	**7**	**0.430**
Benzo(a)pyrene	**0.044**	**0.046**	**0.048**	**0.7**	**0.7**	**0.7**	**0.430**
Indeno(1,2,3-cd)pyrene	**0.025**	**0.180**	**0.013**	**0.7**	**0.7**	**0.7**	**NA**
Dibenzo(a,h)anthracene	**0.006 j**	ND (0.011)	ND (0.012)	**0.7**	**0.7**	**0.7**	**0.063**
Benzo(g,h,I)perylene	**0.024**	**0.014**	**0.011 j**	**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 Adminstration Effects Range Low.
7. NA: Not Available.

TABLE 15
MARSH SEDIMENT DATA SUMMARY AND SCREENING
B120 RELEASE
BUZZARDS BAY, MASSACHUSETTS
Sampling Date: 8/24-26/04

Analyte	W2A02-MS01	W2A02-MS02	W2A05-MS01	W2A05-MS02	W1F04-S01	W1C02-MS01	WIF05-MS01	W2A14-MS01	MCP Method 1 Standards S-1 / GW-1	MCP Method 1 Standards S-1 / GW-2	MCP Method 1 Standards S-1 / GW-3	NOAA Effects Range-Low for Marine Sediments (ERL)
EPH	**GAI**	**GAI**	**GAI**	**GAI**	**GAI**	**GAI**	**GAI**	**GAI**				
C_9-C_{18} Aliphatic Hydrocarbons	ND(51)	ND(50)	ND(38)	ND(43)	ND(45)	ND(47)	ND(59)	ND(41)	**1,000**	**1,000**	**1,000**	**NA**
C_{19}-C_{36} Aliphatic Hydrocarbons	ND(51)	**64**	ND(38)	ND(43)	ND(45)	ND(47)	ND(59)	ND(41)	**2,500**	**2,500**	**2,500**	**NA**
C_{11}-C_{22} Aromatic Hydrocarbons	ND(51)	**77**	ND(38)	ND(43)	ND(45)	ND(47)	ND(59)	ND(41)	**200**	**800**	**800**	**NA**
PAH by GC/MS-SIM by method 8270												
Naphthalene	ND(0.017)	**0.013 j**	ND(0.013)	ND(0.014)	ND(0.015)	**0.006 j**	ND(0.020)	ND(0.013)	**4**	**100**	**100**	**0.160**
2-Methylnaphthalene	ND(0.017)	ND(0.017)	ND(0.013)	ND(0.014)	ND(0.015)	**0.006 j**	ND(0.020)	ND(0.013)	**4**	**500**	**500**	**0.070**
Acenaphthylene	ND(0.017)	**0.021**	ND(0.013)	ND(0.014)	ND(0.015)	ND(0.016)	ND(0.020)	ND(0.013)	**100**	**100**	**100**	**0.044**
Acenaphthene	**0.018**	**0.012 j**	ND(0.013)	ND(0.014)	ND(0.015)	ND(0.016)	ND(0.020)	ND(0.013)	**20**	**1,000**	**1,000**	**0.016**
Fluorene	**0.034**	**0.023**	ND(0.013)	ND(0.014)	ND(0.015)	ND(0.016)	ND(0.020)	ND(0.013)	**400**	**1,000**	**1,000**	**0.019**
Phenanthrene	**0.42**	**0.32**	**0.021**	**0.007 j**	ND(0.015)	**0.006 j**	**0.009 j**	ND(0.013)	**700**	**1,000**	**100**	**0.240**
Anthracene	**0.055**	**0.08**	**0.007 j**	ND(0.014)	ND(0.015)	ND(0.016)	ND(0.020)	ND(0.013)	**1,000**	**1,000**	**1,000**	**0.085**
Fluoranthene	**0.46**	**0.64**	**0.052**	**0.021**	ND(0.015)	**0.014 j**	**0.02**	**0.014**	**1,000**	**1,000**	**1,000**	**0.600**
Pyrene	**0.46**	**0.45**	**0.042**	**0.021**	ND(0.015)	**0.008 j**	**0.010 j**	**0.014**	**700**	**700**	**700**	**0.665**
Benzo(a)anthracene	**0.23**	**0.23**	**0.021**	**0.016**	ND(0.015)	ND(0.016)	**0.009 j**	**0.006 j**	**0.7**	**0.7**	**0.7**	**0.261**
Chrysene	**0.25**	**0.33**	**0.021**	**0.018**	ND(0.015)	**0.006 j**	**0.011 j**	**0.006 j**	**7**	**7**	**7**	**0.384**
Benzo(b)fluoranthene	**0.11**	**0.23**	**0.015**	**0.012**	ND(0.015)	**0.006 j**	**0.011 j**	**0.005 j**	**0.7**	**0.7**	**0.7**	**NA**
Benzo(k)fluoranthene	**0.11**	**0.21**	**0.017**	**0.016**	ND(0.015)	**0.005 j**	ND(0.020)	**0.005 j**	**7**	**7**	**7**	**NA**
Benzo(a)pyrene	**0.18**	**0.34**	**0.021**	**0.022**	ND(0.015)	**0.005 j**	ND(0.020)	**0.006 j**	**0.7**	**0.7**	**0.7**	**0.430**
Indeno(1,2,3-cd)pyrene	**0.064**	**0.081**	**0.007 j**	**0.007 j**	ND(0.015)	ND(0.016)	ND(0.020)	ND(0.013)	**0.7**	**0.7**	**0.7**	**NA**
Dibenzo(a,h)anthracene	**0.015 j**	**0.029**	ND(0.013)	ND(0.014)	ND(0.015)	ND(0.016)	ND(0.020)	ND(0.013)	**0.7**	**0.7**	**0.7**	**0.063**
Benzo(g,h,I)perylene	**0.068**	**0.095**	**0.007 j**	**0.007 j**	ND(0.015)	ND(0.016)	ND(0.020)	ND(0.013)	**1,000**	**1,000**	**1,000**	**NA**
Total PAH	**2.459**	**3.079**	**0.21**	**0.147**	NA	**0.052**	**0.07**	**0.028**	**NA**	**NA**	**NA**	**4**

NOTES:

1. Results in milligrams per kilogram (mg/kg).
2. GAI = Analysis conducted by Groundwater Analytical, Inc.
3. EPH: Extractable Petroleum Hydrocarbons.
4. ND(x) = constituent not detected at practical quantitation limits noted in parentheses.
5. PAH by GC/MS-SIM: Polyaromatic Hydrocarbons with Selected Ion Monitoring.
6. j: estimated concentration/ detected below standard laboratory reporting limits.
7. NA: Not Analyzed or Not Available.
8. Shaded cells exceed applicable standards.

TABLE 16
MARSH CORE DATA SUMMARY AND SCREENING
B120 RELEASE
BUZZARDS BAY, MASSACHUSETTS
Sampling Date: 8/24/04

Analyte	W2A10-C01	W2A10-C02	W2A10-C03	W2A10-C04	W1E-01-C05	MCP Method 1 Standards S-1 / GW-1	MCP Method 1 Standards S-1 / GW-2	MCP Method 1 Standards S-1 / GW-3	NOAA Standards Marine Sediments ERL
EPH by GC/FID (mg/kg)	**GAI**	**GAI**	**GAI**	**GAI**	**GAI**				
C_9-C_{18} Aliphatic Hydrocarbons	ND(43)	ND(140)	ND(45)	ND(39)	ND(73)	**1,000**	**1,000**	**1,000**	**NA**
C_{19}-C_{36} Aliphatic Hydrocarbons	110	ND(140)	ND(45)	ND(39)	ND(73)	**2,500**	**2,500**	**2,500**	**NA**
C_{11}-C_{22} Aromatic Hydrocarbons	180	ND(140)	ND(45)	ND(39)	ND(73)	**200**	**800**	**800**	**NA**
PAH by GC/MS-SIM by method 8270 (mg/kg)									
Naphthalene	ND(0.014)	ND(0.046) m*	ND(0.015)	ND(0.013)	ND(0.025)	**4**	**100**	**100**	**0.160**
2-Methylnaphthalene	**0.037**	**0.022 j**	ND(0.015)	**0.008 j**	**0.008 j**	**4**	**500**	**500**	**0.070**
Acenaphthylene	ND(0.014)	ND(0.046)	ND(0.015)	ND(0.013)	ND(0.025)	**100**	**100**	**100**	**0.044**
Acenaphthene	**0.014**	ND(0.046)	ND(0.015)	ND(0.013)	ND(0.025)	**20**	**1,000**	**1,000**	**0.016**
Fluorene	**0.026**	ND(0.046)	ND(0.015)	ND(0.013)	ND(0.025)	**400**	**1,000**	**1,000**	**0.019**
Phenanthrene	**0.120**	ND(0.046)	ND(0.015)	**0.005 j**	**0.0012 j**	**700**	**1,000**	**100**	**0.240**
Anthracene	**0.021**	ND(0.046)	ND(0.015)	ND(0.013)	ND(0.025)	**1,000**	**1,000**	**1,000**	**0.085**
Fluoranthene	**0.043**	ND(0.046)	ND(0.015)	ND(0.013)	**0.017 j**	**1,000**	**1,000**	**1,000**	**0.600**
Pyrene	**0.170**	ND(0.046)	ND(0.015)	ND(0.013)	**0.017 j**	**700**	**700**	**700**	**0.665**
Benzo(a)anthracene	**0.098**	ND(0.046)	ND(0.015)	ND(0.013)	**0.006 j**	**0.7**	**0.7**	**0.7**	**0.261**
Chrysene	**0.130**	ND(0.046)	ND(0.015)	ND(0.013)	**0.006 j**	**7**	**7**	**7**	**0.384**
Benzo(b)fluoranthene	**0.070**	ND(0.046)	ND(0.015)	ND(0.013)	**0.012 j**	**0.7**	**0.7**	**0.7**	**NA**
Benzo(k)fluoranthene	**0.014**	ND(0.046)	ND(0.015)	ND(0.013)	ND(0.025)	**7**	**7**	**7**	**NA**
Benzo(a)pyrene	**0.093**	ND(0.046)	ND(0.015)	ND(0.013)	**0.008 j**	**0.7**	**0.7**	**0.7**	**0.430**
Indeno(1,2,3-cd)pyrene	**0.012 j**	ND(0.046)	ND(0.015)	ND(0.013)	**0.008 j**	**0.7**	**0.7**	**0.7**	**NA**
Dibenzo(a,h)anthracene	**0.012 j**	ND(0.046)	ND(0.015)	ND(0.013)	ND(0.025)	**0.7**	**0.7**	**0.7**	**0.063**
Benzo(g,h,I)perylene	**0.015**	ND(0.046)	ND(0.015)	ND(0.013)	**0.006 j**	**1,000**	**1,000**	**1,000**	**NA**
Total PAH	**0.875**	**0.022**	NA	**0.013**	**0.0892**	**NA**	**NA**	**NA**	**4**

NOTES:

1. Results in milligrams per kilogram (mg/kg).
2. GAI = Analysis conducted by Groundwater Analytical, Inc.
3. EPH: Extractable Petroleum Hydrocarbons.
4. ND(x) = constituent not detected at practical quantitation limits noted in parentheses.
5. PAH by GC/MS-SIM: Polyaromatic Hydrocarbons with Selected Ion Monitoring.
6. j: estimated concentration/ detected below standard laboratory reporting limits.
7. NA: Not Analyzed or Not Available.
8. Shaded cells exceed applicable standards.
9. m: Surrogate recovery outside recommeded limits due to sample matrix interference.
10. *: Sample was analyzed twice. During the second run, concentration was reported at 0.009 j

TABLE 17
LEISURE SHORES/HOWARD'S BEACH (W1F-02) SEDIMENT DATA SUMMARY AND SCREENING
BUZZARDS BAY, MASSACHUSETTS
SEGMENT: W1F-02
BRANDT ISLAND WEST, MATTAPOISETT

													MCP Method 1 Standards			NOAA Effects Range- Low for Marine Sediments (ERL)
Analyte	**LS-OS-S01**	**LS-OS-S02**	**HB-SED-01**	**HB-SED-02**	**HB-SED-03**	**HB-SED-04**	**HB-SED-05**	**HB-SED-06**	**HB-SED-07**	**HB-SED-08**	**HB-SED-09**	**HB-DUP-01**	**S-1 / GW-1**	**S-1 / GW-2**	**S-1 / GW-3**	
Sample Date	8/31/2004	8/31/2004	12/9/2004	12/9/2004	12/9/2004	12/9/2004	12/9/2004	12/9/2004	12/9/2004	12/9/2004	12/9/2004	12/9/2004				
EPH	*GAI*	*GAI*	*GAI*	*GAI*	*GAI*	*GAI*	*GAI*	*GAI*	*GAI*	*GAI*	*GAI*	*GAI*				
C_9-C_{18} Aliphatic Hydrocarbons	NA	NA	ND(33)	ND(34)	ND(34)	ND(34)	ND(33)	ND(33)	ND(34)	ND(35)	ND(35)	ND(51)	**1,000**	**1,000**	**1,000**	**NA**
C_{19}-C_{36} Aliphatic Hydrocarbons	NA	NA	ND(33)	ND(34)	ND(34)	ND(34)	ND(33)	ND(33)	ND(34)	ND(35)	ND(35)	ND(51)	**2,500**	**2,500**	**2,500**	**NA**
C_{11}-C_{22} Aromatic Hydrocarbons	NA	NA	ND(33)	ND(34)	ND(34)	ND(34)	ND(33)	ND(33)	ND(34)	ND(35)	ND(35)	ND(51)	**200**	**800**	**800**	**NA**
PAH (ppm)	*B&B*	*B&B*	*B&B*	*B&B*	*B&B*	*B&B*	*B&B*	*B&B*	*B&B*	*B&B*	*B&B*	*B&B*				
Naphthalene	**0.1410**	**0.0316**	**0.0001j**	**0.0002**	**0.0002**	**0.0001j**	**0.0001j**	**0.0001j**	**0.0002**	**0.0002**	**0.0002**	**0.0002**	**4**	**100**	**100**	**0.16**
2-Methylnaphthalene	**0.2210**	**0.0069**	**0.0001j**	**0.0001j**	**0.0002j**	**0.0001j**	**0.0001j**	**0.0002j**	**0.0002j**	**0.0002j**	**0.0002j**	**0.0002j**	**4**	**500**	**500**	**0.07**
Acenaphthylene	**0.1150**	**0.0030**	**0.0001j**	ND(0.2)	ND(0.2)	ND(0.2)	ND(0.2)	ND(0.2)	ND(0.2)	**0.0001j**	ND(0.2)	**0.0001j**	**100**	**100**	**100**	**0.044**
Acenaphthene	**0.5520**	**0.0081**	**0.0001j**	**0.0001j**	**0.0001j**	ND(0.1)	**0.0001j**	**0.0001j**	ND(0.1)	ND(0.1)	**0.0002**	**0.0002**	**20**	**1,000**	**1,000**	**0.016**
Fluorene	**0.9730**	**0.0194**	**0.0001j**	ND(0.2)	**0.0001j**	ND(0.2)	ND(0.2)	**0.0001j**	ND(0.2)	**0.0003**	**0.0001j**	ND(0.2)	**400**	**1,000**	**1,000**	**0.019**
Phenanthrene	**4.3900**	**0.1210**	**0.0002**	**0.0001j**	**0.0007**	**0.0002**	**0.0002**	**0.0003**	**0.0003**	**0.0007**	**0.0005**	**0.0003**	**700**	**1,000**	**100**	**0.24**
Anthracene	**0.5540**	**0.0188**	**0.0001j**	ND(0.2)	**0.0001j**	ND(0.2)	ND(0.2)	ND(0.2)	**0.0001j**	**0.0007**	ND(0.2)	ND(0.2)	**1,000**	**1,000**	**1,000**	**0.0853**
Fluoranthene	**0.5760**	**0.0239**	**0.0005**	**0.0002j**	**0.0007**	**0.0002j**	**0.0004**	**0.0003**	**0.0006**	**0.0023**	**0.0004**	**0.0006**	**1,000**	**1,000**	**1,000**	**0.6**
Pyrene	**3.3100**	**0.1520**	**0.0007**	**0.0003**	**0.0029**	**0.0004**	**0.0005**	**0.0004**	**0.0035**	**0.0126**	**0.0005**	**0.0013**	**700**	**700**	**700**	**0.665**
Benzo(a)anthracene	**2.7800**	**0.1160**											**0.7**	**0.7**	**0.7**	**0.261**
Chrysene	**5.4200**	**0.2640**	**0.0013**	**0.0004**	**0.0036**	**0.0009**	**0.001**	**0.0005**	**0.0123**	**0.0182**	**0.0004**	**0.0011**	7	7	7	**0.384**
Benzo(b)fluoranthene	**0.6810**	**0.0326**	**0.0005**	**0.0004**	**0.0009**	**0.0004**	**0.0006**	**0.0004**	**0.0031**	**0.004**	**0.0005**	**0.0009**	**0.7**	**0.7**	**0.7**	**NA**
Benzo(k)fluoranthene	**0.1270**	**0.0063**	**0.0002j**	**0.0001j**	**0.0002j**	**0.0001j**	**0.0001j**	**0.0001j**	**0.0004**	**0.0004**	**0.0001j**	**0.0001j**	7	7	7	**NA**
Benzo(a)pyrene	**1.4700**	**0.0777**	**0.0003**	**0.0003**	**0.001**	**0.0005**	**0.0003**	**0.0003**	**0.0043**	**0.0059**	**0.0003**	**0.0007**	**0.7**	**0.7**	**0.7**	**0.430**
Indeno(1,2,3-c,d)pyrene	**0.1610**	**0.0110**	**0.0002j**	**0.0001j**	**0.0002j**	**0.0002j**	**0.0002j**	**0.0002j**	**0.0005**	**0.0008**	**0.0002j**	**0.0004**	**0.7**	**0.7**	**0.7**	**NA**
Dibenzo(a,h)anthracene	**0.2800**	**0.0148**	**0.0001j**	**0.0001j**	**0.0001j**	**0.0002**	**0.0001j**	**0.0001j**	**0.0006**	**0.0007**	ND(0.2)	**0.0001j**	**0.7**	**0.7**	**0.7**	**0.0634**
Benzo(g,h,i)perylene	**0.3280**	**0.0211**	**0.0002**	**0.0002**	**0.0003**	**0.0003**	**0.0002**	**0.0003**	**0.0011**	**0.0014**	**0.0002**	**0.0005**	**1,000**	**1,000**	**1,000**	**NA**
Total PAH	**22.0790**	**0.9282**	**0.005**	**0.003**	**0.012**	**0.004**	**0.004**	**0.004**	**0.029**	**0.050**	**0.004**	**0.007**	**NA**	**NA**	**NA**	**4.022**

NOTES:
1. Results in milligrams per kilogram (mg/kg).
2. GAI= Groundwater Analytical, Inc.
3. B&B= B&B Laboratories.
4. EPH: Extractable Petroleum Hydrocarbons.
5. Qualifiers: J=Below the MDL.
6. PAH by GC/MS-SIM: Polyaromatic Hydrocarbons with Selected Ion Monitoring.
7. ND(x) = constituent not detected at practical quantitation limits noted in parentheses.
8. NA: Not Available.
9. Shaded cells exceed applicable NOAA ERLs.

TABLE 18
SUMMARY OF 2003 SURFACE WATER SAMPLES
B120 RELEASE
BUZZARDS BAY, MASSACHUSETTS

ANALYTE	SWAP-1: Near inlet of Allen's Pond					SWBJP-1: North end of Barney's Joy Point					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	Critieria Maximum Concentration
Naphthalene	ND (<0.0094) U	**0.012**	ND (<0.0095) U	**0.011**	ND (<0.013) U	**0.085**	ND (<0.0097) U	ND (<0.01) U	ND (<0.011) U	ND (<0.014) U	**2,350**
Methylnaphthalene, 2-	**0.019**	**0.030**	**0.022**	**0.024**	**0.021**	**0.28**	**0.019**	**0.025**	**0.025**	ND (<0.014) U	**300**
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	**300**
Acenapthene	ND (<0.0094) U	ND (<0.0094) U	ND (<0.0095) U	ND (<0.011) U	ND (<0.013) U	**0.020**	ND (<0.0097) U	ND (<0.01) U	ND (<0.011) U	ND (<0.014) U	**970**
Fluorene	ND (<0.0094) U	ND (<0.0094) U	ND (<0.0095) U	ND (<0.011) U	ND (<0.013) U	**0.024**	ND (<0.0097) U	ND (<0.01) U	ND (<0.011) U	ND (<0.014) U	**300**
Phenanthrene	ND (<0.0094) U	**0.012**	**0.012**	ND (<0.011) U	ND (<0.013) U	**0.076**	ND (<0.0097) U	**0.014**	**0.014**	ND (<0.014) U	**7.7**
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	**300**
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	**40**
Pyrene	ND (<0.0094) U	ND (<0.0094) U	ND (<0.0095) U	ND (<0.011) U	ND (<0.013) U	**0.024**	ND (<0.0097) U	ND (<0.01) U	ND (<0.011) U	ND (<0.014) U	**300**
Benzo[a]anthracene	ND (<0.0094) U	ND (<0.0094) U	ND (<0.0095) U	ND (<0.011) U	ND (<0.013) U	**0.010**	ND (<0.0097) U	ND (<0.01) U	ND (<0.011) U	ND (<0.014) U	**300**
Chrysene	ND (<0.0094) U	ND (<0.0094) U	ND (<0.0095) U	ND (<0.011) U	**0.026**	**0.030**	ND (<0.0097) U	ND (<0.01) U	ND (<0.011) U	ND (<0.014) U	**300**
Benzo[b]fluoranthene	ND (<0.0094) U	ND (<0.0094) U	ND (<0.0095) U	ND (<0.011) U	**0.033**	ND (<0.0093) U	ND (<0.0097) U	ND (<0.01) U	ND (<0.011) U	ND (<0.014) U	**300**
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	**300**
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	**300**
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	**300**
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	**300**
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	**300**
Other PAH	**0.078**	**0.126**	**0.116**	**0.175**	**0.160**	**2.151**	**0.067**	**0.121**	**0.131**	**0.015**	**NA**
Total PAH	**0.097**	**0.180**	**0.150**	**0.210**	**0.240**	**2.700**	**0.086**	**0.160**	**0.170**	**0.015**	**300**

Notes:

1. All concentrations in ug/l (equivalent to parts per billion).
2. C1-Naphthalene reported value was used as a substitute for 2-Methylnaphthalene.
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 18
SUMMARY OF 2003 SURFACE WATER SAMPLES
B120 RELEASE
BUZZARDS BAY, MASSACHUSETTS

ANALYTE	SWCC-1: Near Entrance of Clark's Cove					SWWP-1: Southwest of Wilbur's Point					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	Critieria Maximum Concentration
Naphthalene	ND (<0.0089) U	ND (<0.0092) U	ND (<0.011) U	ND (<0.01) U	ND (<0.014) U	**0.018**	ND (<0.011) U	ND (<0.01) U	**0.013**	ND (<0.013) U	**2,350**
Methylnaphthalene, 2-	ND (<0.0089) U	ND (<0.0092) U	ND (<0.011) U	**0.011**	ND (<0.014) U	ND (<0.0093) U	ND (<0.011) U	**0.011**	**0.015**	ND (<0.013) U	**300**
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	**300**
Acenapthene	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	**970**
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	**300**
Phenanthrene	ND (<0.0089) U	ND (<0.0092) U	ND (<0.011) U	ND (<0.01) U	ND (<0.014) U	**0.010**	ND (<0.011) U	**0.014**	**0.011**	ND (<0.013) U	**7.7**
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	**300**
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	**40**
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	**300**
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	**300**
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	**300**
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	**300**
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	**300**
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	**300**
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	**0.011**	ND (<0.011) U	ND (<0.01) U	ND (<0.0099) U	ND (<0.013) U	**300**
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	**300**
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	**300**
Other PAH	**0.009**	**0.011**	ND	**0.012**	ND	**0.071**	**0.014**	**0.435**	**0.061**	**0.028**	**NA**
Total PAH	**0.009**	**0.011**	ND	**0.023**	ND	**0.110**	**0.014**	**0.460**	**0.1**	**0.028**	**300**

Notes:

1. All concentrations in ug/l (equivalent to parts per billion).

2. C1-Naphthalene reported value was used as a substitute for 2-Methylnaphthalene.

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 18
SUMMARY OF 2003 SURFACE WATER SAMPLES
B120 RELEASE
BUZZARDS BAY, MASSACHUSETTS

ANALYTE	SWWI-1: One and a Half Miles South of West Island					SWWI-2: North of West Island					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	Critieria Maximum Concentration
Naphthalene	ND (<0.0094) U	ND (<0.0094) U	ND (<0.018) U	ND (<0.01) U	ND (<0.013) U	ND (<0.0095) U	**0.013**	ND (<0.011) U	ND (<0.011) U	ND (<0.012) U	**2,350**
Methylnaphthalene, 2-	**0.027**	**0.028**	**0.029**	ND (<0.01) U	ND (<0.013) U	**0.0097**	**0.047**	**0.024**	**0.014**	**0.014**	**300**
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	**300**
Acenapthene	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	**970**
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	**300**
Phenanthrene	**0.025**	**0.015**	**0.012**	ND (<0.01) U	ND (<0.013) U	ND (<0.0095) U	**0.027**	**0.016**	ND (<0.011) U	ND (<0.012) U	**7.7**
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	**300**
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	**40**
Pyrene	**0.014**	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	**300**
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	**300**
Chrysene	**0.013**	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	**300**
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	**300**
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	**300**
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	**300**
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	**300**
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	**300**
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	**300**
Other PAH	**0.771**	**0.227**	**0.079**	**0.039**	**0.014**	**0.047**	**0.553**	**0.250**	**0.065**	**0.049**	**NA**
Total PAH	**0.850**	**0.270**	**0.120**	**0.039**	**0.014**	**0.057**	**0.640**	**0.290**	**0.079**	**0.063**	**300**

Notes:

1. All concentrations in ug/l (equivalent to parts per billion).
2. C1-Naphthalene reported value was used as a substitute for 2-Methylnaphthalene.
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 18
SUMMARY OF 2003 SURFACE WATER SAMPLES
B120 RELEASE
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	Critieria Maximum Concentration
Naphthalene	ND (<0.011) U	**0.016**	ND (<0.0091) U	**0.015**	ND (<0.012) U	ND (<0.0095) U	ND (<0.0094) U	ND (<0.0093) U	ND (<0.01) U	ND (<0.013) U	**2,350**
Methylnaphthalene, 2-	ND (<0.011) U	**0.036**	**0.011**	ND (<0.01) U	ND (<0.012) U	ND (<0.0095) U	**0.015**	**0.016**	ND (<0.01) U	ND (<0.013) U	**300**
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	**300**
Acenapthene	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	**970**
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	**300**
Phenanthrene	ND (<0.011) U	**0.020**	**0.0095**	ND (<0.01) U	ND (<0.012) U	**0.017**	**0.014**	**0.012**	ND (<0.01) U	ND (<0.013) U	**7.7**
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	**300**
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	**40**
Pyrene	ND (<0.011) U	ND (<0.0097) U	ND (<0.0091) U	ND (<0.01) U	ND (<0.012) U	**0.013**	ND (<0.0094) U	ND (<0.0093) U	ND (<0.01) U	ND (<0.013) U	**300**
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	**300**
Chrysene	ND (<0.011) U	ND (<0.0097) U	ND (<0.0091) U	ND (<0.01) U	ND (<0.012) U	**0.013**	ND (<0.0094) U	ND (<0.0093) U	ND (<0.01) U	ND (<0.013) U	**300**
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	**300**
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	**300**
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	**300**
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	**300**
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	**300**
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	**300**
Other PAH	ND	**0.378**	**0.060**	**0.065**	ND	**0.667**	**0.131**	**0.102**	**0.130**	ND	**NA**
Total PAH	ND	**0.450**	**0.080**	**0.080**	ND	**0.710**	**0.160**	**0.130**	**0.130**	ND	**300**

Notes:

1. All concentrations in ug/l (equivalent to parts per billion).
2. C1-Naphthalene reported value was used as a substitute for 2-Methylnaphthalene.
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 18
SUMMARY OF 2003 SURFACE WATER SAMPLES
B120 RELEASE
BUZZARDS BAY, MASSACHUSETTS

ANALYTE	SWPI-1: Just North of Penikese Island				SWQH-1: Quicks Hole				NOAA SQUIRT Marine Surface Water Quality
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	Critieria Maximum Concentration
Naphthalene	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**
Methylnaphthalene, 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**
Acenapthene	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-Naphthalene reported value was used as a substitute for 2-Methylnaphthalene.
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 18
SUMMARY OF 2003 SURFACE WATER SAMPLES
B120 RELEASE
BUZZARDS BAY, MASSACHUSETTS

ANALYTE	SWCH-1: Cuttyhunk Island				DUP-1	NOAA SQUIRT Marine Surface Water Quality
Sampling Date:	4/30/2003	5/1/2003	5/5/2003	5/12/2003	4/30/2003	Critieria Maximum Concentration
Naphthalene	ND (<0.01) U	ND (<0.0091) U	ND (<0.01) U	ND (<0.013) U	**0.010**	**2,350**
Methylnaphthalene, 2-	ND (<0.01) U	ND (<0.0091) U	ND (<0.01) U	ND (<0.013) U	**0.039**	**300**
Acenaphthylene	ND (<0.01) U	ND (<0.0091) U	ND (<0.01) U	ND (<0.013) U	ND (<0.0088) U	**300**
Acenapthene	ND (<0.01) U	ND (<0.0091) U	ND (<0.01) U	ND (<0.013) U	ND (<0.0088) U	**970**
Fluorene	ND (<0.01) U	ND (<0.0091) U	ND (<0.01) U	ND (<0.013) U	ND (<0.0088) U	**300**
Phenanthrene	**0.011**	ND (<0.0091) U	ND (<0.01) U	ND (<0.013) U	**0.017**	**7.7**
Anthracene	ND (<0.01) U	ND (<0.0091) U	ND (<0.01) U	ND (<0.013) U	ND (<0.0088) U	**300**
Fluoranthene	**0.014**	ND (<0.0091) U	ND (<0.01) U	ND (<0.013) U	ND (<0.0088) U	**40**
Pyrene	**0.047**	ND (<0.0091) U	ND (<0.01) U	ND (<0.013) U	ND (<0.0088) U	**300**
Benzo[a]anthracene	ND (<0.01) U	ND (<0.0091) U	ND (<0.01) U	ND (<0.013) U	ND (<0.0088) U	**300**
Chrysene	ND (<0.01) U	ND (<0.0091) U	ND (<0.01) U	ND (<0.013) U	ND (<0.0088) U	**300**
Benzo[b]fluoranthene	ND (<0.01) U	ND (<0.0091) U	ND (<0.01) U	ND (<0.013) U	ND (<0.0088) U	**300**
Benzo[k]fluoranthene	ND (<0.01) U	ND (<0.0091) U	ND (<0.01) U	ND (<0.013) U	ND (<0.0088) U	**300**
Benzo[a]pyrene	ND (<0.01) U	ND (<0.0091) U	ND (<0.01) U	ND (<0.013) U	ND (<0.0088) U	**300**
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	**300**
Dibenzo[a,h]anthracene	ND (<0.01) U	ND (<0.0091) U	ND (<0.01) U	ND (<0.013) U	ND (<0.0088) U	**300**
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	**300**
Other PAH	**0.000**	ND	ND	ND	**0.314**	**NA**
Total PAH	**0.072**	ND	ND	ND	**0.380**	**300**

Notes:

1. All concentrations in ug/l (equivalent to parts per billion).
2. C1-Naphthalene reported value was used as a substitute for 2-Methylnaphthalene.
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 19
SUMMARY OF SURFACE WATER SAMPLES - JUNE 9, 2004
BUZZARDS BAY, MASSACHUSETTS
HOPPY'S LANDING, FAIRHAVEN
SEGMENT: W2A-10
Sampling Date: 6/9/04

Analyte	W2A10-SW1	W2A10-SW2	W2A10-SW3	Surface Water Quality Standards	
				MADEP VPH/EPH Surface Water Guideline	NOAA SQuiRT Marine Surface Water Quality Criteria Maximum Concentration
EPH					
C_9-C_{18} Aliphatic Hydrocarbons	ND(530)	**540**	ND (560)	**1,800**	**N/A**
C_{19}-C_{36} Aliphatic Hydrocarbons	**820**	**3,600**	ND (560)	**2,100**	**N/A**
C_{11}-C_{22} Aromatic Hydrocarbons	**1,300**	**6,700**	ND (180)	**See Note Below**	**N/A**
PAH by GC/MS-SIM by method 8270					
Naphthalene	ND(0.5)	**2.9**	ND(0.6)	**N/A**	**2,350**
2-Methylnaphthalene	ND(0.5)	**35**	ND(0.6)	**N/A**	**300**
Acenaphthylene	ND(0.5)	ND(0.5)	ND(0.6)	**N/A**	**300**
Acenaphthene	ND(0.5)	**3.2**	ND(0.6)	**N/A**	**970**
Fluorene	ND(0.5)	**5.1**	ND(0.6)	**N/A**	**300**
Phenanthrene	**0.8**	**24**	ND(0.6)	**N/A**	**7.7**
Anthracene	ND(0.5)	**2.1 j**	ND(0.6)	**N/A**	**300**
Fluoranthene	ND(0.5)	**0.7**	ND(0.6)	**N/A**	**40**
Pyrene	**1.9**	**15**	ND(0.6)	**N/A**	**300**
Benzo(a)anthracene	**1.8**	**6.5**	ND (0.1)	**N/A**	**300**
Chrysene	**3.2**	**14**	ND (0.1)	**N/A**	**300**
Benzo(b)fluoranthene	**0.7**	**2.8**	ND (0.1)	**N/A**	**300**
Benzo(k)fluoranthene	ND(0.5)	**1.0**	ND (0.1)	**N/A**	**300**
Benzo(a)pyrene	**1.3**	**5.9**	ND (0.1)	**N/A**	**300**
Indeno(1,2,3-cd)pyrene	**0.1**	**0.3**	ND (0.1)	**N/A**	**300**
Dibenzo(a,h)anthracene	**0.1**	**0.3**	ND (0.1)	**N/A**	**300**
Benzo(g,h,I)perylene	**0.2**	**0.4**	ND (0.1)	**N/A**	**300**

NOTES:
1. Results in ug/L (micrograms per liter).
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. NA: Not Available.
6. Effects for C11-C22 Aromatic Hydrocarbons may be seen at less than the EPH reporting limit.
7. Shaded cells exceed applicable surface water quality standards.

TABLE 20
SUMMARY OF SURFACE WATER SAMPLES - AUGUST 24-26, 2004
B120 RELEASE
BUZZARDS BAY, MASSACHUSETTS

Sampling Dates: 8/24-26/04

Analyte	W2A02-TP01	W1F04-W01	W1C02-TP01	W1C02-TP02	W1F05-TP01
EPH	**GAI**	**GAI**	**GAI**	**GAI**	**GAI**
C_9-C_{18} Aliphatic Hydrocarbons	ND(500)	ND(590)	ND(500)	ND(500)	ND(500)
C_{19}-C_{36} Aliphatic Hydrocarbons	ND(500)	ND(590)	ND(500)	ND(500)	ND(500)
C_{11}-C_{22} Aromatic Hydrocarbons	ND(150)	ND(180)	ND(150)	ND(150)	ND(150)
PAH by GC/MS-SIM by method 8270					
Naphthalene	ND(0.0005)	ND(0.0006)	ND(0.0005)	ND(0.0005)	ND(0.0005)
2-Methylnaphthalene	ND(0.0005)	ND(0.0006)	ND(0.0005)	ND(0.0005)	ND(0.0005)
Acenaphthylene	ND(0.0005)	ND(0.0006)	ND(0.0005)	ND(0.0005)	ND(0.0005)
Acenaphthene	ND(0.0005)	ND(0.0006)	ND(0.0005)	ND(0.0005)	ND(0.0005)
Fluorene	ND(0.0005)	ND(0.0006)	ND(0.0005)	ND(0.0005)	ND(0.0005)
Phenanthrene	ND(0.0005)	ND(0.0006)	ND(0.0005)	ND(0.0005)	ND(0.0005)
Anthracene	ND(0.0005)	ND(0.0006)	ND(0.0005)	ND(0.0005)	ND(0.0005)
Fluoranthene	ND(0.0005)	ND(0.0006)	ND(0.0005)	ND(0.0005)	ND(0.0005)
Pyrene	ND(0.0005)	ND(0.0006)	ND(0.0005)	ND(0.0005)	ND(0.0005)
Benzo(a)anthracene	ND(0.0001)	ND(0.0001)	ND(0.0001)	ND(0.0001)	ND(0.0001)
Chrysene	ND(0.0001)	ND(0.0001)	ND(0.0001)	ND(0.0001)	ND(0.0001)
Benzo(b)fluoranthene	ND(0.0001)	ND(0.0001)	ND(0.0001)	ND(0.0001)	ND(0.0001)
Benzo(k)fluoranthene	ND(0.0001)	ND(0.0001)	ND(0.0001)	ND(0.0001)	ND(0.0001)
Benzo(a)pyrene	ND(0.0001)	ND(0.0001)	ND(0.0001)	ND(0.0001)	ND(0.0001)
Indeno(1,2,3-cd)pyrene	ND(0.0001)	ND(0.0001)	ND(0.0001)	ND(0.0001)	ND(0.0001)
Dibenzo(a,h)anthracene	ND(0.0001)	ND(0.0001)	ND(0.0001)	ND(0.0001)	ND(0.0001)
Benzo(g,h,I)perylene	ND(0.0001)	ND(0.0001)	ND(0.0001)	ND(0.0001)	ND(0.0001)
Total PAH	NA	NA	NA	NA	NA

NOTES:

1. Results in micrograms per liter (ug/L)
2. GAI = Analysis conducted by Groundwater Analytical, Inc.
3. EPH: Extractable Petroleum Hydrocarbons.
4. ND(x) = constituent not detected at practical quantitation limits noted in parentheses.
5. PAH by GC/MS-SIM: Polyaromatic Hydrocarbons with Selected Ion Monitoring.
6. j: estimated concentration/ detected below standard laboratory reporting limits.
7. NA: Not Analyzed or Not Available.
8. Shaded cells exceed applicable standards.