IMMEDIATE RESPONSE ACTION
STATUS AND COMPLETION REPORT
BARGE B120 SPILL
BUZZARDS BAY, MASSACHUSETTS
RTN 4-17786

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GeoInsight Project 3701-002

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1.0 INTRODUCTION

GeoInsight, Inc. (GeoInsight) prepared this Immediate Response Action (IRA) Status and Completion Report at the request of Bouchard Transportation Company, Inc. (Bouchard or RP), and under the direction of the Licensed Site Professional (LSP)-of-Record, Richard J. Wozmak, P.E., P.H. of EnviroLogic, LLC, for the release of oil from the Bouchard Barge #120 (B120) into Buzzards Bay, Massachusetts on April 27, 2003. The response actions described in this report were conducted pursuant to the September 15, 2003 IRA Plan (the "IRA Plan") prepared by GeoInsight. The IRA Plan was prepared in response to a September 8, 2003 *Request for IRA with Interim Deadline* letter from the Massachusetts Department of Environmental Protection (MADEP). Several modifications were made to the September 15, 2003 IRA Plan in consultation with MADEP, the National Oceanic & Atmospheric Administration (NOAA), and the U.S. Coast Guard (USCG). These modifications to the IRA Plan were summarized in a September 29, 2003 Errata Sheet. Additional modifications to the IRA Plan were proposed to conduct cleanup activities at selected shoreline segments in 2004, 2005, and 2006. This report covers IRA activities conducted during the period from June 30, 2006 until March 28, 2007, when IRA activities were completed in accordance with the IRA Plan, Errata Sheet, and IRA Plan Modifications.

The activities conducted pursuant to the IRA Plan supplement the activities conducted in accordance with the May 23, 2003 Immediate Response Action: Treatment and Completion Guidelines Plan (IRATCGP) that was developed for this incident by the Unified Command. The Unified Command was comprised of representatives from the USCG, MADEP, and the Responsible Party (RP). Field activities conducted as part of the IRATCGP were completed as of September 3, 2003. The IRA activities bridge the transition period from the end of the

IRATCGP activities to the performance of post-IRA response actions conducted under the MCP, 310 CMR 40.0000 and the Oil Pollution Act of 1990 (OPA 1990).

As part of response actions conducted under the MCP, a Phase I Initial Site Investigation (Phase I) and Conceptual Site Model (CSM), Tier Classification, Tier 1A Permit Application, and Phase II Conceptual Scope of Work were submitted to MADEP on May 3, 2004. The release was classified as a Tier 1A disposal site in accordance with the site scoring guidelines in the MCP. On May 21, 2004, a Partial Class A-2 Response Action Outcome (RAO) statement was submitted for a portion of the 120 shoreline segments impacted by the release. Of the original 120 shoreline segments considered as part of the disposal site, the partial RAO applied to 57 shoreline segments where the maximum degree of oiling was categorized as "very light" or "light" as well as three sandy shoreline segments where the maximum degree of oiling was characterized as "moderate." As described in the partial RAO, a condition of No Significant Risk (NSR) was achieved for these 57 segments and additional response actions at these segments were not required under the MCP. Please refer to the May 21, 2004 Partial RAO statement for specific information regarding the 57 segments included in the partial RAO.

On August 24, 2005, a Phase II Scope of Work (SOW) and Updated CSM were submitted to MADEP. The Updated CSM expanded upon the original CSM using data obtained since the original CSM was submitted. The Phase II SOW was prepared in response to the July 27, 2004 Decision to Grant Permit letter from MADEP. The proposed Phase II activities were to characterize residual oil at the remaining 63 segments and evaluate potential risk to human health and ecological receptors. The results of the Phase II investigation were summarized in an August 3, 2006 Phase II Comprehensive Site Assessment (CSA) report. The Method 3 Risk Characterization included with the Phase II CSA report evaluated potential risks associated with identified constituents of concern to human health, safety, public welfare, and the environment. The Method 3 Risk Characterization concluded that a condition of No Significant Risk to human health and safety existed at the remaining 63 shoreline segments and subtidal zone in Buzzards Bay. A condition of NSR to public welfare existed at 61 of the remaining 63 shoreline segments, and a condition of NSR to the environment existed at 62 of the 63 remaining shoreline segments and in the subtidal zone. A condition of NSR to public welfare was not demonstrated at the time

the Phase II CSA was completed for two localized areas at a portion of the Leisure Shores area at segment W1F-02 and the southern tip of Hoppy's Landing in segment W2A-10 where residual oiling was characterized as a potential nuisance condition (and therefore different from residual oil in other areas). A condition of NSR to the environment was not concluded at the time the Phase II CSA was completed for the southern tip of Hoppy's Landing due to the presence of sporadic pavement and splatter on cobbles and the sporadic presence of tarballs on marsh sediment.

Based upon the results of the Method 3 Risk Characterization, a Partial Class A-2 RAO was prepared on August 3, 2006 for 61 of the remaining 63 shoreline segments (i.e., those segments where a condition of NSR to human health, public welfare, safety, and the environment was demonstrated) and for the subtidal zone in Buzzards Bay. A Phase III Remedial Action Plan (RAP) was submitted to MADEP on August 3, 2006 for a portion of the Leisure Shores shoreline at segment W1F-02 and the southern portion of Hoppy's Landing at segment W2A-10. On November 26, 2006 a Phase IV Remedy Implementation Plan (RIP) was submitted to MADEP for cleanup activities to be conducted near the southern tip of Hoppy's Landing in segment W2A-10. The Phase IV cleanup activities were initiated in December 2006 and will be described in an upcoming Phase IV Monitoring and Completion Report. On September 20, 2006, a shoreline and buried oil inspection was conducted at portions of Leisure Shores to further characterize the extent of residual oiling, which has manifested itself primarily in the form of subsurface "flecks" (small particles) of oil that become exposed when test pits are excavated in some parts of the lower intertidal zone. Oiling conditions at Leisure Shores appeared to have attenuated since the previous inspections, in part because cleanup activities (including rototilling) has removed some of the residual oil mass, and also because of natural weathering processes. Additional characterization activities will be conducted during the summer of 2007 to evaluate potential Phase IV remediation activities.

2.0 RELEASE BACKGROUND AND ENVIRONMENTAL SETTING

On April 27, 2003, a release of No. 6 fuel oil (estimated to range between approximately 22,000 gallons and 98,000 gallons) was reported from the B120 barge into Buzzards Bay, Massachusetts after it struck a ledge at the western entrance to Buzzards Bay. The exact location where the release initially occurred is unknown; however, the grounding location of Barge B120 was estimated to within a ½-mile radius of Buoy G-1, offshore and to the south of Gooseberry Point in Westport, Massachusetts. Winds and currents moved the oil primarily to the north, northwest, and northeast, and the oil came ashore on sections of shoreline abutting Buzzards Bay in Westport, Dartmouth, New Bedford, Fairhaven, Mattapoisett, Marion, Wareham, Gosnold, Bourne, and Falmouth. Isolated occurrences of tarballs/patties to the south and southeast on the Elizabeth Islands and in Rhode Island to the west also were observed, although some of these occurrences were later determined not to be related to the B120 release.

The Updated CSM submitted to MADEP on August 24, 2005 summarized the fate and transport of the released oil, the areas where residual oil impacts may be present, and the potential exposure pathways that may potentially exist. The Updated CSM identified locations where residual oil from the B120 release could potentially be located, and identified human and ecological receptors associated with these exposure pathways based on pertinent literature on oil spills, updated field results, updated field data, and modeling information on the transport and fate of released oil. The Updated CSM indicated that the majority of the released oil stranded in the intertidal zone of the shoreline was removed by the initial cleanup operations directed by the Unified Command. The majority of the remaining oil on the shoreline is present as hardened material on exposed rock surfaces and subject to natural weathering processes.

2.1 SHORELINE IDENTIFICATION

Unified Command initially divided the oiled shorelines into 15 geographical divisions to facilitate cleanup operations. The divisions extending from the Elizabeth Islands and Cape Cod (to the east and south of the Cape Cod Canal) were labeled with an "E" prefix, and the divisions to the west of the Cape Cod Canal were labeled with a "W" prefix. The divisions were

subdivided into 149 individual shoreline segments during Shoreline Cleanup Assessment Team (SCAT) reconnaissance visits (Table 1). For example, shoreline segment W1E-04 corresponds to Crescent Beach in Mattapoisett (west of the Cape Cod Canal in geographical division 1E, segment 04). The shoreline segments are identified on Figure 1. Of the original 149 segments, 29 were subsequently confirmed to be unoiled and were not included in response actions.

Therefore, the remaining 120 segments were oiled to varying degrees and considered to be part of the "disposal site" as defined in the MCP. Of these 120 segments, conditions of NSR have been demonstrated at 118 segments and the subtidal zone in Buzzards Bay, as described in partial Class A-2 RAO Statements completed in May 2004 and August 2006.

2.2 SHORELINE CLASSIFICATION

Individual shoreline segments were classified based upon the shoreline composition, public use, and habitat. As described in the IRATCGP, the shoreline in the vicinity of the release area was classified into the following shoreline types:

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

More than one classification type may be present at a particular shoreline segment. 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 has been widely utilized by the scientific community in assessing and responding to oil spills.

2.3 SENSITIVE RECEPTORS

Potential sensitive receptors identified in the project area include water resources (aquifers, public and private water supply wells), critical habitats, threatened and endangered species, and humans.

Review of information provided by the Massachusetts Geographic Information System (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 United States Environmental Protection Agency (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 Natural Heritage and Endangered Species Program (NHESP) indicated that several threatened or endangered species are present in certain areas of Buzzards Bay. For example, two bird species that utilize the intertidal zone of the shoreline for foraging habitat in this area include the roseate tern (*Sterna dougallii*), an endangered species under Massachusetts and Federal law, and the piping plover (*Charadrius melodus*), a threatened species under Massachusetts and Federal law. Several Buzzards Bay areas are designated as rare and critical habitats according to NHESP information. Naushon and Pasque Islands (Elizabeth Islands) are designated as areas that may contain rare wetland habitats.

Areas west of the Cape Cod Canal also may 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 August 3, 2006 Phase II CSA report.

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

3.0 RESPONSE ACTIONS

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

(a) abate, prevent or eliminate any Imminent Hazard to health, safety, public welfare or the environment; and/or

(b) respond to any other time-critical release, threat of release and/or site conditions.

The IRA response action strategies include:

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

IRA activities conducted during this monitoring period consisted of:

1. Inspecting for residual oil at the Leisure Shores Beach portion of the Brandt Island West segment (segment W1F-02) and at the Hoppy's Landing portion of the Long Island and Causeway South segment (segment W2A-10);
2. Conducting a buried oil delineation at the Leisure Shores Beach portion of the Brandt Island West segment (segment W1F-02);
3. Performing a post-storm shoreline profile at the Leisure Shores Beach portion of the Brandt Island West segment (segment W1F-02);
4. Collecting samples for petroleum fingerprint analysis; and
5. Responding to citizen reports of oil at shoreline segments.

Specific information regarding these activities is summarized in the following sections of this report.

3.1 FIELD INSPECTION AND CHARACTERIZATION

3.1.1 Brandt Island West (Leisure Shores) – W1F-02

3.1.1.1 Background

Inspections for potentially buried oil were initially conducted at nine shoreline segments between November 2003 and April 2004 as part of the activities described in the September 15, 2003 IRA Plan. These inspections for potentially buried oil were completed in April 2004. However, particles of residual oil were encountered at a portion of Leisure Shores at segment W1F-02 during the inspections; therefore, periodic inspections have continued at this segment after April 2004 in conjunction with small-scale cleanup activities at this segment.

In September 2004, discontinuous oil sheens, and small (generally less than 0.5 centimeters in diameter), flattened particles of oil were encountered below the surface in a discrete, limited area of the intertidal zone at the Leisure Shores Beach 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. In this limited area, the oil particles and sheen were primarily encountered in an area approximately measuring 20 feet by 20 feet near the eastern rock groin. IRA cleanup activities were conducted in September 2004 to remove residual oil, as described in a letter to the Massachusetts Department of Environmental Protection (MADEP) dated September 21, 2004. The cleanup activities consisted of manually raking the intertidal zone to expose the particulate residual oil and using oil absorbent material to remove the exposed oil.

Inspections for residual oil continued in the spring of 2005 to evaluate whether the residual oil in the intertidal zone of Leisure Shores Beach had dissipated after cleanup activities and scouring associated with winter storms and tides. The degree of impacts appeared to be less in 2005 than encountered in 2004, suggesting that the cleanup activities and/or winter scouring were effective

in removing some of the residual oil; however, very small particles of oil (approximately 1 to 7 millimeters in diameter) were encountered in some of the test pits excavated in the cleanup area. A small area on the eastern portion of the beach (an approximate 30-foot by 10-foot zone) within the cleanup area had slightly larger particles of oil (some up to 3 centimeters in diameter).

Therefore, additional cleanup activities to remove residual oil in the same approximate area were proposed to MADEP in a letter dated July 7, 2005. Due to the discontinuous nature of the oil distribution, cleanup activities consisted of mechanically mixing and turning over the top 10 to 12 inches of beach sediment in the area of concern using two Roto Tiller machines to expose the residual oil. An August 2005 post-cleanup inspection indicated that the cleanup activities were effective in removing some of the residual oil. However, residual oil was observed during the post-cleanup inspection, and, therefore, additional inspections (including trench/test pit excavation) were warranted to evaluate residual oil and whether additional cleanup activities should be conducted in the future.

Refer to IRA Status Reports dated February 10, 2004, September 16, 2004, March 23, 2005, September 23, 2005, March 24, 2006, and September 25, 2006 for additional information regarding previous inspection and cleanup activities at this segment.

3.1.1.2 Residual Oil Evaluation

Inspections for residual oil were typically conducted in warm summertime months when residual oil and sheens are expected to be most noticeable due to warm air, sediment, and water temperatures. On July 12, 2006, the LSP and representatives from GeoInsight, ENTRIX, Inc. (ENTRIX) and MADEP conducted a buried oil inspection at a portion of Leisure Shores Beach to evaluate whether residual oil was present in the shoreline sediment in the area between the two rock groins where oil particles were previously observed. The weather was overcast with a light rain and the air temperature was approximately 80 degrees Fahrenheit. Approximately 20 test pits were excavated in the area of concern. Particles and/or sheen were observed in approximately six of the test pits. In general, the oil particles were small, generally 2 millimeters or less in diameter.

On September 20, 2006, another inspection was conducted at Leisure Shores to evaluate residual oil in the sediment within the area of concern. The weather on this day was sunny and approximately 75 degrees Fahrenheit. Surface water temperature at Leisure Shores was approximately 69 degrees Fahrenheit, as measured on-site using a thermometer. A total of 121 test pits were excavated by hand in the lower intertidal zone (i.e., the relatively "flat" portion of Leisure Shores) in a grid pattern. The grid consisted of seven transects (identified as transects A through G) that were orientated approximately parallel to the shoreline between two rock groins. Refer to Figure 2 for the transect locations. The transects were spaced approximately 15 feet apart and test pits were excavated at 10-foot intervals along each transect. The test pits were of uniform size and depth, approximately 12 inches in diameter and 9 inches deep. Test pits could not be excavated at a few of the planned locations on each transect because of unfavorable conditions (e.g., a stream channel or advancing tide).

Sediment excavated from each of the test pits was placed in a 5-gallon bucket, lined with a disposable polyethylene bag. Seawater was added to each bucket until the level of the water was slightly above the level of the sediment. The test pits were allowed to equilibrate and naturally fill with water. Approximately 10 to 20 minutes after excavation, the presence of oil sheen and/or oil particles (if present) on the water surface in both the bucket and the test pit was then recorded. If oil particles were present, the number of oil particles were counted or estimated, and the approximate size range of the oil particles was noted. After the data were recorded, the test pit was backfilled with the excavated sediment in the bucket. The test pit and bucket observations are summarized in the table below. The quantity of particles represents the sum of the particles observed in the test pit and the corresponding bucket.

Field Observation	Number of Test Pits or Buckets	Percent of Total
No sheen or particles	97	80%
Oil sheen only	5	4%
Fewer than six particles	12	10%
Six or more particles	7	6%

In general, the oil particles were small, generally one millimeter or less in diameter ("pinhead" size) and were soft to the touch. Additional information regarding the field observations in each test pit and bucket is presented in the data tables attached in Appendix A, and the data are also shown on Figure 2.

It is important to note that naturally-occurring inorganic sheens (commonly associated with iron oxides) that are not related to the B120 release were observed in some test pits. Inorganic sheens typically break into fragments when disturbed, in contrast to oil sheens that are liquid and do not break apart when disturbed. Inorganic sheens are not included in the summary presented above.

It is also important to note that during this excavation event, oil did not often appear until the test pits or buckets were allowed to stand for over 10 minutes. This is in contrast to the trenches excavated in 2004, where the sheen or oil was typically immediately visible as the trenches were excavated. These observations may suggest that the overall amount of residual oil present at this location has decreased substantially since the 2004 inspections.

The test pits where oil sheen or particles were observed were primarily located in the eastern portion of the study area. Of the 24 buckets where oil sheen or particles were observed, 17 of them were located within 80 feet of the easternmost groin, indicating that the residual oil is mostly present in this location. The test pits in the western side of the grid area were observed to have oil sheen only, with the exception of one test pit where fewer than six oil particles were observed.

An evaluation of the vertical distribution of residual oil in the sediment column was also conducted at three locations adjacent to grid locations where particles of oil were observed in the initial test pit. At each location, an additional test pit was excavated at 2-inch intervals (to a total depth of 6 inches below grade surface) and the test pit was allowed to equilibrate at each depth interval before advancing to the next depth interval. In two of the three of the vertical test pits (test pits A-70 and E-40) oil particles appeared to be concentrated at the 4-inch depth interval. At the A-110 test pit location, the vertical distribution of oil appeared to be more uniform with depth, although the field team noted that the oil at the 4-inch depth interval appeared to be less

weathered than the oil in the 2-inch interval. Additional information regarding field observations recorded during the vertical distribution inspection is presented in a data table attached in Appendix A, and locations of the vertical distribution test pits are shown on Figure 2.

As part of this evaluation, samples of oil floating on the top of the water surface in test pits A-70, B-30, and B-70 were collected for fingerprint analysis. The samples were collected using a Teflon® net that was placed on the water surface to adsorb the oil particles in the test pits. The net was then placed into a clean glass jar and sent to B&B Laboratories for fingerprint analysis. Review of the analytical results indicated that the oil was composed primarily of B120 oil, with small contributions of a non-B120 oil and plant waxes. Additional information regarding the fingerprint analysis is included in Appendix C.

3.1.1.3 Post-Storm Survey – Shoreline Profiling

On November 1, 2006, a "post-storm" shoreline profile survey was conducted to evaluate potential erosional effects and/or changes in shoreline topography caused by a storm that occurred October 28 and October 29, 2006. High surf associated with the storm affected south-facing shorelines along Buzzards Bay, including the Leisure Shores portion of segment W1F-02. The profile survey was conducted using an auto level and standard surveying techniques to measure the elevation at existing transects, H2, H3, H4, and H5, and H7. The transect elevation profiles are presented in Figure 3. The elevations recorded during the post-storm survey were compared to the most recent survey data previously collected at Leisure Shores (October 2005) to evaluate differences in shoreline topography, and to define areas of deposition and erosion (Figure 4). In general, erosion (up to approximately 1.2 feet) of beach sediment occurred in the middle and upper intertidal portions of the shoreline, particularly along the "steep" portion of the beach, between October 2005 and October 2006. Deposition of beach sediment (up to approximately 1.0 foot) occurred in the lower intertidal zone on the "flat" portion of the beach, including the area where the oil sheens and particles were observed in test pits on September 20, 2006 (described in Section 3.1.1.2).

3.1.2 Long Island and Causeway South (Hoppy's Landing) – W2A-10

On July 12, 2006, the LSP and representatives from GeoInsight and MADEP conducted a visual inspection of the southern tip of Long Island (Hoppy's Landing) to evaluate the extent and magnitude of residual oil. Residual oil was present in two general locations, along the southwestern side of the island and at the southernmost tip of the island. The observed oil consisted primarily of sporadic splatter, small areas of pavement (generally less than 2 inches in diameter), and sheen observed in tidal pools adjacent to algal mats with areas of pavement. The degree of residual oiling present at the segment warranted additional cleanup activities. Refer to the November 29, 2006 RIP for additional information regarding proposed cleanup activities at this segment. Cleanup operations were conducted at this location between December 2006 and March 2007. Information regarding these cleanup operations will be included in the forthcoming Phase IV RIP Completion Report.

3.2 RESPONSE TO CITIZEN REPORTS OF OIL

After the closure of the incident command post on September 3, 2003, local residents were directed to call GeoInsight to report oil potentially associated with the B120 spill. During this monitoring period, GeoInsight received a total of 13 citizen calls associated with reports of oil and five additional calls requesting information on the notification letter. A report of oil was also voiced to GeoInsight during the June 6, 2006 public meeting on the status of the B120 MCP process at the New Bedford Whaling Museum.

Notification of the Phase II CSA and Phase III RAP reports was provided at the end of July 2006 to owners of property within the boundaries of the shoreline segments that comprised the Site. This notification was a new requirement under the MCP regulations, and the information package provided citizens with detailed information about the cleanup and MCP process. The large majority of citizen calls during this reporting period were received during the 3 weeks following the notification of property owners. As described below, these reports of potential oiling were largely not associated with oil, or the oil present was highly localized (e.g., weathered splatter on a rock or two). A summary of the call reports, responses, and outcomes during this

monitoring period is included in Table 2. Specific information regarding responses to citizen reports of oil is summarized in the following sections of this report.

3.2.1 Brandt Island West (Segment W1F-02)

On July 21, 2006, the LSP and a representative from GeoInsight met with residents of Leisure Shores Beach in response to concerns voiced during the June 6, 2006 public meeting. The Leisure Shores residents also expressed concern that cleanup activities may have accelerated beach erosion. During the meeting, the residents indicated that buried oil was present in the stream channel and that oil was located in the marsh behind the beach. The LSP and GeoInsight recorded their concerns, reviewed historic aerial photographs, and excavated test pits in the lower intertidal zone to show the residents the characteristics of the residual oil particles in the lower intertidal shoreline sediment. A field visit was scheduled for August 18, 2006 to evaluate residual oil at the locations identified by the residents during the July 21, 2006 field meeting.

On August 2, 2006, GeoInsight received a phone call from a citizen who reported oil on their dog after it had been running through the back-barrier marsh at Leisure Shores. The citizen did not indicate when the oil was observed on the dog. GeoInsight informed the citizen that an inspection of the area was scheduled for August 18, 2006 and that GeoInsight would contact them with the results of the inspection.

On August 18, 2006, the LSP, GeoInsight, and ENTRIX personnel conducted a visual inspection of the areas of concern identified by the residents, specifically the stream channel and marsh. Several residents from Leisure Shores were also present for this inspection. Clam rakes with attached absorbent pads were used to agitate sediments in the stream bed and evaluate the area where potentially buried oil was reported, which would manifest itself with surface sheening. Evidence of oil was not observed on the water surface, in the sediment, or on the absorbent pads during the raking activities. To further evaluate the potential presence of buried oil at depth, 23 test pits were excavated in the stream channel and along the channel banks (Figure 5). The test pits were of uniform size and depth, approximately 1 foot in diameter and 6 inches deep. Oil sheen and/or particles were not observed in 20 of the 23 test pits. In one test pit (5C), a 1-inch

thick "lens" of oily sediment approximately 6 inches in diameter was removed. The lens was beneath approximately 3 inches of un-impacted sediment, and was tacky to the touch. An additional test pit (5D) was excavated adjacent to 5C to evaluate the extent of buried oil in the immediate area. Oil was not observed in 5D, indicating that the oily sediment lens was likely a localized condition. Small areas of oil sheen (up to approximately dime-size) were observed in test pits 7A and 7C. Several cobbles with dried, hardened oil splatter (generally about 1 inch diameter) were observed on the shoreline and removed by the field team. The volume of rocks removed was approximately one-half to two-thirds of a 5-gallon bucket (approximately 50 pounds).

The field team also inspected the back-barrier marsh area, including standing water surfaces, marsh surface, and the "sandbar" (technically identified as a flood-tidal delta) in the pond. Naturally-occurring inorganic sheens were observed on the water surface at the east side of the pond and in the drainage channels. White-colored material, tentatively identified as a mold or fungus was observed in standing water surrounding decaying vegetation. Black algae was observed on mussel shells located in the central portion of the marsh. Evidence of residual oil was not observed on marsh sediment, standing water surfaces, or on the "sandbar" sediment during the inspection activities. However, it was recognized that the marsh grass/vegetation present during the visual inspection of the marsh may have obstructed view of potential oil on the marsh surface. Therefore, a second survey was conducted on November 20, 2006, after the end of the growing season when marsh grass is dormant, to facilitate inspection of the marsh surface. Similar conditions (i.e., inorganic sheens, white mold or fungus, and black algae) were observed during the second marsh inspection, and evidence of residual oil was not observed.

On March 26, 2007 GeoInsight received an e-mail (dated March 25, 2007) from a resident who reported rocks covered with a black substance suspected to be oil. A field visit was conducted on March 27, 2007 with the husband of the resident and two other residents who were present. Two cobbles approximately 3 inches in diameter with residual oil were found and removed. The residual oil on one cobble was soft and tacky to the touch, and the oil on the other cobble was weathered and hardened. Naturally-occurring black sediment (anoxic sediment) was also

observed below the beach surface, and pieces of black-to-brown eelgrass or seaweed wrack were also observed on the shoreline surface.

After the field visit, GeoInsight received a phone call from another resident who indicated that another location with residual oil was present on the shoreline. A field visit was conducted on March 28, 2007 and the field team met with the resident who sent the March 25, 2007 e-mail and her husband (the resident who phoned in the report of oil was not available to meet with the field team). The field team found and removed one 5-gallon pail of cobbles with residual oil (approximately 100 pounds of cobbles). The residual oil consisted mostly of hardened splatter that was not tacky to the touch. Residual oil was also scraped off a rock that was too large to be removed. The residual oil on this rock was weathered and hard on the surface, but soft and tacky below the surface. The cobbles will be disposed as part of the material generated during the Phase IV cleanup activities at Hoppy's Landing. Residual oil was not observed elsewhere on the shoreline at this location.

3.2.2 West Island West (Segment W2A-11)

On July 31, 2006, GeoInsight received a phone call from a citizen who reported residual oil at the shoreline at 28 Alder Street in Fairhaven. The citizen described a black coating on a rock retaining wall, visible during low tide. The following day, representatives from GeoInsight and ENTRIX responded to this report. The inspection team observed a growth of naturally-occurring black algae on rocks and beach sediments, and evidence of oil was not observed at the property. Two groins were inspected south of the property and one hardened dime-sized residual oil splatter on one rock was observed on the southernmost groin.

3.2.3 Mattapoisett Shores (Segment W1F-07)

On July 31, 2006, GeoInsight received a phone call from a citizen who reported residual oil on a rock groin located at 44 Ocean Drive in Mattapoisett (located in segment W1F-07 – Mattapoisctt Shores). The following day, representatives from GeoInsight and ENTRIX responded to the report of oil. The field team observed a considerable amount of black algae growing on the rock

groin and rocks in the intertidal zone near the high tide line. Sporadic, tacky oil splatter (typically 4 to 6 inches in diameter) was observed on some of the rocks in the layer below the top rock layer near the end of the groin. A second groin, located at 42 Ocean Drive, was also inspected during the site visit. One tar patty (approximately 4 inches in diameter) was found and removed from the groin surface. A trace amount of hard, weathered, dime-size splatter was observed along the groin. Evidence of oil was not observed on the sandy beach located between the two groins.

On August 21, 2006, the LSP and GeoInsight returned to 44 Ocean Drive to further assess the degree of residual oil relative to the conditions identified in the partial Class A-2 RAO. The conditions present at the area of concern were found to be consistent with the RAO (i.e., the small amount of residual oil splatter did not constitute a Condition of Significant Risk), and further response actions were not warranted.

3.2.4 Blankinship Cove (Segment W1C-04)

On August 5, 2006, GeoInsight personnel responded to a report of oil at 520 Point Road in Marion. A heavy growth of black algae was observed on beach cobbles and on boulders of a nearby groin. An area (approximately three square feet) with sporadic, tacky oil splatter was observed on boulders within the groin. The splatter was predominantly located on the lower tier of boulders on the groin and could not be accessed by the field team for removal. The small amount of oil splatter was not directly accessible for contact, was consistent with the RAO (i.e., the small amount of residual oil splatter did not constitute a Condition of Significant Risk), and further response actions were not warranted.

3.2.5 Nye's Neck (Segment E1-13)

On August 9, 2006, GeoInsight and ENTRIX responded to a report of oil at 20 Point Road in Falmouth. An isolated splatter (approximately 0.5 by 1 inch) on a rock and one tarball (approximately 0.5 by 1 inch) were found and removed for disposal. Black algae was observed on cobbles in the lower intertidal zone.

On August 10, 2006, GeoInsight responded to a report of oil at 25 Sunset Point Road in Falmouth. The field team found and removed one oiled cobble from the intertidal zone. Weathered oil splatter covered approximately 10 percent of the cobble surface.

On August 21, 2006, the LSP and GeoInsight responded to a report of oil at 25 Sunset Point Road in Falmouth. Very hard splatter was observed on rocks; however, it was not consistent with B120 oil and was considered to be from another unidentified oil release. On the same date, GeoInsight returned to 20 Point Road in Falmouth. The resident indicated to the LSP and GeoInsight that five boulders (each approximately three feet in diameter) were moved during the initial cleanup activities at this property conducted by Unified Command in 2003. The boulders were located on the shore above mean high tide within approximately 15 feet from an existing rock groin, and the boulders were approximately the same size, angularity, and composition as the rocks in the groin. A representative from Gallagher Marine Systems (the company that oversaw the initial cleanup activities) indicated that, according to their records, a Bobcat loader was used in this area during the initial cleanup. Although their records did not indicate that rocks were moved during the initial cleanup, it is possible that the boulders were moved by the Bobcat to clean oil in the groin. On October 16, 2006, the five boulders were moved onto the groin to locations indicated by the homeowner.

3.2.6 Crow Point (Segment E1-15)

On August 10, 2006, GeoInsight responded to a report of oil at 188 Bayshore Drive in Falmouth. The field team observed a heavy growth of black algae on cobbles in the area. One tar patty (approximately 3 inches by 2 inches by 0.75 inches thick) was found and removed for disposal. Hardened, weathered splatter was observed on one cobble in the intertidal zone covering approximately 10 percent of the surface area.

3.2.7 Silver Shell Beach (Segment W2A-06)

On August 21, 2006, GeoInsight received a phone call from a citizen who reported residual oil in a back-barrier marsh at 8 Windward Drive in Fairhaven. This location is part of shoreline

segment W2A-06 Silver Shell Beach. The field team conducted a visual inspection of the marsh area and evidence of oil was not observed. However, a naturally-occurring inorganic sheen was observed on the surface of stagnant water in the marsh.

3.2.8 New Silver Shell Beach (Wild Harbor) – (Segment E1-14)

On August 23, 2006, GeoInsight received a call from a citizen who observed oiled rocks visible during low tide at 40 Point Road in Falmouth. The following day, a field team met with the residents and conducted a visual inspection at the area of concern. Black algae was observed on the rocks in the lower intertidal zone, not B120 oil. One cobble, covered in soft, tacky oil, was removed by the field team. An isolated patch of very thin, weathered splatter was observed on a large cobble located above the high tide line.

3.2.9 Sunset Beach (Segment W2A-05), Harbor View (Segment W2A-02), and Clark's Cove West (Segment W2B-03)

On September 7, 2006, GeoInsight and ENTRIX responded to a report of oil near the foot of Jerusalem Road (in shoreline segment W2A-05, Sunset Beach). The citizen described dark staining on rocks in the lower intertidal zone, visible during full moon low tide. The inspection team observed a very thick growth of naturally-occurring black algae on rocks and beach sediments. In some areas the algal material was dry and cracking, and could be peeled off with a fingernail. One tarball (approximately 2 inches in diameter) was found and removed from the middle intertidal zone. The resident supplied photographs of the beach area from a previous full moon low tide to GeoInsight for further review, and the photographs showed black algae on rocks, not oil.

On October 6, 2006, GeoInsight received a phone call reporting residual oil near the end of Jerusalem Road on Sconticut Neck West in Fairhaven (in shoreline segment W2A-05, Sunset Beach) and at 20 Harborview Avenue in Fairhaven (part of segment W2A-02). The report included observations of tarballs, splatter, and a "brown sticky material" on the underside of rocks. On October 7, 2006, the LSP and GeoInsight conducted visual inspections of the two

areas. At Sconticut Neck West, hardened splatter was observed on I-beam pylons at the end Jerusalem Road; however, the material was not consistent with B120 oil and appeared to be roadway asphalt and/or a resurfacing agent associated with roadway construction. Extremely limited hardened oil splatter, generally 1 inch in diameter or less, was observed on fewer than 10 rocks near the high tide line. Several chunks of roadway pavement were observed on the beach, particularly near the ends of Jerusalem Road and Calumet Street. The roadway at the foot of at Calumet Street appeared to be "crumbling" due to wave action eroding and undercutting the asphalt. Approximately 50 cobbles were overturned in response to the report of "brown sticky material" on the underside of rocks. The field team observed brown, rust-colored iron staining and black organic sediment; however, evidence of residual oil was not observed. The field team also observed pieces of slag on the surface of the beach. At 20 Harborview Avenue, substantial amounts of slag, coal, and roadway pavement were present on the beach surface. In addition, amphibolite rocks (a rock containing the black mineral amphibole) were also observed on the beach. The only evidence of B120 oil observed was on one rock with two spots of dried, hardened splatter that measured approximately 1 inch by 0.5 inch and 0.25 inch diameter.

On October 25, 2006, the LSP and GeoInsight met in the field with an individual who reported oil and requested an inspection of various areas along Sconticut Neck West. The individual also indicated that residual oil was present at Mosher's Point in Dartmouth, part of shoreline segment W2B-03, Clark's Cove West. During the inspection at Sconticut Neck West, three shells were found with a thin, hardened, residual oil coating on the inside of the shells. The other observations were consistent with the October 7, 2006 field inspection in this area as described above (i.e., primarily non-B120 oil with some highly localized B120 splatter). The field team accompanied the person who reported the oil to Mosher's Point and observed many pieces of thin, flexible material similar to tar paper with gravel embedded in one surface. This material was encountered in the vicinity of a rip rap seawall where slag, coal, and other debris (interpreted to be fill) was placed. The oil on the thin, flexible tar paper-like material was tentatively interpreted in the field to be roofing tar from a tar and gravel roof. A sample of this material, labeled W2B-03-S2, was collected for potential fingerprint analysis. Several very hard rounded tarballs approximately 1 inch in diameter, interpreted to be roadway pavement, were also observed in this area. A sample of these tarballs, labeled W2B-03-S1, was collected for potential

fingerprint analysis. Weathered oil splatter, consistent with B120 oil, was observed in some of the interstitial spaces between the boulders in the seawall. A tarball sample of splatter material, labeled Exhibit 31, was collected from an interstitial space in the seawall.

During the field inspection, the person also showed GeoInsight samples of material that were collected from various locations around Buzzards Bay and were in his possession. GeoInsight took splits of the following samples for potential laboratory analysis:

Sample Identification	Shoreline Segment Name	Shoreline Segment Number	Sample Location
Exhibit A	Sunset Beach, Fairhaven	W2A-05	Within a 10-yard radius of the end of Jerusalem Road
Exhibit B	Sunset Beach, Fairhaven	W2A-05	Within a 10-yard radius of the end of Jerusalem Road
Exhibit 15	Mishaum Point West, Dartmouth	W3B-02	West-facing beach near 142 Mishaum Point Road
Exhibit 19	Mishaum Point West, Dartmouth	W3B-02	West-facing beach near 142 Mishaum Point Road
Exhibit 26	Clark's Cove West, Dartmouth	W2B-03	Eastward-facing beach at Mosher's Point, near intersection of Sol-E-Mar Street and Mosher Street
Exhibit 27	Clark's Cove West, Dartmouth	W2B-03	Eastward-facing beach at Mosher's Point, near intersection of Sol-E-Mar Street and Mosher Street
Exhibit 28	Clark's Cove West, Dartmouth	W2B-03	Eastward-facing beach at Mosher's Point, near intersection of Sol-E-Mar Street and Mosher Street

Samples W2B-03-S2, Exhibit A, Exhibit B, and Exhibit 31 were submitted for laboratory analysis. Additional information regarding the laboratory analysis of selected samples is included in Section 3.3 of this report.

3.2.10 Mishaum Point West (Segment W3B-02)

On January 23, 2007 the individual who reported oil at Mosher's Point, Sconticut Neck, and Clark's Cove West indicated that two of the samples described above were collected at Mishaum Point West (Exhibits 15 and 19) from an area of residual oil present on the shoreline approximately 100 yards south of a dock near 142 Mishaum Point Road. A field visit was conducted by the LSP and GeoInsight at Mishaum Point West on January 23, 2007 to evaluate for the presence of residual oil at this location. The shoreline was inspected to a distance of approximately 200 yards south of the dock and two small (1 inch diameter) pieces of hardened splatter were observed on rock surfaces. Black algae was present on many of the rock surfaces. GeoInsight contacted the individual who reported the oil after the field visit and another field visit was conducted on March 14, 2007. The shoreline was inspected to a distance of approximately 300 to 400 yards south of the dock and residual oil was not observed during the inspection. Black algae was observed on rocks in some areas.

3.3 SAMPLE ANALYSIS

3.3.1 Brandt Island West (Segment W1F-02)

The samples of oil particles in test pits collected with Teflon® nets on September 20, 2006 (described in Section 3.1.1.2) were submitted for fingerprint analysis. The analytical results were reviewed by a forensic chemist relative to fresh and weathered B120 oil to evaluate whether these samples were consistent with B120 oil. The forensic chemist report is included as Appendix C. The forensic report indicated that the samples contained primarily weathered B120 oil, with minor contribution of a non-B120 oil and plant waxes.

3.3.2 Sunset Beach (Segment W2A-05) and Clark's Cove West (Segment W2B-03)

Of the samples collected on October 25, 2006 (described in Section 3.2.9), sample W2B-03-S2 was submitted for fingerprint analysis because of the relatively large number of pieces of this material observed in this area. The remaining samples were visually evaluated and three additional samples (Exhibits 31, A, and B) that had physical characteristics most similar to B120 oil were also submitted for fingerprint analysis. The laboratory reports of the fingerprint analyses are included in Appendix E. The analytical results were reviewed by a forensic chemist relative to fresh and weathered B120 oil to evaluate whether these samples were consistent with B120 oil. The forensic chemist report is included as Appendix F. The report indicates that sample W2B-03-S2 is not B120 oil and is pyrogenic in origin, which is consistent with the field interpretation that this material is roofing tar from a tar and gravel roof. The report indicates that the Exhibits 31, A, and B samples have a signature that is consistent with weathered B120 oil, although the Exhibit B sample appears to be a mixture of B120 oil and another oil.

3.4 POST-SAMPLE ANALYSIS SHORELINE INSPECTIONS

Based on the forensic evaluation of the analytical results for the three samples collected in October 2006 that contained B120 oil (Exhibits A, B and 31), additional field inspections were conducted to evaluate whether the degree of residual oil at these locations warranted cleanup activities, or whether additional analysis of the remaining samples should be conducted. On January 23, 2007 field inspections were conducted at the end of Jerusalem Road in Fairhaven (segment W2A-05), Mosher's Point in Dartmouth (segment W2B-03), and Mishaum Point in Dartmouth (segment W3B-02). At the three locations, only limited, isolated amounts of hardened splatter less than 1 inch diameter were observed on a few (less than 10) rock surfaces. Black algae was observed at the three locations, as well as slag, roadway pavement (particularly at Jerusalem Road and Mosher's Point), and other flotsam (e.g., tires, burned wood). These observations were consistent with conditions upon which the partial Class A-2 RAO was based. Therefore, the observed conditions at these segments are considered to present a Condition of No Significant Risk to human health, public welfare, safety, and the environment and that further cleanup activities were not warranted.

4.0 REMEDIATION WASTE

A small amount of remediation waste, less than approximately two cubic feet of oiled rocks and small tarballs, was generated by IRA activities during this monitoring period. Remediation waste will be incorporated into the material removed from Hoppy's Landing during Phase IV cleanup activities that were initiated in December 2006.

5.0 IRA COMPLETION STATEMENT

The objectives of the IRA are described in the September 15, 2003 IRA Plan and in Section 3.0 of this report. IRA activities conducted since September 2003 have consisted of field inspections of shoreline segments for residual oil, surveys for potentially buried oil, response to reports of oil, and cleanup activities to remove residual oil. IRA cleanup activities generally consisted of removing isolated small tarballs (typically less than 2 inches in diameter) or wrack patties, wiping tacky oil from rocks using sorbent material, and removing small rocks with oil that could not be effectively wiped or cleaned. These activities were conducted by IRA reconnaissance teams during periodic shoreline inspections or in response to reports of oil. During several IRA cleanup operations, additional personnel from Fleet Environmental Services, Inc. (Fleet) were retained to assist the field teams in cleanup activities at several segments, including Naushon Island, Brandt Island West, Hoppy's Landing (Long Island), Planting Island Causeway, and Strawberry Point West. In addition, the following IRA Plan Modifications and Proposed IRA Cleanup Activity letters were submitted to MADEP for segment-specific IRA cleanup activities.

Report Date	Report Title	Segment Name and Identification
April 23, 2004	Immediate Response Action Plan Modification	Long Island and Causeway South (W2A-10)
June 8, 2004	Immediate Response Action Plan Modification	Long Island and Causeway South (W2A-10)
September 21, 2004	Proposed IRA Cleanup Activities	Brandt Island West (W1F-02)
December 1, 2004	Proposed IRA Cleanup Activities	Strawberry Point West (W1E-03)
July 7, 2005	Proposed Additional IRA Cleanup Activities	Brandt Island West (W1F-02)
July 7, 2005	Immediate Response Action Plan Modification	West Island West (W2A-11)
August 16, 2005	Immediate Response Action Plan Modification	Harbor View (W2A-02)
November 18, 2005	Immediate Response Action Plan Modification	Long Island and Causeway South (W2A-10)
April 5, 2006	Immediate Response Action Plan Modification	Pope's Beach (W2A-03)

A condition of No Significant Risk has been achieved at 118 of the 120 shoreline segments that were oiled by the release and the subtidal area of Buzzards Bay, as described in the May 2004 and August 2006 Partial Class A-2 RAO Statements for these segments and the subtidal area. Comprehensive response actions are being conducted within limited portions of the two shoreline segments that were not included in the RAO Statements, segments W1F-02 (Brandt Island West) and W2A-10 (Long Island and Causeway South). The objectives identified in the IRA Plan are considered to be complete, and additional assessment and cleanup activities at Brandt Island West and Long Island Causeway South, if required, will be conducted as part of Comprehensive Response Actions.