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Supplemental Remedial Investigation Field Work
Subject to April 2011 Supplemental Remedial Investigation Work Plan & November 9, 2010 Stipulation of Discontinuance

Harbor Isle
7 Washington Avenue
Harbor Island, NY

Prepared for
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A. Introduction

This report has been prepared for Brownfield Cleanup Program (BCP) Volunteer Posillico Development Company at Harbor Isle (PDC) to describe the results of the supplemental remedial investigation requested by the New York State Department of Environmental Conservation (DEC) to complete the remedial investigation (RI) at the former Cibro Brothers Petroleum Terminal located at 7 Washington Avenue, Harbor Island, NY (Site). The DEC remediation and guidance document DER-10 was used to guide the activities and procedures used during the investigation.

During July and August 2011, soil and sediment samples were collected at 49 locations up to five depths at each location. The samples were examined in the field for gross contamination and volatile organic vapors, and were analyzed by an ELAP-approved laboratory for ten VOC and thirty SVOC Tentatively-Identified Compounds (TICs) with the objective of identifying any source areas that may require subsequent actions to prepare the Site for restricted residential development pursuant to a BCP Track 4 remedy.

An entity named Blue Island Development LLC ("Blue Island") purchased the Site in November 2000 after all petroleum-related operations had ceased. Blue Island entered into a contract with PDC in 2005 to develop the property. PDC entered into a Brownfield Cleanup Agreement (BCA) with the DEC on April 14, 2006. This agreement was subsequently amended in 2010 and additional field work requested by the DEC in Stipulation Exhibit B to complete the delineation of the source area was performed and is summarized in this report. See November 9, 2010 stipulation and exhibits reproduced in Appendix A.

1. Workplan Objectives

A workplan covering the additional field work was accepted by the DEC on April 26, 2011. The activities in that work plan are listed below and were an integral part of the Stipulation Exhibit B. This report summarizes the investigation and presents the results of the Supplemental Remedial Investigation.

Activities 1-6 listed below and in Stipulation Exhibit B were the objectives accomplished by the field work described herein. Activities 7-9 will be completed during the construction phase of the project.

1. Install 5 temporary wells to fill gaps in the groundwater monitoring network.
2. Measure free product in all wells and, if oil is found, sample it instead of the groundwater.

3. Collect groundwater samples from wells that don't have free product: max 10 samples.
4. Collect sediment and groundwater samples from below the peat at three locations.
5. Collect surficial soil samples in a 100-ft grid in only the accessible and undisturbed areas. Analyze the indicated percent of collected samples for the following constituents: 100% lead, 20% PCBs, 30% RCRA metals. Sample inaccessible areas during remediation if samples from adjacent areas show excessive levels of tested constituents.
6. Collect five 0.5-2 ft deep soil samples in the area previously delineated as clean that will be analyzed by Methods 8260+10 and 8270+20 [the intent was to analyze for 30 TICs] for VOCs and SVOCs, respectively.
7. Find the historical 3000-gal UST formerly observed near the filling racks during the remediation/construction phase.
8. Include sediment sampling in the canal along the bulkhead as a requirement in the bulkhead reconstruction permit.
9. During the remediation phase determine if soil vapor mitigation will be needed. (See items #8 and #9 on remediation below).

Table 1 contains a summary of the samples collected at 49 locations and 222 laboratory analyses completed during this part of the project. The laboratory results and field observations were used to identify soil considered "source material" according to the following criteria that were in the November 9, 2010 Stipulation:

a. Meet the definition of 6NYCRR375-1.2(u), which defines grossly-contaminated soil as "soil, sediment, surface water or groundwater which contains sources or substantial quantities of mobile contamination in the form of NAPL, as defined in subdivision 375-1.2 (ac), that is identifiable either visually, through strong odor, by elevated contaminant vapor levels or is otherwise readily detectable without laboratory analysis".
b. Exceed a total TIC content of 100 PPM for 30 SVOC TICs, and/or 10 PPM for 10 VOC TICs; or
c. Exceed a PID meter reading of 250 PPM.

2. Quality Assurance

All of the field activities followed an approved Quality Assurance Plan (QAP) that is in Appendix B.

3. Site Location

The Site is located at the southern terminus of Washington Avenue on Harbor Island, Nassau County, New York (Figure 1). According to Nassau County tax maps, the Site is identified as Block 381, Lots 35, 36, 102, 314 and 323. Surface water bodies border the Site on three sides: Island Park Canal to the east; Wreck Lead Channel to the south; and Simmons Hassock Creek to the west. As noted above, residential properties border the Site to the north and northwest, and an operating marina borders the Site to the southwest. The property was zoned Y Industrial District at the beginning of this BCP Project. In 2007, PDC received a zoning change from Y-Industrial to CA-Residential.

4. Physical Setting

The Site layout is shown on Figure 2. With the exception of a small building to the south and several concrete bases used to support above-ground storage tanks (ASTs) that are no longer on the property, all above-grade structures were removed prior to Blue Island's purchase. Most of the Site is covered by vegetation, soil stockpiles, recycled concrete aggregate stockpiles or exposed soil, with the remainder covered by asphalt-paved roadways and the previously-mentioned concrete tank bases. Most of the shoreline is supported by a bulkhead, except for a portion to the west, which is at sea level and contains a mapped wetland as defined under Article 25 of the NYS Environmental Conservation Law.

The Site topography is relatively flat. According to the United States Geological Survey (USGS) 7.5-minute series topographic map (Lawrence, New York quadrangle) the Site is approximately seven feet above mean sea level. Surface water bodies, consisting of Island Park Canal, Wreck Lead Channel, and Simmons Hassock Creek, border the property to the east, south and west, respectively. Stormwater percolates through the soil or ponds on land surface during heavy storm events.

5. Geology and Hydrogeology

The Site is underlain by Cretaceous and Quaternary sediments, which rest unconformably on weathered Precambrian-aged biotite schist and gneissic bedrock. Depth to bedrock in the Long Island area ranges between 200 and 1,800 feet below grade. The late Cretaceous deposits are predominately associated with the Raritan and Magothy Formations, consisting of interbedded sand, gravel, silt and clay. Quaternary sediments of Pleistocene and younger age form the surficial deposits throughout the region and consist of sand, gravel, glacial till and associated outwash.

Site-specific hydrogeologic conditions consist of a tidally influenced, unconfined aquifer within the shallow fill and glacial fluvial deposits underlying the property. Prior investigations encountered a peat layer approximately nine feet below grade. Depth to the watertable varies as a result of tidal effects, but is approximately four to six feet below grade. Groundwater flows from the northwest corner of the property towards the east-southeast, and diffuses into the adjacent saltwater bodies.

B. Field Work

During May-June 2011, the following tasks were completed to prepare the Site for the field program:

1. Site Preparation

Prior to collecting any groundwater samples, the integrity of existing wells was inspected, and the locations of any replacement and additional wells were marked out. A 100-ft orthogonal grid was surveyed to identify the ideal target locations for collecting the soil samples. The feasibility of collecting samples at the proposed grid was then evaluated. Grid points falling on disturbed soil or flooded parts of the Site were moved to more appropriate/accessible locations. In some instances pathways were constructed to allow the sampling and well drilling equipment access to various parts of the Site that were deemed important to sample. The proposed and final sampling locations are shown on Figure 3.

a) Inspect the integrity of the existing wells and redevelop usable wells

On May 23, 2011 the existing wells were located and tested for their integrity and ability to produce representative groundwater samples. The well locations are shown on Figure 4. Wells numbered from 1 through 12 were previously-existing wells. As eight previously-installed were still viable, Wells 13-16 are the four new wells installed to complete the watertable monitoring well network required by Stipulation Activity 1 above. Wells 15D, 16D and 17D were installed into the sandy zone underlying the peat layer that separates the shallow groundwater from the deeper zone required by Stipulation Activity 4 above. Table 2 contains construction information for the wells. A detailed description of the well installation process is contained in Section B-3 below.

b) Survey locations

The initial 100-ft grid was laid out on May 23, 2011. The locations were plotted on a map and those that were inaccessible were either eliminated or moved. A revised proposed sampling location map was sent to the DEC on May 25, 2011. On June 23, 2011, based on comments from the DEC, additional locations were established, and the map showing the final sampling points was approved by the DEC on June 30, 2011 (Figure 3).

2. Soil Sampling

The soil sampling was carried out from July 20-21, and on August 3, 2011. The soil boring locations are shown on Figure 3.

As mentioned previously, the objectives of the soil sampling were to describe the soil quality aerially and vertically in the potions of the Site previously-defined as contaminated and uncontaminated. Surficial soil samples in the 0 to 6-in deep zone (designated "A" in the numbering sequence) were to be collected where the existing land surface was not disturbed required by Stipulation Activity 5 above. At some of these locations, deeper samples were also collected at various intervals depending on the location of the sampling site required by Stipulation Activity 6 above. In general, the depths that were sampled were 0.5-3 ft, one foot below the Activity 6 required depth below land surface (bls, designated the "B" depth interval). The depth of this interval was increased one foot by using a boring rig instead of a hand auger to collect the sample. It would have been difficult to collect a representative soil sample from this 2.5-ft interval and 3-ft depth using a hand auger, so the boring rig was used to increase the integrity of the samples from this zone and to make sure a gap in samples wasn't present between this zone and the next sampling interval.

The next sampling intervals were 3-7 ft bls ("C"), 7-ft bls to the top of the peat layer ("D"), and from the top of the sandy zone under the peat layer ("E"). The procedures used to collect the samples are described ahead, and a matrix of the number of samples collected at each depth and the analyses performed is contained in Table 1.

The work plan and Stipulation Exhibit B set a goal of collecting surficial samples at each 100-ft node if the area was undisturbed, and performing the following analyses on the samples: 100% of the soil samples were to be analyzed for lead; 30% for the Target Analyte List of RCRA metals (TAL); and 20% for polychlorinated biphenyls (PCBs).

Existing Site conditions caused some challenges to implementation of the Supplemental RI surficial soil sampling requirements. Trenches were excavated for pilot tests conducted in 2007, which disturbed surficial soils. Flooding of parts of the Site is an ongoing problem due to high tides, excessive rainfall, and the low elevation of the property. Surficial aggregate and fill piles from demolished tank bases also obscure some of the underlying surficial soil. Therefore, in some of the areas, the surface soil has been removed and reworked. Nevertheless, a total of twenty locations were deemed undisturbed and suitable for surficial soil conditions. Of these, all (100%) were analyzed for lead, 9 (45%) for PCBs, and 8 (40%) for TAL metals, which exceeds the amounts required in the work plan and Stipulation Exhibit B.

Thirty-nine shallow borings were installed above the peat layer, and three borings were installed into the sediments underlying the peat as required. The borings and soil sampling were conducted on July 20, 21 and August 3, 2011. Mr. Nick Acampora of the DEC was present on the first day of field work to observe the operations. Work started at 9:45 AM and he arrived at the site at 11:20 AM and left in the afternoon before operations were completed that day. Mr. John Sheehan of the DEC observed site activities on August 3, 2011. Work started at 8:21 AM and the DEC was present from 11:30 AM until the afternoon, prior to completing the day's activities.

The samples were analyzed by Environmental Quality Services, Inc (EQS), which is a DEC ELAP-approved facility. EQS provided a Category B data validation package for all of the analyses that was delivered to L. A. B. Validation Corporation on October 13, 2011 for the Data Usability Study. Their report is in Appendix C.

a) Surficial Soil Samples

Twenty surficial "A-depth" soil samples were collected with a sampling trowel cleaned in Alconox detergent solution and rinsed prior to and after each use. Dedicated Nitrile gloves were used at each sample location and disposed of after individual use.

The sampling technique involved scraping away the surficial fill until the subsoil was exposed. A grab sample was collected using the trowel by compositing the soil in a 6-in diameter hole, 6-in deep before the sample was taken. The sample was then placed into clean/dedicated, laboratory supplied glassware using the sample trowel, and the bottle was placed into ice-filled cooler for preservation.

b) Deeper Soil Samples

Although the Work Plan specified that the B-depth samples would be collected using a hand auger, all of the samples deeper than 0-0.5 ft below land surface were collected using either a single-tube, track mounted Geoprobe 54-LT, or a double-tube, track mounted, Geoprobe 7822 drilling rig. As explained above, the depth of the B-samples was increased one foot to make sure the 2-ft to 3-ft deep zone was included in the site characterization, and the sampling method was changed from a hand auger to a boring rig to increase the sample integrity. The Geoprobe 54-LT was used for all borings installed on July 20, 2011. The Geoprobe 7822 was used to install all of the subsequent borings as it had dual-tube capability, which facilitated deeper sampling into the peat layer of the Site.

The procedure followed using the Geoprobe 54-LT to collect the samples was to position the rig at the desired location and push a 5-ft long 2-in diameter sampling tube containing a new clear plastic liner into the ground. The sampling tube would then be extracted, the liner containing the soil removed, and placed on clean plastic sheeting and cut open to reveal its contents. The tube was then cleaned in Alconox and rinsed in potable water, a new liner installed and then it was placed into the hole and lowered to the depth of the previous sample. A drive rod was then attached to the core tube, and the tube was driven to the next 5-ft depth where the process was repeated until the top of the peat layer was encountered.

The Geoprobe 7822 rig was used for the deeper borings including those into the sandy zone underlying the peat layer, as its dual-tube capability prevented any cave-ins from occurring that could contaminate the deeper samples. This capability was also needed to prevent any groundwater movement between the shallow and deeper permeable zones.

The dual tube procedure involved using a 3.25-in OD outer casing into which a liner sheath was inserted. The outer tube was pushed into the ground with the inner tube collecting the core. When the tubes were fully-inserted into the ground, at 5-ft increments, the inner core barrel was extracted and the core handled as described above. The outer tube remained in place to prevent any material from the side of the hole from caving in, and then the inner coring tube was reinserted to the bottom of the hoe, 5-ft of outer casing and drive rod was attached to each casing and then pushed to the next increment, where the coring tube was removed.

The soil core extracted from the boring was examined by the field geologist, described geologically, any free product was noted, and vapor readings were taken using a PID meter. Generally cores were taken at the B and C depths, and the D depth when either the C –dept boring looked like it wasn't clean or the D depth-boring looked like it may have contained contaminants.

The sampler and drilling staff all used clean nitrile gloves at each location. All drilling and sampling equipment was cleaned between samples and between each sampling location.

The holes that did not extend through the peat layer were backfilled with the portion of the core samples not selected for laboratory analysis. The holes that extended through the peat layer were backfilled with bentonite pellets to prevent any groundwater and soil exchange between the shallow and deeper sediments. The bentonite-pellet-filled portion of the boring extended above the layer, after which unused core material was placed back into the hole.

3. Monitoring Well Installation

The new wells were installed on August 9, 2011, and groundwater samples were collected on August 12 and 17, 2011. The monitoring-well network is shown on Figure 4. The network consists of three wells installed below the peat layer and twelve wells installed into the shallow groundwater system. All of the deep wells and four shallow wells were installed during this field program. Well construction details are shown in Table 2 and the well construction logs are in Appendix D. Although the approved work plan specified using temporary shallow wells, it was decided to install permanent wells to insure the integrity of the wells and samples.

All of the new wells were installed using the Geoprobe 7822 drilling rig, through hollow-stem augers. The procedure was to install a plug into the front of the auger and drill to the desired depth. The well casing and screen was then lowered into the annulus and the augers were lifted while the well was kept in place to push the plug out. Approximately 6-in of the screen was exposed and clean gravel was placed into the space between the inside of the auger and the well until it covered the screened interval. The auger was retracted as the gravel was added to make sure the gravel moved into the borehole between the formation and the screen. Once a minimum of 1-ft of gravel extended above the screen zone, bentonite pellets were added until 2-3 ft below land surface, or just below land surface for the shallow wells. The protective, locking metal casing was then cemented into place sealing the borehole.

The bentonite seal in the deep wells extended through the peat layer, sealing the borehole to prevent any groundwater circulation between the shallow and deeper zones.

The monitoring wells were developed on the day that they were sampled, and the purging/sampling details are shown in Table 3

The augers were cleaned with a detergent wash and potable water rinse between each borehole.

The well locations were surveyed and the elevation of the measuring point was established to enable the elevation of the watertable to be calculated. The data are shown in Table 2.

4. Groundwater Sampling

All of the wells, except LMW-4 were sampled on August 12, 2011. Prior to purging the well, the depth-to-water and the depth to the bottom of the well were measured. The volume of water in the well was calculated and at least three times that volume was removed from the well using a dedicated clean polyethylene bailer to insure that a fresh water sample was collected.

The water sample was then transferred from the same bailer to the appropriate sampling bottles, which were stored in an ice-cooled freezer chest. The samples were delivered to the laboratory at the end of the day.

Well LMW-4 was sampled on August 20, 2011 using a peristaltic pump. Only the waterlevel in the well and its depth were measured on August 12^{th} as a blockage in the casing prevented the bailer from reaching the waterlevel. The narrow polyethylene tubing of the pump was able to reach below the waterlevel and the appropriate volume of water was purged prior to sampling. The samples were taken from the discharge of the pump and the bottles were handled as mentioned above.

5. Data Usability Study Report (DUSR)

The analytical results and Category B data package were examined by L.A.B. Validation Corporation to insure that the proper procedures were followed by the laboratory and the reported results are accurate. The DUSR report is in Appendix C.

The DUSR conclusions had no affect on the validity of the results of this Supplemental RI.

C. Results

As mentioned in Section A.1: The laboratory results and field observations will be used to identify soil considered "source material" according to the following criteria:

a. Meet the definition of 6NYCRR375-1.2(u), which defines Grossly-contaminated soil as "soil, sediment, surface water or groundwater which contains sources or substantial quantities of mobile contamination in the form of NAPL, as defined in subdivision 375-1.2 (ac), that is identifiable either visually, through strong odor, by elevated contaminant vapor levels or is otherwise readily detectable without laboratory analysis".

b. Exceed a total TIC content of 100 PPM for 30 SVOC TICs and/or 10 PPM for 10 VOC TICs; or

c. Exceeds a PID meter reading of 250 PPM."

1. Gross Contamination and PID Reading

Soil and sediment samples were collected on July 20th, 21^{st}, and August 3^{rd}, 2011. All of the soil cores were inspected for free product or other signs of gross contamination. The relative amount of volatile organic vapors was also measured using a MultiRAE Plus photoionization detector (PID) meter. In addition, any odors were also noted, and the observations were recorded in the well logs (Appendix D).

None of the samples meet the first two criteria in the grossly-contaminated soil definition; namely the soil contained no free product and did not exhibit a PID reading above the 250 PPM limit. While some of the cores (shown on Figure 6-10) did have a slight petroleum odor, none of the cores had a strong petroleum odor.

Based on the field observations and meter readings, none of the cores met the definition of grossly-contaminated soil contamination.

2. TIC Content

The soil samples were analyzed for either one or more of the following groups of constituents: 8260/8270 VOCs/SVOCs plus 10 VOC or 30 SVOC Tentatively-Identified compounds (TICs), TAL metals, lead, and PCBs. As shown in summary Table 1, forty-nine (49) locations were sampled at either one or more depths. These consisted of thirty-nine (39) borings installed above the peat layer, three (3) borings installed into the sediments underlying the peat and eleven (11) locations where only surficial soil samples were collected. A total of twenty (20) surficial samples were collected and eight (8) of these were analyzed for VOCs and SVOCs in addition to the lead and/or PCBs and TAL metals. Figure 5 shows the surficial sampling locations and analytical results.

Eighty-five (85) additional samples from various depths were analyzed for VOCs and SVOCs.

The laboratory results for total VOC and total SVOC TICs are shown in Tables 4-7 and the complete laboratory reports are in Appendix E. The validity of the data is discussed in the DUSR in Appendix C. The Total TIC results for all of the collected samples are shown on Figures 6-9.

The samples from 6-in to 7-ft below land surface had either VOC or SVOC TIC exceedances generally in the area east of Washington Avenue and south of location SL-13 as shown on Figures 6-9.

The software program Rockworks was used to calculate the three dimensional boundaries of the TIC exceedances and the boundary of the soil zone exceeding the TIC criteria is shown on Figures 6-9. The model estimated the volume of soil that exceeds the criteria to be approximately 37,000 cubic yards.

The figures also show the locations and depths of soil samples that didn't have detectable concentrations of TICs and also those that had detectable concentrations less than the definition of Source Area.

3. Comparison of TAL Metals, PCBs, and Method 8260/8270 Results to the Part 375.6.8(b) Restricted Residential Track 2 Standards

The results for the TAL metals, PCBs, and lead were compared to the Part 375-6.8(b) Restricted Residential Track 2 Standards. As shown in Table 6, none of the samples exceeded the Track 2 standards for TAL metals and only one sample from location SL-42A slightly exceeded the PCB standard of 1000 micrograms per kilogram (ug/kg). This sample had a PCB content of 1100 ug/kg.

The Part 375 Track 2 Restricted Residential standards were also compared to the individual analytes reported in the Method 8260/8270 analyses for each sample that had total TICs reported. As shown in Table 6 only one sample exceeded these Track 2 standards.

Only one sample, SB-44B, slightly exceeded the Track 2 Restricted Residential standards for Benzo(a)anthracene, Benzo(a)pyrene, and Benzo(a)fluoranthene. Each of these has a limit of 1000 ug/kg and the results were 1260, 1080, and 1210 ug/kg respectively. Moreover, those sample results were qualified by the lab as being estimated.

4. Groundwater

None of the wells contained free product and the twelve shallow wells and three deep wells were sampled on August 12th and 17th 2011. The samples were analyzed for Methods 8260/8270 VOCs/SVOCs and the TICs mentioned above, and the results are shown on Figures 10-11 and in Table 8. The complete laboratory reports are in Appendix E. The results are discussed ahead. As explained below, although the groundwater in this area will never be used for any purpose, the detected chemicals were compared to the Part 703 GA groundwater standards, as no other standards are available.

Shallow wells MW-1, GW-2, MW-12, and MW-13 didn't contain any detected chemicals.

Shallow wells GW-1, MW-2, LMW-2, MW-3R, LMW-4, MW-14, MW-15s, and MW-16s contained dissolved VOCs and SVOCs.

The three wells screened below the peat layer also contained dissolved VOCs and SVOCs.

The highest concentrations and largest number of analytes were found in two shallow wells MW-3R and MW-15S, and two deep wells MW-15D and MW-17D. These wells are located closest to the southern property boundary, which is also the location of the former petroleum company's truck filling rack. Well MW-15s had the largest number of detections at 7 SVOCs and 14 VOCs. Of these, 2 of the SVOCs and 2 VOCs were estimated quantities; and 1 SVOC and 12 VOCs exceeded the GA Groundwater Standards. Well MW-3R had 5 SVOCs and 6 VOC detections of which 2 SVOCs and 4 VOCs were estimated amounts; and 1 SVOC and 3 VOC constituents exceeded the GA standards. The deeper well MW-15D in this area had 4 SVOCs and 2 VOCs detected of which both of the detected VOCs were estimated and 2 SVOCs were estimated; only one SVOC exceeded the GA standards. Well MW-17D had no SVOCs and 15 VOC detections. Of these 6 were estimated values; and 8 VOCs exceeded the GA standards.

The other deep well sampled, MW-16D contained 1 SVOC and 2 VOCs of which both VOCs were estimated values; and no constituents exceeded the GA standards. This well is in the northern, upgradient part of the property, away from the majority of the former terminal activities.

As these wells were only sampled once and may still be showing the effects of well installation, future samples, if required, should provide additional information describing the groundwater quality at these locations.

The sample from shallow well GW-2 upgradient of the fill rack area had no detections.

Upgradient well GM-1 has two (2) detections of which one was an SVOC and the other a VOC. Both of these were very low concentration estimated values. LMW-2 had five (5) detections of which three (3) were estimated concentrations of SVOCs and one low concentration SVOC; and one (1) low concentration VOC.

Of the three wells closest to the northern property boundary, well MW-12 had no detections, except for 5 ug/l SVOC TICs; MW-16S only had the SVOC acenaphthene detected at 1.49 ug/l, which was an estimated value; and LMW-4 had the SVOCs 3+4 Methylphenol at 7.29 ug/l, Cresols at 7.29 ug/l (estimated), and the VOC Acetone at 83.3 ug/l, which exceeded the GA standard. The SVOCs could have been associated with turbidity that was in the sample and the acetone is a common laboratory contaminant that wasn't detected in any other groundwater sample collected at the Site. The DUSR discounts the detected acetone as a laboratory contaminant. In addition, this well is located in the upgradient, northwestern part of the site, away from the majority of the former terminal activities.

MW-14 on the eastern side of the property had 1 SVOC and 2 VOCs detected, of which 1 of each type of analyte was estimated; and 1 VOC exceeded the GA standards.

As groundwater in this area is in close contact with the surrounding saline surface water, it cannot be used for drinking or other purposes. In addition, all potable water in this vicinity is supplied by public water supplies from wells located further inland. Therefore, groundwater is not classified a GA, potable use, nor is it classified as one of the saline water uses. Therefore, no standards exist for its quality but the sample results were still compared to the drinking water standards, which are the only standards that exist for groundwater.

Groundwater under the Site flows towards and discharges into the surrounding saltwater bodies. However, due to the tidal influence exerted on the groundwater, the groundwater flow direction is masked by the height of the adjacent saltwater bodies that change diurnally in concert with the tides. Therefore, depicting groundwater flow using groundwater levels is a complicated process at this peninsula shaped site, which is influenced by water on three side, and will produce a range of opposing results depending on the various factors that affect the waterlevels measured in the wells at any given time. In general, it is an accepted principle that groundwater will eventually flow from the central parts of an island to its perimeter and discharge into the surrounding saltwater body; and there is no reason to expect a different process to be occurring at Harbor Island and this Site.

The quality of the groundwater is not indicative of the adjoining surface water as any groundwater discharge into the surrounding canals, channels, and bay would be diluted to the point where the VOCs and SVOCs measured in the groundwater would be undetectable once they are discharged into and mixed with the surrounding saltwater. Sediments in the canal along the bulkhead will be sampled as a requirement in the bulkhead reconstruction permit.

D. Summary and Conclusions

During July and August 2011, soil and on-site sediment samples were collected at 49 locations at up to five depths. The samples were examined in the field for grossly-contaminated soil conditions metered for volatile organic vapors, and then analyzed by an ELAP-approved laboratory under the 8260 and 8270 sampling protocols and for ten (10) VOC and thirty (30) SVOC TICs with the objective of identifying any source areas that may require subsequent actions to prepare the Site for restricted residential development under the NYSDEC Brownfield Cleanup Program. While the goal was to remedy the Site to track 4 levels, the Supplemental RI has revealed that if is likely possible to achieve a restricted residential Track 2 remediation.

In addition, a matrix was followed to select which samples would be analyzed for TAL metals, PCBs, and lead to provide additional information requested by the DEC.

Four shallow and three deep monitoring wells were installed to fill gaps in the groundwater monitoring well network. Groundwater samples were collected from the shallow groundwater system and from wells screened in the saturated zone underlying a peat layer that generally occurs at the nine (9) to fifteen (15) foot depth under the Site.

None of soil samples met the definition of grossly-contaminated soil as no free product or other indicators were observed. None of the soil samples showed volatile vapors that approached a concentration of 250 PPM and while some samples had a petroleum odor, the odor was not strong.

The total TIC data was used to delineate an area exceeding the source-area criteria that extends at some locations to a depth of greater that 9-ft in a general area located roughly east of Washington Avenue extension and south of the former truck loading racks.

No samples had lead or TAL metals exceeding the Part 375 Track 2 Restricted Residential standards.

One surficial soil sample had PCBs just above the 1 PPM Part 375 Restricted Residential standard. The remedial plan will be to remove the PCBs in this area to Track 2 levels.

Although not part of the work scope for this project, the VOC and SVOC results were also compared to the Part 375 Track 2 Restricted Residential standards to determine whether any exceedances to these criteria for specific chemical species that have cleanup limits are present. None of the samples exceeded the Track 2 Restricted Residential standards except for the 0.6-foot to three-foot deep sample SB-44B, that slightly exceeded the standards for Benzo(a)anthracene, Benzo(a)pyrene, and Benzo(a)fluoranthene. Each of these constituents has a limit of 1000 ug/kg and the results were 1260, 1080, and 1210 ug/kg respectively. Moreover, those sample results were qualified by the lab as being estimated. Again, the remedial plan will be to remove the exceedances in this area to Track 2 levels.

Some of the groundwater samples, including those taken from below the peat layer, contained dissolved VOCs and SVOCs; and some of these exceeded the Part 703 GA Groundwater Standards. The highest concentration of dissolved petroleum constituents was generally found in the area where the truck loading racks were located. Groundwater in this area is affected by the surrounding saltwater and will not be used for any purpose. Potable water is supplied by a municipal water supply from wells located farther inland.

Groundwater flows into the surrounding saltwater bodies that will dilute any of the detected chemicals to undetectable levels.