

6.0 FINDINGS

This section summarizes the findings of the Remedial Investigation regarding the nature and extent of chemical constituents present within and adjacent to the Sag Harbor former MGP site, as well as the findings of the Qualitative Human Exposure Assessment and the Fish and Wildlife Resources Impact Analysis (FWRIA). Where appropriate, additional investigation activities are recommended to further delineate the nature and extent of chemical constituents. **Appendix G** presents the detailed findings of the Qualitative Human Exposure Assessment and the FWRIA.

6.1 On-site Field Investigation

Remedial Investigation

The following discussion presents a summary of the findings of the field investigation conducted on-site.

Surface Soil

- Total PAH concentrations ranged from less than 1 mg/kg to 951 mg/kg in the 13 surface soil samples collected from the site. Metals were generally not detected above typical background concentrations for soil in the eastern United States, with the exception of mercury (which was detected above the typical background concentrations in 11 of the 13 samples) and lead (which was detected at 3,390 mg/kg in sample SHSS-07). Total cyanide was not detected above a concentration of 12.6 mg/kg. The entire Sag Harbor site is covered with 6 to 8 inches of crushed stone, limiting direct contact with surface soil.

Subsurface Soil

- Areas of subsurface soil, primarily in close proximity to the former MGP structures located in the eastern and central portions of the site, exhibited evidence of NAPL. This was characterized by the presence of naphthalene/hydrocarbon-like odors, staining, sheens as well as tar/oil droplets or blebs. Evidence of NAPL did not extend beyond a depth of 12 feet bgs at the majority of the completed soil borings and

probes, indicating that the underlying peat silt/clay unit limits the vertical migration of NAPL. However, in source areas where the peat silt/clay unit appears to be relatively thin or absent, such as near the former Tar Separating Tank and former Gas Holder No. 3, evidence of NAPL extends to a depth of 32 feet bgs. In addition, soil collected from monitoring well borehole SHMW-02, completed adjacent to the former Tar Separating Tank, also exhibited evidence of NAPL to a depth of 90 feet bgs.

- BTEX and PAH concentrations in subsurface soil appear to decrease rapidly below the peat silt/clay unit, even in areas exhibiting evidence of NAPL. Total BTEX and PAH concentrations do not exceed 0.2 mg/kg and 31.2 mg/kg, respectively, below a depth of 32 feet.
- Based on the BTEX/PAH soil data, evidence of NAPL in recovered soil samples, and the direction of groundwater flow, the following former MGP structures and associated subsurface soil are considered source areas of BTEX and PAH compounds:
 - Tar Separating Tank
 - Generator Room/Crude Oil Tank
 - Gas Holder No. 2
 - Gas Holder No. 3
 - Gas Oil Tank
 - Oil Tanks
- Metals detected in subsurface soil samples were found to be generally within or below typical background concentration ranges. Thirty-six of the 48 subsurface soil samples selected for analysis exhibited nondetectable levels of total cyanide. The highest total cyanide concentration, at 4.8 mg/kg, was detected in sample SHSB-10 (2-4 feet) located within the area of former Gas Holder No. 3.
- Total phenols were not detected in any of the 48 subsurface soil samples collected from the site.

Groundwater

- Depth to groundwater at the site ranges from approximately 0.5 to 1.6 feet bgs and is tidally influenced. On-site groundwater predominantly flows in a northwest direction towards Sag Harbor Cove. However, in the southern portions of the site there also appears to be groundwater flow towards the west and south. There is also an easterly component of flow within the intermediate zone in the extreme eastern portion of the site.
- Based on measurements obtained during the investigation, only shallow groundwater monitoring well MW-05, located in the northeastern portion of the site, contained a

measurable layer of NAPL (i.e., less than 0.1 foot). A number of samples collected from groundwater probes exhibited evidence of NAPL, such as sheens, odors, tar/oil blebs, etc. These locations included: SHGP-01 (1-5 feet), located on the northern property boundary; SHGP-02 (32-34 feet), SHGP-03 (2-6 feet), SHGP-05 (30-32 feet), SHGP-06 (0.5 to 4.5 feet) and SHGP-10 (30-32 feet), all located within the eastern portion of the site; SHGP-04 (0-4 feet), located in the central portion of the site; and SHGP-25 (2-6 feet), located in the northwestern corner of the site.

- The highest concentrations of BTEX and PAH compounds were generally detected in shallow groundwater (i.e., above the peat silt/clay unit) in the eastern and central portions of the site. However, the maximum total BTEX concentration of 23,900 ug/l was observed at SHGP-02 (30-32 feet) and the maximum total PAH concentration of 2,518,000 ug/l was observed at SHGP-05 (30-32 feet). Both of these groundwater samples exhibited evidence of NAPL and were collected from the northeastern portion of the site below the peat silt/clay unit. However, groundwater samples collected from deeper intervals at SHGP-02 and SHGP-05 indicate that BTEX and PAH concentrations decrease with increasing depth at both locations. For example, sample SHGP-02 (58-62 feet), exhibited total BTEX and PAH concentrations of 18 ug/l and 43 ug/l, respectively, while SHGP-05 (60-62 feet) exhibited total BTEX and PAH concentrations of 13 ug/l and 627 ug/l, respectively.
- Analysis of groundwater collected from on-site monitoring wells indicates metal concentrations to be generally within concentration ranges typical of ambient groundwater quality. Total cyanide concentrations were generally below the CRDL of 20 ug/l with a maximum total cyanide concentration of 92.2 ug/l observed at shallow monitoring well MW-02 located in the southeastern corner of the site.

Ambient Air

- A total of two ambient air samples were collected from on-site locations. BTEX analysis of the samples only detected only toluene at a maximum of 0.91 ppbv. Naphthalene was not detected in the samples.

Qualitative Human Exposure Assessment

Under current and future site use conditions, the potentially exposed populations (i.e., potential receptors) are those that might come into contact with the site-related chemicals of potential concern (COPCs).

Current Scenarios

Current human populations considered in the exposure assessment include on-site adolescent trespassers and adult on-site KeySpan workers. The perimeter fencing is in good condition and gates are maintained closed and locked. A trespassing scenario was included because the property could be accessed, with difficulty, over the fence. On-site exposure for trespassers is limited to surface soil via the ingestion (oral), dermal, and inhalation routes. Current on-site KeySpan workers are those individuals currently engaged in activities required for the function and maintenance of those portions of the site devoted to KeySpan operations (i.e., compressor station maintenance). These individuals are assumed to spend time both outdoors and indoors and, consequently, are assumed to be exposed to chemicals in surface soil and subsurface soil via ingestion, dermal contact and inhalation during outdoor activities and also to COPCs in indoor air (via inhalation during indoor activities).

Future Scenarios

Future human populations considered in this exposure assessment include construction workers, commercial workers, adult and child visitors to commercial establishments, if the site were converted to commercial use; and adult and child residents. It is expected that future land use may be deed restricted to prevent residential development; however, because deed restrictions are not yet in place, a future on-site residential scenario is included in this assessment. The construction worker is considered since virtually any site redevelopment would involve construction activity in some form. Potential on-site exposure media for the construction worker include surface and subsurface soil (via ingestion and dermal contact), inhalation of soil particulates, dermal contact with groundwater, and volatilization of chemicals from soil and groundwater into ambient air during construction trenching activities.

The possibility exists that the site may be used in the future for commercial purposes. Thus, exposures for adult commercial workers and adult and child visitors to future commercial establishments may exist. These individuals may be exposed to chemicals in indoor air that have volatilized out of the groundwater and subsurface soil underneath the commercial structure.

Potential on-site exposure media for future on-site residents includes surface and subsurface soil (via dermal contact and ingestion), groundwater (via dermal contact, ingestion, and inhalation of volatiles while showering), and inhalation of vapors in ambient and indoor air.

A summary of the potential exposure pathways, by population and medium, is presented in Table 2-2 of Appendix G (see Appendix G for the complete Qualitative Human Exposure Assessment).

Fish and Wildlife Resources Impact Analysis Findings

Following Appendix 1C Decision Key in the NYSDEC's FWRIA guidance, a FWRIA was deemed required. Although this analysis indicated that several chemicals of potential ecological concern (COPECs) were detected at concentrations greater than the toxicological benchmark values, which may suggest a risk of impact to wildlife, the potential for an impact from COPECs is minimal for several reasons. Exposure frequency, chemical concentration (especially within six inches of the ground surface), mechanism of exposure, and duration of exposure determines the risk for impact. The site has minimal habitat areas in the form of "weedy" patches that would not support a wildlife population. Because only transient species and a few individual animals would use this area, the frequency and duration of exposure is limited. The future use of the site is expected to be of a type that will not provide a significant wildlife habitat.

Recommendations

Based on the findings described above, it is recommended that the following additional on-site investigation work be completed as part of a Supplemental Remedial Investigation:

- Additional soil borings are recommended in the vicinity of monitoring well borehole SHMW-02, adjacent to the former Tar Separating Tank, to further delineate the extent of BTEX and PAH compounds, as well as NAPL in subsurface soil at this location.

- In order to evaluate whether a freshwater/saline interface (“salinity line”) exists beneath the site, it is recommended that three conductivity/resistivity probes be advanced on-site to a depth up to 100 feet bgs.

6.2 Off-site Field Investigation

Remedial Investigation

The following discussion presents a summary of the findings of the field investigation conducted off-site.

Subsurface Soil

- Evidence of NAPL was observed in off-site soil probes SHSB-14 and SHSB-16 to a depth of approximately 12 feet bgs. SHSB-14 was located adjacent to the northwest corner of the site. SHSB-16 was located approximately 65 feet south of the southwestern corner of the site. At off-site soil probe SHSB-15, located approximately 35 feet north of the northeastern site boundary, recovered soil exhibited evidence of NAPL to a depth of 32 feet bgs.
- BTEX compounds were detected in four of nine subsurface soil samples collected from off-site locations with a maximum total BTEX concentration of 64 mg/kg detected in SHSB-14 (5-7 feet), adjacent to the northwest corner of the site. Six out of nine samples exhibited detectable levels of PAHs with a maximum total PAH concentration of 738.7 mg/kg also detected in SHSB-14 (5-7 feet).
- Based on BTEX/PAH data and evidence of NAPL observed in on-site and off-site samples, subsurface soil containing levels of BTEX and PAHs appears to extend beyond the northern and southern site boundaries. Analytical sampling data for subsurface soil to the west of the site is limited.
- Metals in off-site subsurface soil samples appear to be at or below typical background concentrations. Analytical results indicate total cyanide concentrations are below the CRDL of 1.0 mg/kg in all samples. Total phenols were not detected in any samples.

Groundwater

- Off-site groundwater to the north and northwest of the site is tidally influenced and generally flows in a northwesterly direction towards Sag Harbor Cove. Groundwater

south of the site appears to be less tidally influenced and flows in a south to southwesterly direction. An easterly component of flow within the intermediate zone also exists to the east of the site.

- Off-site groundwater samples collected in close proximity of the site exhibited hydrocarbon-like odors and sheens, but measurable separate phase NAPLs were not observed. The groundwater sample collected from shallow well SHMW-07S, located approximately 40 feet south of the site, exhibited hydrocarbon odors, sheens and oil blebs.
- Although evidence of NAPL was observed in several on-site and off-site subsurface soil samples, monitoring wells exhibited little evidence of any measurable separate-phase NAPL, with the exception of on-site shallow well MW-5 which exhibited 0.1-foot of LNAPL. This indicates that while NAPL is present in subsurface soil, it appears to be currently in a relatively immobile residual saturation state, trapped within subsurface soil. As a result, continued off-site migration of NAPL beyond its current state is unlikely.
- The highest BTEX and PAH concentrations were generally detected in off-site groundwater samples collected above the peat silt/clay unit in close proximity to the site. The maximum total BTEX concentration of 7,490 ug/l was observed in shallow well SHMW-04S located approximately 50 feet north of the site. The maximum total PAH concentration of 7,211 ug/l was observed in shallow well SHMW-07S, located approximately 40 feet south of the site.
- Off-site migration of BTEX and PAHs is occurring in shallow groundwater to the north and northwest of the site above the peat silt/clay unit. This is supported by data from groundwater probes SHGP-14, SHGP-15, SHGP-18 and SHGP-20 and monitoring well SHMW-04S. Off-site migration of BTEX and PAHs appears to be occurring to the west based on data from SHGP-22 and SHMW-09S, as well as to the south as indicated by data from SHGP-23, SHMW-06S and SHMW-07S. However, data from the northernmost off-site groundwater probes SHGP-29 and SHGP-30 indicates BTEX and PAHs are not present at these locations, with the exception of an estimated concentration of 2 ug/l of acenaphthene in the intermediate zone sample collected from SHGP-30. Additionally, data from SHGP-28 located approximately 165 feet west of the site indicates BTEX and PAHs are not present in groundwater at this location.
- Off-site migration of BTEX and PAHs appears to be occurring within the intermediate groundwater zone below the peat silt/clay unit to a depth of 35 feet bgs. However, migration appears to be limited primarily to areas immediately to the north of the site, and concentrations are generally lower as compared to shallow groundwater. As with shallow groundwater, intermediate groundwater samples collected from SHGP-29 and SHGP-30 exhibited nondetectable levels of BTEX and PAHs (with the exception of an estimated concentration of 2 ug/l of acenaphthene in SHGP-30). While BTEX does not appear to be present, some off-site migration of PAHs does appear to be occurring in intermediate zone groundwater to the west as

indicated by data from SHGP-22. However, SHMW-09I, located immediately to the west of this probe, exhibited a total PAH of only 3 ug/l.

- Based on groundwater data collected below 35 feet bgs, off-site migration of BTEX and PAHs in the deep groundwater zone does not appear to be occurring.
- The nearest active public supply well field is located over 1 mile to the southeast of the site. Based on its location, and depth of the screened zone, there is virtually no potential for site-related constituents to influence the water quality of this well field.
- A review of NYSDEC-registered well records indicates the presence of one privately owned water supply well located approximately 500 feet southwest of the site. The potential for site-related constituents to influence the water quality of this well is remote.
- Metal concentrations in groundwater samples collected from off-site monitoring wells are generally within concentration ranges considered typical of ambient groundwater quality. The majority of groundwater samples exhibited total cyanide concentrations below the CRDL of 20 ug/l, with a maximum total cyanide concentration of 103 ug/l observed at SHMW-07S, located approximately 40 feet south of the site. Free cyanide was not found above the CRDL of 20 ug/l.

Soil Vapor

- The maximum total BTEX concentration of 154.7 ppbv was observed in soil probe SHSV-13, located immediately adjacent to the northeast corner of the site. However, off-site soil vapor samples collected beyond 50 feet from the site were found to have total BTEX concentrations not exceeding 17 ppbv. Naphthalene was not detected in any of the 13 soil vapor samples collected from off-site locations.

Qualitative Human Exposure Assessment

Under current and future site use conditions, the potentially exposed populations (*i.e.*, potential receptors) are those that might come into contact with the COPCs. It should be noted that additional off-site investigation work to further define the limits of any off-site migration of BTEX and PAHs is being conducted at the site (refer to Recommendations below). Analytical results from the supplemental investigation may result in refinement of potential exposure scenarios associated with off-site human populations.

Current Scenarios

Current off-site human populations considered in the exposure assessment include adult commercial workers; adult and child visitors to those commercial establishments; adult and child residents of the Harbor Close Condominium complex located to the southwest of the site; and adult and child residents of homes and condominiums located to the north of the site. Indoor air exposure to chemicals volatilizing from groundwater and subsurface soil underneath structures was assumed to occur for these receptor populations. Potential exposure to chemicals in surface soil may be possible for off-site residents. Additionally, potential inhalation exposure to wind-borne particulates from excavations is possible for off-site human populations; however, it is anticipated that this potential exposure would be short-term and, if warranted, mitigative measures would be employed to further reduce potential exposure. Inhalation of site-related wind-borne particulates also is possible for these off-site populations; however, the potential for this exposure is considered limited given that the site is currently covered with bluestone; thereby reducing the potential for exposure.

A private well survey is planned in the vicinity of the Sag Harbor site (refer to Recommendations below). The survey area was identified by agreement between NYSDEC and KeySpan on April 3, 2002. Although it is unlikely that individuals utilizing a private well as a water supply will be identified, potential exposure to groundwater via dermal contact, ingestion, and inhalation of volatiles while showering (for off-site residents) is included here as potential exposure pathways pending results of the survey. Additionally, given the high water table at the site, dermal contact with groundwater, as well as subsurface soil by off-site residents is possible if they were to access the subsurface in their yards. The potential for this exposure will be refined upon receipt of analytical results associated with the supplemental investigation.

Future Scenarios

Future human off-site populations considered in this exposure assessment include construction workers and utility workers. Off-site construction worker exposure to areas surrounding the site is possible in the event of future off-site redevelopment. Chemical exposures

for nearby, off-site utility workers could be expected because of the presence of subsurface utility lines in areas adjacent to the site. Like the on-site construction worker, potential exposure pathways for off-site construction and utility workers include ingestion of and dermal contact with surface and subsurface soil, inhalation of soil particulates, dermal contact with groundwater, and volatilization of chemicals from soil and groundwater into ambient air during construction trenching activities.

A summary of the potential exposure pathways, by population and medium, is presented in Table 2-2 of Appendix G (see Appendix G for the complete Qualitative Human Exposure Assessment).

Fish and Wildlife Resources Impact Analysis

Wildlife resources in the commercial/residential areas surrounding the site are limited due to the lack of food and cover. Also, constant human disturbance limits the population to wildlife species more tolerant of human activity. Several state-listed endangered species are located within 2-miles of the site. In addition, state and federally regulated tidal wetlands are located in the Peconic Estuary. Wetlands are considered significant natural resources. However, these wetlands are currently too distant and/or up-gradient of the site for exposure to site-related chemicals. Also, most of the COPECs are PAHs and metals. The fate and transport mechanisms of these chemicals reduce the likelihood of future migration into these areas. Thus, the potential for exposure is limited to wildlife near, or immediately downgradient from the site. Because only transient species and a few individual animals would use this area, the frequency and duration of exposure is limited. Potentially site-related impacts on the Peconic Estuary are unlikely. Data collected under the additional site investigation recommended below will be evaluated to aid in determining if remedial activities specific to biota in the Peconic Estuary are warranted.

Recommendations

Based on the findings described above, it is recommended that the following additional off-site investigation work be completed as part of a Supplemental Remedial Investigation:

- Additional soil probes are recommended to the north, west and south of the site to further define the off-site extent of BTEX and PAH compounds in subsurface soil.
- Additional groundwater probes and/or monitoring wells are recommended to the north, east, west and south of the site to further define the off-site extent of BTEX and PAH compounds in shallow and intermediate groundwater. Although it is unlikely that site-related constituents have influenced the water quality of the privately owned water supply well located approximately 500 feet southwest of the site, it is recommended that the additional groundwater sampling include areas southwest of the site in order to further define off-site migration of site-related constituents in this area.
- Although properties within the vicinity of the site are provided with public water, it is possible that some properties may also have private unregistered wells that may be used for irrigation or other purposes. Therefore, it is recommended that a private well survey be conducted via mailing questionnaires and/or door-to-door interviews at properties within close proximity of the site in an effort to identify any unregistered private wells.
- It is recommended that indoor ambient air sampling be conducted at structures adjacent to the site to confirm that site related constituents have not impacted air quality in these locations.
- Surface water, pore water and sediment sampling is recommended in Sag Harbor Cove in order to evaluate whether site-related constituents have impacted this surface water body.