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July 24, 2014

Kimberly N. Tisa, Region 1 PCB Coordinator
United State Environmental Protection Agency
5 Post Office Square OSRR07-2
Boston, MA 02109-3912

Subject: **November 2013 Groundwater Monitoring Results**
Greenwich High School Remedial Investigation Program
Greenwich High School
10 Hillside Road, Greenwich, CT 06830

Dear Ms. Tisa:

Attached, please find information detailing the results from the November 2013 groundwater sampling event performed at the above referenced site. The November 2013 monitoring event was the final quarterly sampling event of 2013. Quarterly groundwater monitoring will continue to be performed at the site throughout 2014 and the data will continue to be provided to the regulators and the community through public updates.

Twenty-seven groundwater monitoring wells were sampled from the existing monitoring well network during the November 2013 sampling event. One monitoring well, MW-AP11 had insufficient water volume and a sample was not collected from this well. One monitoring well, MW-AP28 was not able to be accessed safely due to on-going construction activities at the site. Both of these wells are located upgradient of soil impacts at the site and no exceedances of groundwater screening criteria have been determined at these wells during previous sampling events. Thus, the inability to sample these monitoring wells during this quarterly sampling event is not seen as significant and the data collected are sufficient to assess groundwater impacts at the site.

Groundwater samples were collected for analysis of polychlorinated biphenyls (PCBs), extractable total petroleum hydrocarbons (ETPH), volatile organic compounds (VOCs), polyaromatic hydrocarbons (PAHs), and metals. Analytical methods are the same as those

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described in the Remedial Investigation Report (RI), Greenwich High School (AECOM, February 2013). A total of twenty-nine samples, including two duplicates, were collected and analyzed during this round of sampling.

Screening criteria used to assess the data include the Groundwater Protection Criteria (GWPC), Surface Water Protection Criteria (SWPC), and the Residential Groundwater Volatilization Criteria (Res GWVC) established by the Connecticut Department of Energy and Environmental Protection (CT DEEP) in the Remediation Standard Regulations (Section 22a-133k-3). The federal groundwater standard established in 40 CFR Part 761 for PCBs, 0.5 µg/L, is the same as the GWPC and SWPC established by CT DEEP.

Overall, the analytical results and groundwater elevation contours are similar to those previously determined for the site and reported in the RI and previous groundwater monitoring updates. Analytical data are summarized in Table 1 and the analytical data reports are attached. Figure 1 shows monitoring locations where groundwater screening criteria were exceeded and Figure 2 depicts the groundwater elevation contours.

PCBs

PCBs were reported at concentrations above the GWPC and SWPC in the groundwater samples collected from monitoring wells MW-AH16, MW-AA12, MW-AJ13, and MW-Y15. PCBs have been detected at concentrations exceeding the screening criteria at each of these locations previously. These monitoring wells are located within AOC 1 and areas where the highest impacts to soil have been identified.

PCBs were not detected in any other samples and migration of PCB impacts to groundwater from the areas of highest soil impacts has not been observed during any of the sampling events. Homologs detected in groundwater samples include monochlorobiphenyl through hexachlorobiphenyl. Reporting limits for these homolog groups are a factor of 100 times less than the screening standards for monochlorobiphenyl through trichlorobiphenyls and 50 times less for tetrachlorobiphenyls through hexachlorobiphenyl. Thus, for samples where PCBs are not detected, the reporting limit is much less than the screening levels.

Extractable Total Petroleum Hydrocarbons

ETPH was reported at a concentration above applicable screening criteria in the groundwater sample collected from monitoring well MW-AH16, located in AOC 1 within the area of greatest soil impacts and not detected in any of the other samples collected. These results are consistent with results from previous groundwater monitoring events. Thus, there is no evidence of migration of ETPH impacts to groundwater.

Volatile Organic Chemicals

VOCs have been detected at the site but only methyl ethyl ketone (MEK) has ever been reported at a concentration above screening criteria (MEK exceeded the GWPC in the one sample collected from MW-AA12 in July 2012). MEK has not been reported at concentrations above laboratory reporting limits in any groundwater samples collected subsequent to the July 2012 sampling event.

VOCs were reported at concentrations above laboratory reporting limits in groundwater samples from three wells during the November 2013 sampling event; MW-BB34 (methyl-tert-butyl-ether (MTBE)), MW-V12 (toluene) and MW-X17 (MTBE). All reported results were below applicable screening criteria. Reporting limits for 1,2-dibromoethane consistently exceeded the GWPC for this compound. However, 1,2-dibromoethane has not been detected in any of the soil samples collected from the site and is not a chemical of concern.

Data collected during this quarterly sampling event and previous sampling at the site indicate that VOC impacts to groundwater are extremely limited and do not exceed screening criteria. There is no evidence for migration of VOC impacts from the site.

Polyaromatic Hydrocarbons

PAHs were reported at concentrations above laboratory reporting limits in groundwater samples collected from MW-AH16, MW-AJ19, MW-T23, MW-V12, MW-Y15 and MW-Y9. These locations, with the exception of MW-T23, are all located within AOC 1. MW-AH16 and MW-Y15 are located in areas of highly impacted soil within AOC 1.

PAHs were reported at concentrations above screening criteria in the samples collected from MW-AJ19, MW-T23 and MW-Y15. The following PAHs were reported above screening criteria:

- MW-AJ19: Phenanthrene reported above the SWPC.
- MW-T23: Benzo(a)anthracene reported above the GWPC.
- MW-Y15: Phenanthrene reported above the SWPC.

At monitoring location MW-AJ19, phenanthrene has been sporadically detected but has exceeded the SWPC in each of the last three quarterly sampling events. At monitoring location MW-Y15, phenanthrene has equaled or exceeded the SWPC in each of the last four quarterly sampling events. Benzo(a)anthracene was detected at a concentration above the GWPC at MW-T23 in the August 2013 sampling event but was not detected in the previous three sampling events.

Analytical data collected during this sampling event and previous sampling do not indicate the presence of a PAH groundwater plume as exceedances of screening criteria are sporadic and are not found in contiguous monitoring wells. Thus, there is no evidence indicating that groundwater impacts are migrating from the site.

Metals

During the November 2013 sampling event five metals (arsenic, barium, chromium, lead and zinc), were reported at concentrations above screening criteria in groundwater samples from the site. All of these metals have been detected at concentrations exceeding screening criteria during previous groundwater sampling events.

Arsenic was reported at concentrations above the SWPC in groundwater samples collected from monitoring wells MW-AH16 and MW-S15, both located within AOC 1. These results are consistent with previously reported arsenic results. Arsenic exceeded the SWPC at MW-AH16 in one of the previous four sampling events and exceeded the SWPC at MW-S15 in all four previous events. However, there is no evidence of migration of these groundwater impacts.

The reporting limit for arsenic exceeded the SWPC at MW-AE8. Arsenic was detected at a concentration exceeding the SWPC at MW-AE8 in August 2013 but not in other previous sampling events.

Barium was reported at concentrations above the GWPC in groundwater samples collected from monitoring wells MW-AA19 and MW-X17 which is consistent with previous data. These monitoring wells are located southeast of areas of the highest soil impacts. Analytical data collected to date indicate that these exceedances are limited and not migrating.

Chromium was reported at a concentration above the GWPC in the sample collected from MW-AH16, located within AOC 1. Chromium has not been detected in any groundwater samples collected from this well during previous sampling events and chromium has only been sporadically been detected at concentrations exceeding the GWPC in other sampling events at other monitoring wells. There is no evidence of consistent chromium impacts to groundwater or migration of impacts.

Lead was reported at a concentration above the GWPC and SWPC in the sample collected from MW-AH16, located within AOC 1. Lead has not been detected in any groundwater samples collected from this well during previous sampling events. Lead has only been sporadically been detected at concentrations exceeding the GWPC and SWPC in other sampling events. There is no evidence of migration of these groundwater impacts.

Zinc was reported at concentrations above the SWPC in the samples collected from MW-AH16 and MW-AV17. These results are generally consistent with previously reported results. MW-AV17 is located on the northern end of the site and is upgradient of impacted fill materials known to exist at the site. MW-AH16 is located within the area of highest soil impacts. The data from this sampling event and previous sampling events indicate that zinc impacts are not migrating at the site.

Screening Criteria Exceedance Summary

Figure 1 depicts the well locations where exceedances of groundwater screening criteria were reported from the November 2013 sampling event. Seventeen of the wells sampled had no exceedances of screening criteria including the three wells located in the southeast corner of the site which is the primary location for groundwater discharge from the site.

For organics (PCBs and PAHs), the exceedances of screening criteria are generally limited to within AOC 1. PAHs were reported at concentrations above screening criteria in the sample collected from MW-T23, located southeast of AOC 1. Based on previous groundwater monitoring results from MW-T23, samples collected from this well are typically moderately to highly turbid which may contribute to the PAH detections. The area of highest impacts to soil is roughly defined by a box surrounding monitoring wells MW-AH16, MW-AJ13, MW-Y15 and MW-AA12 and PCBs were only detected at these four locations. These findings are consistent with what has been previously found at the site and continue to indicate that organic groundwater impacts are not migrating from the site.

Metals data collected to date, including the November 2013 sampling results, do not indicate a consistent pattern of groundwater impacts exceeding screening criteria. Barium has

consistently been found at levels exceeding the screening GWPC at MW-X17 and MW-AA19 and arsenic has consistently exceeded the SWPC at MW-S15. However, other metals impacts at the site have been sporadic and inconsistent and additional monitoring will be ongoing. Data continue to indicate metals impacts to groundwater do not appear to be migrating from the site at concentrations above screening criteria.

Groundwater Elevation Contours

Groundwater elevation contours are depicted on Figure 2. Groundwater elevation contours were determined based on water level measurements made on November 11, 2013. The groundwater contours indicate that groundwater flows onto the site from the east and the north, there is a groundwater mound located beneath Field 3, and groundwater flows off the site in the southeast corner. This is consistent with previous results.

If you have any questions, comments, or concerns you may contact me via phone at (203) 622-7740 or via email at asiebert@greenwichct.org or Malcolm Beeler via phone at (860) 263-5806 or via email at malcolm.beeler@aecom.com.

Very Truly Yours,

Amy J. Siebert, P.E.
Commissioner, Department of Public Works

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Attachments