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Memorandum

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Subject: Polychlorinated Biphenyls (PCBs) in Groundwater

Date: October 13, 2016

CC: Andrew Stehn, Project Engineer, TRC

Project No.: 243950.0000.0000 PH6

As requested by Madison Kipp Corporation (MKC), TRC has completed a general literature review of migration and transport of polychlorinated biphenyls (PCBs), as well as an independent review of past groundwater monitoring data for PCBs at the MKC facility located at 201 Waubesa Street, Madison, Wisconsin (the site). This memorandum summarizes TRC's review.

The intermittent reports of PCBs in three monitoring wells beneath the MKC facility footprint are suspect as PCBs are not known to migrate readily. Numerous references concur that due to the tendency for PCBs to strongly adsorb to soil particles and their low water solubility, PCBs do not migrate significantly *to* groundwater except under extreme conditions (ATSDR, 2000; USGS, 1985; WDHFS, 2001), and, for the same reasons, they do not significantly migrate if *in* groundwater (ATSDR, 2000; USGS, 1985; WDHFS, 2001). Further, if PCB migration was occurring, then it is not evident by detections in downgradient wells. A more detailed review of the data follows.

MKC has sampled select monitoring wells and piezometers in and around the facility for PCBs since 2012. In January 2013, MKC sampled monitoring wells MW-1, MW-2S, MW-2D, MW-3S MS, MW-3D, MW-3D2, MW-3D3, MW-4S, MW-4D, MW-4D2, MW-5S, MW-5D, MW-5D2, MW-5D3, MW-6S, MW-6D, MW-17, MW-22S, MW-22D, MW-23S, MW-23D for PCBs. Of the 21 groundwater table wells and piezometers sampled in 2013, only wells MW-22S, MW-22D, and

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MW-23D had any detections for PCBs. MW-22S/MW-22D and MW-23D were installed earlier in the month, and the January 2013 sampling event was the first since the wells had been installed/developed. Both of these well nests are located within the building footprint of the MKC facility. Since the January 2013 sampling event, PCBs have only been sporadically detected in well MW-22S and MW-22D, and no further PCBs have been detected in MW-23D. An additional groundwater table well, MW-28, was installed inside of the MKC facility in March 2015. MW-28 has been sampled three times (March, April, and October 2015), and PCBs were not detected in any of the samples collected. No other MKC wells have had PCB detections at any time. This indicates that the sporadic PCB reports at the limited number of wells may be an artifact of monitoring well installation.

The primary objective of groundwater sampling is to collect representative groundwater samples (i.e. groundwater under natural flow conditions). Inconsistent sample results (sporadic detections/artificial fluctuations) can be caused when monitoring wells are installed in an environment where shallow soil contamination is present and, via drilling activities, contamination from the shallow soils is carried down the borehole during well installation and is then detected during subsequent sampling events. These detections are not necessarily an indication of the presence of a contaminant in the aquifer, or transport of a contaminant through an aquifer under natural conditions, but more likely suggest that there is residue from well installation in the borehole, filter pack, or well casing. The USEPA and WDNR recognize that in some hydrogeologic environments, even with proper well design, installation, and development, in combination with the low-flow purging and sampling techniques (as utilized at MKC), sample turbidity cannot be reduced to ambient levels that are representative of the surrounding aquifer. If this residue dragged down during wells installation is suspended during sampling then analytical results may be detected, but the results do not reflect the actual conditions or concentrations in the aquifer (USEPA, 2002 & WDNR, 1996).

The groundwater data collected to date at the MKC site, suggest that there is neither widespread, nor migrating PCB contamination. Future PCB reported detections should be scrutinized further as sporadic reports of PCBs in a single boring installed through shallow soil contamination is not evidence of migration. In addition to PCBs, turbidity, pumping rate, and drawdown data that is currently being collected, additional parameters Total Suspended Solids (TSS) and Total Dissolved Solids (TDS), should be performed at each well subject to PCB analysis in order to evaluate the in-situ conditions present during the time of sample collection.

References

ATSDR, 2000. "Toxicological Profile for Polychlorinated Biphenyls (PCBs)." November.

USEPA, 2002. "Ground-Water Sampling Guidelines for Superfund and RCRA Project Managers." D. Yeskis and B. Zavala. Ground Water Forum Issue Paper.

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WDHFS, 2001. "Public Health Assessment for PCB Contaminated Sediment in the Lower Fox River and Green Bay." December 5.

WDNR, 1996. "Groundwater Sampling Desk Reference." Wisconsin Department of Natural Resources, PUBL-DG-037-96, September, 1996.