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December 7, 2016

Gardner Manufacturing Company, Inc.
c/o Attorney Michael Flanagan
Foley & Lardner
777 East Wisconsin Ave, Suite 3800
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Subject: Review of the "Documentation of 2016 Supplemental Site Investigation Results" Report for Gardner Manufacturing Property (former), 263 Kansas Street, Horicon, WI
DNR BRRTS # 02-14-554523

Dear Mr. Flanagan:

Thank you for having GZA send in the September 8, 2016 report (referenced above). The report discussed the findings of the recent investigation and presented conclusions on the adequacy of the investigation at the Kansas Street properties, particularly with regard to the primary contaminant trichloroethene (TCE).

GZA estimates about 1100 pounds of TCE is present in the two main source areas. The goal of the proposed treatment is to address the TCE that is adsorbed to the aquifer materials, and the focus will be on the area extending from the east half of the site (see finding #5 on page 11 of the report). Regarding these estimates and the proposed remedial approach:

- There is a scarcity of analytical chemistry data on the aquifer materials and the groundwater down-gradient (east northeast) of the 267 Kansas Street property. See Figure 5 of the report for reference. If there is a similar groundwater problem to that extending from 263 Kansas Street, it seems likely that the mass of contamination east of 267 Kansas Street is similar to the mass of contamination extending from the east half of 263 Kansas Street.
- The appropriateness of GZA's assumptions used in their mass calculations are difficult to evaluate. I suggest that GZA prepare revised cross sections showing the sample depths and contaminant concentrations throughout the source areas and submit those together with the calculations and/or other supporting documentation. Cross sections are required as part of the Ch. NR 716, Wisc. Adm. Code reporting contents.
- It seems reasonable to assume there is TCE adsorbed to the aquifer materials at the MW-14 location. Testing of the aquifer materials in this (northern) portion of the plume should be performed.

GZA's finding #11 on page 12 states the addition of organic carbon resulted substantial reduction of chlorinated volatile organic compounds at monitoring well MW-17. The reduction of TCE from about 10 ug/L to non-detectable levels is encouraging. However this work appears to have also resulted in the substantial increase in the breakdown product vinyl chloride. Vinyl chloride at MW-17 increased by a factor of three or four to 24 ug/L, which is more than 100 times the groundwater standard. Is the proposed remedy likely to cause a similar spike of vinyl chloride throughout the affected area? If so, what is GZA's plan for managing the vinyl chloride?

The recent work at 267 Kansas Street shows a significant source of TCE and other volatile organic chemicals near and under that building. More work is needed to evaluate the contamination at this area.

- What is the presumed or likely source(s) of the contamination?
- The current occupant reports a floor drain in the northeast part of that building. Is this a potential source? Also, this feature and any associated laterals should be shown on the site map.
- Is there a distinct groundwater plume emanating from this source area, separate from the one already mapped by GZA?
- Does the building floor consist of gravel, as could be inferred using the GP-301 boring log?

GZA installed several borings near 267 Kansas Street. Many of these borings extended through the source area and penetrated the low permeability deposits that likely minimize contaminant migration into the bedrock (see finding # 2 on page 10 of the report). It is possible that these borings created preferential pathways for contaminant migration to bedrock, especially considering that this is in an area of downward vertical hydraulic gradients. Borings GP-304, GP-405, GP-306, and GP-308 were not abandoned in compliance with the ch. NR 141, Wis. Adm. Code requirements; these borings should have been grouted during abandonment. Many of the other borings in this area appear to have had insufficient bentonite chips emplaced to adequately seal the borehole. Additional work is needed to address this new concern at 267 Kansas Street:

- Monitoring wells need to be installed in the bedrock, between the source area and the municipal supply well. The wells should be installed according to ch. NR 141, Wisc. Adm. Code requirements, and should be designed to prevent cross-contamination of the bedrock aquifer.
- Remedial efforts are needed to reduce the mass of contaminants at 267 Kansas Street, contaminants that might move through the improperly abandoned borings, and down into bedrock.
- Other work as needed, based on subsequent findings and actions.

Monitoring wells MW-19 and MW-20 are not compliant with the ch. NR 141, Wis. Adm. Code requirements, because these wells were installed in two-inch diameter boreholes. There is also ten feet of filter sand below the well screens, which makes the water level data and groundwater chemistry less reliable. These wells should be abandoned by over-drilling to the total boring depths and then replaced with code-compliant monitoring wells.

All of the underground utilities should be mapped at all areas affected by the contamination. It appears that GZA only mapped the sewer and water main lines, and they did not map other utilities or the relevant laterals. For instance, the drain at 267 Kansas Street is not mapped. The symbols used for the utility features should be described in the legend.

GZA reports that monitoring well P-10 is obstructed. This well should be repaired or replaced during the next field effort.

I understand that this review raises a number of questions about the project. Please contact me if you think a meeting would be useful.

Sincerely,

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Hydrogeologist
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