



September 29, 2022

--sent by email--

Mr. Andy Selle, City Engineer
City of Fort Atkinson
101 N. Main Street
Fort Atkinson, 53538

Subject: Review of "Site Investigation Report and Remedial Action Options Report" for the Former Loeb-Lorman Scrapyard 115 Lorman Street, Fort Atkinson, Wisconsin
600 Oak Street, Fort Atkinson, BRRTS #02-28-588371

Dear Mr. Selle:

The Department of Natural Resources (Department) reviewed the "Site Investigation and Remedial Action Options Report" (Report) for the Former Loeb-Lorman Scrapyard properties in Fort Atkinson, Wisconsin. The Report was prepared by Terracon Consultants, Inc. (Terracon) and submitted to the Department on the City of Fort Atkinson's (City) behalf on July 11, 2022. A ch. NR 749, Wis. Adm. Code review fee was included with the submittal.

The Report includes investigative findings and recommends remedial options for three parcels; 115 Lorman Street, 600 Oak Street, and 205 Hake Street. This letter addresses the Department's review of the 115 Lorman Street parcel (Property) investigative findings and the adequacy and code-compliance of the work. The Department reviewed the Report for compliance with the requirements of Wis. Adm. Code NR 700 rules with emphasis on the requirements of Wis. Adm. Code chapters NR 716 and NR 722.

The Department's response for 600 Oak Street was provided in an August 5, 2022, letter. The contaminants found at 205 Hake Street do not require additional investigation at this time, based on current information. Vapor intrusion remains a concern at Hake Street and arsenic detections require that site soil must be handled properly.

The Report requests a) Department concurrence the site investigation is complete, and b) the Department's approval of the proposed remedial action. An overview of the Department response is:

1. The Department finds significant aspects of the project have not complied with code requirements.
2. The Department does not agree the site investigation is complete. Additional site characterization and a revised Site Investigation Report are needed.
3. The proposed remedial action is not approved because the site investigation is not complete and because the remedy does not include restoration of PCB-contaminated soils.
4. The Department finds the site conceptual model needs further analysis and support, the Report's description of the methodologies is incomplete, and the presentation of data needs improvement to support the site conceptual model and comply with code requirements.

Details are provided below.

1. Project Compliance

Several elements of the Site Investigation have not complied with key components of the administrative code:

- The site investigation was not performed in accordance with an approved workplan, as required by Wis. Adm. Code s. NR 716.11 (2). Problems with the workplan and a lack of compliance were previously communicated in the Department's December 7, 2021, *Work Plan Not Approved and Non-Compliance with the Cleanup Rules* letter.

- The project has not complied with sample notification requirements of Wis. Adm. Code s. NR 716.14 (2), which states in part, “Responsible parties shall report all sampling results other than those for water supply wells, to the department... within 10 business days of receiving the sample results” and “...The report to the department shall include a preliminary analysis of the cause and significance of any contaminant concentrations observed...”
- The project has not complied with the submittal requirements of Wis. Adm. Code s. NR 700.11 (1), which states in part, “Responsible parties shall submit site progress reports that summarize the completed work and additional work planned to adequately complete the response action at the site or facility to the department at 6 month intervals...” The two semi-annual reports submitted on your behalf by Terracon do not meet the requirement because they did not summarize the completed work and additional work planned at the Property.
- The Department’s December 7, 2021, letter recommended the Report, “Cite a lack of compliance with the cleanup rules where appropriate and qualify any chapter NR 712, Wis. Adm. Code professional certifications accordingly.” No issues of non-compliance were noted by Terracon in the Report and the professional certifications submitted by Mr. Welch and Mr. Buc appear to be the standard language without any qualifiers with respect to deviations from the Wis. Adm. Code NR700 rules

Department records indicate a gap in communication from December 10, 2021, to the date of the Report, July 12, 2022, regarding the on-going investigation at the Property. During this time, Terracon mobilized twice to sample for PCBs and multiple times to evaluate a newly discovered occurrence of petroleum-related light non-aqueous phase liquid (LNAPL).

Non-compliance with the approved workplan requirement and the reporting requirements also prolonged the Department’s review of the Report.

The delays in reporting and lack of communication also appear to have led to a delay in Environmental Protection Agency (EPA) involvement in the project. The City and its consultant are responsible for fulfilling EPA project requirements with respect to polychlorinated biphenyls (PCB) and assuring federally-regulated aspects of the project meet EPA requirements.

2. Site Investigation Needs - Extent of Contamination and Source Area(s)

PCBs

The extent of PCB contamination is not adequately defined.

The Report’s conclusions that the PCB source is primarily associated with the fill material and that a lack of point sources indicates minimal contributions from former site operations is not well supported by the data or the existing evaluation. The Department provides the following observations:

- There appear to be various types of fill at the site, and it is unclear if all fill types or just some fill types were contaminated with PCBs prior to placement at the site. Additional discussion of the fill characterization needs is provided under the “Fill” heading below.
- The two nearby parcels (Oak Street and Hake Street) investigated as part of this effort have fill materials but showed no PCB impacts. The fill descriptions included in the Report do not differentiate between parcels.
- The distribution of PCBs shows a spatial pattern that is not discussed in the Report. Araclor 1242 is the dominant PCB at the northeast portion of the Property. This is the area where automobiles were stored and the 1955 air photo appears to show disturbance. Elsewhere on the Property araclor 1254 is typically the most common. Provide a discussion regarding spatial occurrences of the different detected araclors.
- The Report offers no contaminant transport mechanism for PCBs to migrate downward from contaminated fill and into native materials.

- The highest concentration of PCBs at the site was detected in native material.
- There is uncertainty regarding Terracon's sample collection methods and soil logging efforts, which could create concern about the data quality, as discussed below.

Additional soil sampling is needed to define the PCB contamination vertically and horizontally:

- Shallow soil samples (between 0 to 1-foot depth) are needed to characterize the existing threats to human health and to better evaluate the source(s) of the PCB contamination.
- Deeper samples are needed to define the vertical extent of soil contamination.
- Additional horizontal samples are needed to fill in data gaps and to test the theory that the site-wide presence of fill material defines the extent of soil contamination to the Property boundaries.
- Additional sampling should also be performed to assess the scale of the variability in concentrations of PCBs at the site to show whether the existing sample spacing is adequate to assess the contamination and plan remedial actions. This sampling will also help evaluate the source(s) and occurrence of PCBs.
- Sampling should extend off the Property, to comply with the degree and extent requirements of Wis. Adm. Code s. NR 716.11 (4) and to test the concept that fill material is the source of the PCB contamination.

LNAPL

Light non-aqueous phase liquid consisting of a complex mixture of hydrocarbons tentatively identified as lubricating oils and/or weathered gasoline, was observed in monitoring well MW-3 on December 2, 2021.

Terracon subsequently performed additional evaluation, including:

- Testing of the physical properties of the LNAPL for viscosity, density, and flash point
- Environmental fingerprinting and chemical analysis of the LNAPL
- LNAPL removal by bailing MW-3 and measuring LNAPL thickness on several occasions
- Installation of four ("OW"-series) monitoring wells to check for the presence of LNAPL
- Grain size analysis of soil samples from monitoring wells OW-1 and OW-2

A goal of site investigation is to "Provide an estimate, along with all necessary supporting information, of the mass of contamination...", per Wis. Admin Code s. NR716.11 (3). The mass of LNAPL contamination is not known. The Report discusses "Apparent LNAPL Thickness" in section 6.5.3, which is a summary of the LNAPL removal observations presented on Table 12, "MW-3 Product Recoverability Evaluation Table". The goal of the additional testing and evaluation should be to determine the approximate *actual* LNAPL thickness and extent as a means of estimating the mass of contamination.

The Department provides the following comments with respect to the LNAPL:

- Provide an explanation why LNAPL was not noted during well installation or well development and then was present later at thicknesses of up to 4.15 feet.
- Explain how the physical properties of the LNAPL, the grain size of the aquifer materials, and the recoverability testing can be used to estimate an actual thickness of LNAPL at the site. Provide a reference for the methodology and calculate the actual product thickness and mass.
- Provide and discuss the results of the physical LNAPL testing.
- Provide the LNAPL viscosity test results.
- Provide Terracon's standard operating procedures for LNAPL recovery testing and the scientific reference upon which the method is based.
- Explain the significance of what appear to be changing well hydraulics at MW-3. During well development the well could not be purged dry. During the product removal testing the well could be bailed dry after removing anywhere from between 5 and 20 gallons of liquid. Describe what accounts for this variability and if accumulation of LNAPL within the borehole is a contributing factor.

- Explain why the testing of LNAPL recovery was not completed on May 4, 2022, the day when the highest thickness of LNAPL was recorded.
- The Report states that "...LNAPL has not partitioned into the dissolved-phase", yet MW-3 is the only monitoring wells where PAHs (ie. Chrysene) has been detected in groundwater. Provide a statement regarding the potential presence of chrysene in the LNAPL and explain why the sole occurrence of PAHs in groundwater was at the MW-3 location.
- Correct the time durations in the comment field on Table 12 to match the sample times or explain why the times and durations do not match.
- Provide documentation and field notes for the LNAPL recoverability testing, as required under Wis. Adm. Code ss. NR 716.13 (7) (a), (b), and (c).
- Explain the rationale and basis for proposing a performing a 25 by 25-foot excavation to address the LNAPL. Specifically, explain how the area was determined and the expected mass removal. Also explain why removal of LNAPL contaminated soil is the proposed remedial option whereas in other areas the contaminants (e.g. PCBs) are proposed to be capped.

Trichloroethylene (TCE)

The extent of TCE contamination is not adequately defined near monitoring well MW-5, where TCE was detected in soil at a depth of three feet. This contamination appears to be unrelated to the neighboring DB Oak site, and therefore represents an on-site source of TCE. Additional sampling is needed to characterize the extent and mass of TCE contamination at this area. Additional vapor intrusion evaluation may also be needed.

Polycyclic Aromatic Hydrocarbons (PAHs) and Metals

The data presented in the Report show PAH and metal concentrations at the Property are comparable to other former industrial properties. One remaining concern is the adequacy of the testing of foundry sand at the Property. The Phase I report (per Section 3.1) identified foundry sand as a Recognized Environmental Condition and section 7.2, "Potential Sources of Contamination" mentions foundry sand. Several boring logs describe what appears to be foundry sand and/or foundry waste, and only a few borings reference "possible foundry sand". The Report does not provide a discussion on the findings with respect to foundry sand, so it is impossible to gauge whether the PAH and metal testing has been sufficient. Provide additional evaluation of the presence or absence of foundry sand (and waste) and identify which samples were collected from those materials.

Emerging Contaminants

The Department cannot evaluate the need for testing of emerging contaminants at this time. The emerging contaminant scoping statement included in the Report does not reference the firefighting methods employed during the "One or more fires requiring fire department response..." (section 3.1 of the Report). Provide a description of the firefighting methods with attention to the potential use of per-and polyfluoroalkyl substances in firefighting foam at the Property.

Public Notice

The City should review requirements for public notification(s), including signage, listed in Wis. Adm. Code ch. NR 714, and any similar requirements in federal rule. Provide a summary of your plans for complying with these requirements, or alternatively explain why the requirements do not apply.

3. Remedial Action Plan

Terracon's remedial action plan (RAP) is primarily conceptual and can't be approved for the Property with the existing site investigation. Additional evaluation, a revised site investigation report, and a design report are needed prior to implementing remedial actions at the Property.

After completion of the site investigation, an updated Site Investigation Report and a revised remedial action options evaluation, the following step for the project should be preparation of a Remedial Design Report that meets the requirements of Wis. Adm. Code s. 724.09. For your reference a “remedial action plan” is defined in Wis. Adm. Code ch. 747 and was requirement for sites regulated under the former petroleum cleanup fund program.

The design report should describe the methodologies, likely effectiveness, and mass removal of the proposed LNAPL-related remediation.

The design report should also include plans for addressing the TCE found at monitoring well MW-5.

The Department reviewed the conceptual remedial action option for PCBs and recommends reevaluation of the recommended PCB remedy for the Property, which is capping with six inches of gravel and/or concrete rubble. The Spill Law, s. 292.11(3), Wis. Stats, and Wis. Adm. Code s. 722.07 (3)(a) require a Responsible Party to “restore the environment to the extent practicable”. Under the current proposed remedy and given concentrations of PCBs the Property would necessarily be restricted to low-occupancy uses. Such a project outcome would not constitute restoration. The environmental persistence of PCBs is well-documented and restoration via natural attenuation would not occur in a reasonable timeframe.

4. Data Evaluation, Presentation, Methods, and Conceptual Model

The following section discusses technical aspects of the investigation and uncertainty within the Report. The items are not intended as comprehensive quality control of the project or Report, but rather a list to help move the project forward during preparation of a revised Report.

Fill

The fill is alleged to be the primary source of contamination at the Property, and so its characterization, distribution, and association with contaminants (especially PCBs) must be accurate and precise. The Report’s characterization of the fill is overly generalized and does not form the basis for a strong conceptual model.

The generalized characterization of the conceptual model is illustrated by the conclusion, “The extent of soil contamination is defined to the property boundaries due to the site-wide presence of fill material.”, which implies the entire Property is contaminated.

The Department provides the following observations regarding the fill characterization:

- Terracon states there are two types of fill at the site but does not differentiate if one or both fill types is source of PCB contamination.
- Many borings (including MW-1, MW-2, MW-6, B-1, B-2, B-4, B-6, B-9, B-10, B-12, B-13, B-15, B-16, B-17, P-8A, and DP-8) encountered silt that was identified as possible fill. The two fill types described in the Report are both sand.
- Nearly all the boring log descriptions that mention fill list it as “possible fill”, which suggests uncertainty in the field characterization. Conversely, there is no indication that any samples represent native material.
- The likely geologic origins should be described and there are no such descriptions other than for suspected fill material. See Wis. Adm. Code s. NR 716.14 (4) (g) 4.
- Munsell color descriptions are not used as required under Wis. Adm. Code s. NR 716.14 (4) (g) 4. A consistent and objective evaluation of soil color is needed for accurate cross-comparison of samples and stratigraphic correlations.
- The source of arsenic at the Hake Street parcel is attributed to contaminated fill but similar arsenic concentrations were not found in fill samples at the Property. The conceptual model should explain the cause of this distribution.

- As discussed above, the presence of foundry sand (and other foundry wastes) is an environmental concern at the site. The description of one fill type as “fine-grained, black sand, which contained traces of cinders and slag” sounds like a description of foundry sand. The Report should be clear about the origin of the fill material.
- The areal extent of the fill units is not illustrated in the Report. Consider the use of isopach maps to show the extent of contaminated fill units across the Property.
- The concept that the fill is site-wide and so the extent has been defined is not congruent with the plan for capping the site, which encompasses less than half of the Property.
- The geologic classifications on the boring logs are not consistent or complete, as discussed below.
- Characterizing the native soil profile(s) would aid in determining the presence of fill material.

Groundwater

Groundwater flow at the site is believed to be to the southeast, but a corroborating water table configuration has not been adequately demonstrated by the site data. Observations include:

- The 12/2/2021 groundwater contour map shows groundwater flow converging to MW-2 near the center of the Property.
- The 4/27/2022 groundwater contour map shows a south-southwesterly component of groundwater flow at the east half of the Property.
- The monitoring wells reportedly have expandable (non-vented) caps and are allowed to equilibrate prior to water level measurements. Equilibration should not be needed because vented well caps are required, per Wis. Adm. Code NR 141.07(1).
- The groundwater elevation data from the OW-series wells does corroborate a southwesterly flow. The data were not included on water table maps.

Additional water table maps are needed to evaluate groundwater flow.

The hydraulic conductivity test methods are not adequately described, and the data presentation needs correction.

The summary and use of the hydraulic conductivity data needs clarification, including:

- Identify the model results that are used as the basis of data summary table in the Report narrative, and double check the accuracy. The transfer of information from Appendix F to the summary table on page 22 is not clear.
- Justify why a geometric mean of test results from different geologic units is used to calculate groundwater velocity.
- Explain how MW-4 and MW-5 show nearly identical hydraulic conductivity values when MW-4 was purged dry during development and MW-5 could not be purged dry during development.
- Correct the conversion factor used in the summary table; 1 cm/sec equals 2834 ft/day.

The methods for the hydraulic conductivity testing are not clear, and more information is needed to support the documentation in Appendix F:

- Label the model results in Appendix F with the well names.
- Supply Terracon’s standard operating procedures for single-well response tests and indicate what situations might require a pressure transducer and data logger rather than hand measurements.
- Provide instructions for the analytical model.
- Include a description on the selected assumptions that are used for input into the model.
- Describe how the effects of sand pack drainage are accounted for when fitting the curve.
- Indicate which data points are measurements and which are model-generated curves.
- Explain the basis for the initial time and initial displacement.
- Explain the inconsistent use of the “skin effect” in the model.

- Provide the field notes for the testing.

Groundwater Quality

Additional groundwater quality assessment may be needed based on the re-evaluation of groundwater flow. Most notably, the TCE issue at MW-5 will likely require additional groundwater investigation.

EPA expressed concern that the current groundwater monitoring network and sampling may not adequately address the potential for migration of PCBs to groundwater. Discuss additional groundwater PCB concerns with EPA. Perform additional sampling and update the conceptual model to include the transport mechanism for contaminants to migrate into native soil.

Needed Clarifications and Corrections to the Report

Portions of the Report contain information that needs correction and/or additional support. Items that were not mentioned above include, but are not limited to, the following.

There are irregularities with the sample times on the chain of custody documentation for the July 2021 samples included on pages 455 to 457 of the Report. Please confirm the sample times are correct and explain how a batch of many samples was collected at two-minute intervals followed by additional batches hours later. Provide field notes to support the accuracy of the July 2021 chain of custody documentation.

Page 8 states, "Total PCB concentrations exceeded the soil-to-groundwater pathway RCL at several locations across the site." PCBs concentrations exceed the RCL at 43 locations. Most readers would not understand "several" to mean 43 and would likely misunderstand this description of the findings. This and any similar language should be corrected.

The geologic cross sections and locator map are not sufficiently clear.

- The geologic cross section locator should locate the borings that are used in the cross section and not just show the general area of the cross section.
- The geologic cross sections should be bigger and could each have their own page. For instance, the geologic cross section B-B' is smaller than the legend.
- The cross sections should transect areas of contaminated native materials to better illustrate the contaminant distribution. Add additional nearby borings to the cross sections where the data help to illustrate the extent of contamination and/or support the conceptual model.
- The geology should distinguish between different types of sand, including the well-graded sand (SW), and the poorly-graded sand (SP), because these units likely have different origins and hydraulic characteristics.
- Identify the extent of individual contaminants on the cross sections, not just lines showing generic RCL exceedences, to show the extent of contamination with clarity.
- Consider including the soil data and isoconcentration lines on the cross sections.
- Consider the use of more than two cross sections to illustrate site conditions and better support the conceptual model.
- Address the following issues noted on cross section A-A':
 - MW-1 has sandy silt on the boring log that is called silty sand on cross section. The total depth is 15 feet, not 13 feet.
 - P-2 shows sandy clay illustrated as clayey sand and silt mapped as clay.
 - At MW-2, the fill logged as clayey silt is illustrated as silty sand.
 - P-12, intersects what appears to be foundry sand fill, which is simply identified as fill sand.
 - MW-4 boring log shows the total depth as 20 feet, not 17 feet.

- Address the following issues noted on cross section B-B':
 - At MW-2, the fill logged as clayey silt is illustrated as silty sand.
 - P-13, the fill sand (“likely foundry sand”) as illustrated as “fill-silty sand” which is not parallel to the convention used at P-12 on cross section A-A’. Also, soil logged as silty clay is illustrated as clayey sand.
 - At MW-3, the total depth shown on the boring log is 15 feet, not 14 as illustrated. Also, the well depth is 14 feet, with sand pack to 15 feet. The sand unit illustrated at the bottom of the cross section is not indicated on the boring log.

The TCE issue near MW-5 is not shown with sufficient clarity. For instance, the area is quite small on Exhibit 6 due to the large scale of the figure, and so the issue is hard to discern. Also, the illustration of contaminant extent does not go beyond the property line, nor is the information dashed where questionable or inferred, per Wis. Adm. Code ch. NR 716 requirements.

Additional explanation of soil sampling methods is needed.

- Describe the amount of soil collected and length of soil core needed for each type of analysis.
- Explain the representative intervals for all samples collected at 5 feet (e.g P-1) and 10 feet (e.g. MW-4). The sample were collected using 5-foot-long tubes. Which tube did the samples come from?
- Explain the representative intervals for all samples collected at the transition between two different soil types (e.g. MW-3 2’). Explain how the determination included on the data tables were made. Provide field notes confirming which unit was sampled.

Additional explanation of groundwater sampling methods is needed.

- Describe how long water levels in monitoring wells were allowed to equilibrate before measuring the water level.
- Explain the means of assessing water level equilibration.
- Explain the type of “low flow” pump used during purging.
- Describe the device(s) used for collection of groundwater samples.
- Provide the field notes for the groundwater sampling.

The soil boring logs contain misclassifications. Some examples include:

- Many instances where clayey sand is designated “SP – poorly graded sand”. Clayey sand should be designated “SC”. Clayey sand and poorly graded sand have greatly different hydraulic properties. Three of the many instances include P4, MW-2, and GP-7 (7’), which is the sample with the highest PCB concentration.
- Some boring logs (e.g. P1 and P3) use “sorting” rather than grading. Grading is the correct designation. Also, P1 shows well sorted sand, and P3 shows poorly sorted sand, yet both are classified as “SP – poorly graded sand.
- MW-3 and the OW-series wells show well graded sand designated as “SP – poorly graded sand”.

Given the conceptual model indicates two different types of fill sand as the PCB source, these misclassification issues and the missing geologic origins and Munsell colors classifications discussed above effect the reliability of site characterization and conceptual model. All misclassifications on the boring logs should be corrected and the changes reflected on the cross sections and in the evaluation of the site.

Explain how the 15-to-20 foot interval of MW-4 was logged. The boring log shows sampling to only 15 feet.

Explain why the DP-series of soil samples were generally taken a foot deeper than previous rounds.

Explain why soil intervals showing the highest field screening concentrations were not always selected for analysis. For examples, see the boring logs for DP-3 and DP-4.

The report describes decontamination of drilling using a high-pressure washer before beginning each borehole and/or monitoring well. Explain where the high-pressure washing was performed and how the wastewater was collected and disposed.

The depth to water measurements for the OW-series monitoring wells on Table 1 are identical to each other and appear to be wrong. Table 1 is also missing later measurements from the OW-series wells.

Provide the well construction and well development forms for the OW-series of monitoring wells.

Next Steps

The next step in the project should be addressing the concerns raised above and preparation of a site investigation work plan to address the noted data gaps. The responses and workplan may be combined into one document. The work plan must be submitted by December 1, 2022.

The DNR appreciates your efforts to restore the environment at this site. If you have questions regarding hit letter or would like a conference to discuss this letter, please contact me.

Sincerely,

An electronic signature of Jeff Ackerman, consisting of a stylized cursive script in black ink over a light blue horizontal line. Below the line, the text "electronic signature" is written in a small, light blue font.

Jeff Ackerman, P.G.

Hydrogeologist

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cc: Tim Welch (Terracon), Ed Buc (Terracon), Bruce Loeb, Bruce Iverson (TRC Companies, Inc.)
Andrew Kleinberg, EPA