



September 20, 2022

**-Sent by email-**

Millennium Forms LLC  
c/o Walter Hauk  
550 East Centralia St.  
Elkhorn, WI 53131

**Subject:** Review of Site Investigation Report and Remedial Actions Options Evaluation  
Millennium Forms, 550 E. Centralia St., Elkhorn, WI BRRTS # 02-65-587693

Dear Mr. Hauk:

The Department of Natural Resources (Department) reviewed the "Site Investigation Report and Remedial Actions Options Evaluation" (Report) for the Millennium Forms site in Elkhorn, Wisconsin (Site). The Report was prepared on your behalf by The Reese Group (TRG) and submitted to the Department on Millennium Forms LLC's behalf on June 22, 2022. A Wis. Admin Code ch. NR 749 review fee was included with the submittal.

The Department has reviewed the Report for compliance with Wis. Admin. Code ch. NR 716 and determined a corrected report is needed. The Report contains errors and internal inconsistencies, shows the work did not comply with the workplan and administrative code requirements, and is missing supporting documentation and analysis. Additional site investigation may also be necessary.

The Department recommends a teleconference with Millennium Forms and the Department to discuss the project prior to preparation and submittal of a corrected Site Investigation Report. Please contact the DNR project manager, Jeff Ackerman, at 608-219-2302 or [jeffrey.ackerman@wisconsin.gov](mailto:jeffrey.ackerman@wisconsin.gov) to schedule a teleconference or to discuss this letter.

The remainder of this letter includes a discussion about:

- 1) the source area of the contamination,
- 2) missing or incomplete elements of the site conditions,
- 3) the remedial options evaluation, and
- 4) a general discussion of errors and inconsistencies in the Report, including areas where the current evaluation of the data warrants clarification and/or does not meet administrative code requirements.

Site investigation goals are part of the cleanup rules. Several of goals were not met by the investigation and current site investigation report, such as:

- Wis. Admin Code § NR 716.07(2) requires the evaluation of the type and amount of contamination
- Wis. Admin Code § NR 716.07(3) requires the evaluation of the history of hazardous substance discharges and environmental pollution
- Wis. Admin. Code § NR 716.11(3)(a) requires the field investigation to determine the nature, degree, and extent of the hazardous substance or environmental pollution in all affected media

### **Source Area**

The information in the Report identifies chromium and hexavalent chromium as the contaminants of concern at the site. However, the Report is unclear about the source(s) of the known chromium contamination. Several possible sources for the chromium contamination are implicated, including the current operations.

The DNR provides the following comments on the potential contaminant sources discussed in the Report:

- Pages 2, 3, 22, 23, and 25 reference “impacted concrete” within a historical trench system, and it is unclear whether this contributes to contamination at the Site. No data is provided about the concentrations, locations, or mass of contaminants within the concrete. Provide a discussion and/or data about the referenced impacted concrete.
- Page 2 states there are groundwater enforcement standard exceedances in the area surrounding the former trench and the chromium plating process tank. Discuss whether the chromium plating process tank is still being used and whether it is a potential source of contamination
- Page 2 states there are soil exceedances adjacent to the former trench and existing process tank. Discuss whether the existing process tank is the tank referenced as “chromium plating process tank” in the Report and whether it is a potential source of contamination.
- Page 10 states, “The total chromium/hexavalent PAL and ES exceedances are likely related to current industrial operations.”
- Page 15 states the area of hexavalent chromium soil impacts is in the vicinity of the former trench system and an existing containment pit that collects spillage. Discuss whether the existing containment pit is a potential source of contamination.
- Page 17 states “The source of the soil contamination appears to be the former trench system and the existing industrial manufacturing process that includes the use of chromium for plating tiles.”
- Figure 3 shows two areas of soil contamination. The narrative of the report sometimes refers to a “source area” or “source areas”. Discuss and clarify the conceptual site model and identify known or potential sources at the Site.
- Page 20 identifies an “on-site wastewater treatment system”. Discuss the design of the on-site wastewater treatment system and include its location on all applicable figures.
- Known or suspected source areas should be included on all applicable figures.

With respect to several of the statements, the nature of any on-going discharge(s) should be described in more detail and discussed with your DNR Hazardous Waste Inspector, Randy Malek. Also, if the existing industrial process and operations are a source of soil and groundwater contamination, those on-going issues must be addressed before performing additional investigation and remedial actions.

### **Missing or Incomplete Evaluation of Site Conditions**

The evaluation of soil contamination needs further evaluation. Revisions to figures are also needed.

- Figure 3 shows two source areas in an approximate 1 by 1 inch space, which is too small of a scale. The map showing the distribution of soil contaminants must be at a scale that provides reasonable clarity.
- Page 3, section 6.5, states the average depth of contamination is 3 feet deep, over an area of 9,950 square feet. The next sentence states this equates to 9,950 cubic feet of contaminated soil, which is likely an error. Recalculate the mass of soil contamination and provide supporting calculations. Provide a map or maps supporting these calculations.
- Application of an average soil concentration to millions of pounds of contaminated soil is an imprecise way to determine contaminant mass. The same average concentration of contaminants is applied to two identified source areas. Calculate the concentration mass of contamination individually for all applicable source areas based on the best understanding of the spatial distribution of contaminants. Provide supporting calculations to determine contaminant mass.
- The mass of chromium on the impacted concrete and in groundwater are not included in the contaminant mass calculations. Provide additional information and/or clarification.
- Discuss the significance of chromium detected in the laboratory’s method blank.
- The cross sections need to be expanded and updated to include the analytical results.

The evaluation of groundwater chemistry and flow direction need additional evaluation.

- The Report states that only 3.5 to 14 gallons of groundwater was removed from each well during well development. For most water table wells that can't be purged dry, about 7 gallons per foot of standing water, or about 50 gallons of water per well, should be removed during well development. This issue of inadequate water removal may have been the result of an incorrect calculation of the amount of water in the filter pack and well casing, as recorded on the well development forms.
- The groundwater maps do not show contours of the water table surface and the data are not referenced to mean sea level (MSL). Provide updated groundwater flow maps that include the above-referenced standards.
- The hydraulic gradients calculated on Table 4 likely represent apparent gradients and not the slope of the water table. Provide the basis for this evaluation and correct the calculations, as needed.
- The workplan called for hydraulic conductivity testing at six wells, yet only three were reported. The analysis of the data is not presented in its entirety and the evaluation appears unreliable based on the information provided. Supporting information should be provided, including the assumptions used in the analysis and the formulas and/or model output and field notes.
- TRG states that preferential groundwater pathways, such as utility corridors, are not a concern. Provide the basis for TRG suggesting the utility backfill has the same hydraulic conductivity as the native glacial deposits. Discuss what the backfill material consists of and show the utilities on the map.
- The groundwater chemistry results should be discussed in more detail. For instance:
  - Discuss why the four groundwater monitoring wells that were sampled twice (once in October 2021 and once in March 2022) show vastly different results from round to round. One round shows no detectable concentration of chromium or hexavalent chromium, and the other round shows elevated levels.
    - Discuss the reliability of the data.
    - Discuss whether this issue could be the result of improper well development.
  - Results from TRG TW-3 and TRG TW-9 indicate the hexavalent chromium concentration is substantially higher than the total chromium concentration in the same sample. These anomalous findings should be discussed, and the data quality may need to be reevaluated.
  - Discuss the data quality and reliability of samples that had missed holding times, as discussed on page 13 of the Report.
- The duplicate sample results should be included in the data table.
- Where the quality control methods did not match that of the approved workplan, this discrepancy should be called out.

Soil vapor intrusion concerns need consideration and clarification.

- TRG's June 28, 2021, Site Investigation Workplan, which was approved by the Department, included three and a half pages of text explaining their plan and methods for performing high-volume purge sampling to assess vapor intrusion at three locations due to the finding of vinyl chloride at the site. Vinyl chloride is a volatile organic chemical (VOC). Page 11 states "Based on the results of the investigation activities conducted, no VOCs were detected in soil or groundwater. As such, a vapor intrusion assessment was not conducted." Similar statements are made on pages 5 and 19. However, Pages 7 and 16 discuss vinyl chloride groundwater standard exceedances at the Site. The groundwater standard exceedances are documented on Table 2.

Note that Wis. Admin. Code NR § 716.15(2)(e) requires a discussion of any deviations from the approved site investigation workplan. Address and correct the inconsistencies in the Report and discuss any deviations from the workplan. This requirement was not met for the planned vapor intrusion sampling.

### **Remedial Actions Options Evaluation**

The site investigation report does not meet regulatory standards and contains internal contradictions, factual inaccuracies, and the evaluation of soil and groundwater conditions is incomplete. Therefore, it is too soon to evaluate remedial options. The DNR provides the following comments:

- Identify the source area or areas of the chromium contamination.
- Determine the extent that the impacted concrete is contributing to contamination.
- Discuss to what extent the existing operations continuing to cause a problem.
- Discuss where the soil and groundwater contamination is located in relation to the current and former operations. Include this information on all applicable figures.
- Evaluate the contaminant mass and provide a better presentation, as discussed above.
- Assess groundwater conditions according to code and standard practice, with code-compliant well development, re-sampling of wells, proper water table maps, and a more reliable assessment of groundwater flow and preferential pathways.
- Evaluate and discuss the extent of the groundwater contamination. Determine whether the hexavalent chromium attenuates before becoming a risk to potential receptors or moving off-site.
- Address vapor intrusion concerns at the site.

Also, for your future reference, chemical treatment options for remediation usually necessitate additional groundwater and soil monitoring. Accounting for this need may change the outcome of the TRG's recent remedial option analysis to favor option #2.

### **Report Reliability and Completeness**

It is the responsibility of the professionals overseeing the work and certifying the report to assure the information contained in the report is correct and that both the work that was performed and the document submitted are done in compliance with all applicable requirements.

The Department's review of the Report showed information that appears incorrect and/or work that was out of compliance with applicable requirements. The following section includes issues that were noted during review and need correction and/or clarification. Some of the issues may have been discussed in the preceding pages. The list is not intended to be all inclusive and it is possible there are other issues that should also be corrected.

TRG did not adequately describe deviations from the approved work plan. Wis. Admin. Code § NR 716.15(2)(e) states, "Where procedures differed from methods described in the work plan, the site investigation report shall include a description of the procedures used." The Department's review of the Report revealed no reference to variances from the workplan, although several instances were noted, including:

- No vapor sampling was conducted.
- Hydraulic conductivity testing of only three wells, compared to the six in the work plan.
- pH measurements were made by the laboratory rather than in the field.
- Not all specified quality control samples were collected.

Page 1 states the scope of work included "...eleven hollow stem auger soil borings (TRG SB-5 through TRG SB-15) to depths of 15 to 16 feet below ground surface." The four boring logs provided in the appendix state the borings were advanced with a geoprobe (direct push) rig. Not all boring logs were included in the appendix. Borehole abandonment forms were not provided.

Pages 2, 16, and 18, state "the (groundwater) concentrations reported for total chromium are mostly comprised of hexavalent chromium", a statement which is not well supported by the data. A best-fit curve to the 18 data samples presented in the reported show 40 % of the groundwater chromium is in the hexavalent state. Three of the samples in the data set showed hexavalent chromium results that were higher than total chromium, and these

anomalies are not addressed in the report. Finally, the results were highly variable at four wells sampled that were sampled twice, and the quality of the samples is questionable due to the improper well development.

Page 2 states, "As there were no detections of volatile organic compounds in soil or groundwater samples collected during Site Investigation activities, the soil vapor pathway was not assessed." Page 11 states "Based on the results of the investigation activities conducted, no VOCs were detected in soil or groundwater." These statements are inaccurate. Vinyl Chloride was detected in groundwater.

Page 4 omits the phone number for you (as the responsible party representative.) This should be included.

Page 7 states, "Groundwater (GW) RCL exceedances for Vinyl Chloride were likely a result of a historical release(s) to the environment from past operations and/or historical use of solvents by former industries at the Site." Groundwater RCLs apply to contaminant leaching potential from soil. The Report includes no soil data showing RCL exceedances for vinyl chloride. Provide the missing data or correct the above statement.

Pages 7 and 8 include background information in the recommendations section. This appears out of place within the Report and should be addressed.

Page 9 states soils were described using the Munsell Color Classification System. This statement appears inaccurate because none of the submitted boring logs include Munsell colors within the soil descriptions.

Page 9 states, "Portions of the soil from approximately every 2-foot interval of the subsurface were field screened." Based on the field screening results reported on the boring logs, this is not an accurate description. Most boring logs do not show a regular 2-foot interval for the field screening results and some of boring logs indicate no screening results at all.

Page 9 states, "Soil samples were collected at approximately two-foot intervals from each borehole using standard split-barrel sampling techniques in accordance with the American Society for Testing and Materials (ASTM) Standard Method for Penetration Test and Split-Barrel Sampling of Soil (ASTM Method D1586-11; ASTM, 2011)." The information on the boring logs do not corroborate this statement; the borings were done with a geoprobe rig and not a split-barrel sampling typically associated with hollow-stem auger drilling.

Page 10 states, "The filter pack between the PVC screen and outer wall of the borehole was backfilled with a commercially packaged medium size grade sand from the bottom of the borehole to approximately six inches above the screened portion of the well." The well construction documentation forms do not corroborate this statement. According to the forms, the medium size sand stops at the top of the well screen (i.e. zero inches above the screened portion).

Page 10 states, "The wells were developed by surging and bailing with disposable plastic bailers and in general accordance with chapter NR 141 of the WAC. Well development consisted of emptying each well of water a minimum of 10 times, the well and filter pack volume." The well and the filter pack volumes calculations on the well development forms appear about 4.5 to 6.5 times lower than the correct volume. The well development volume appears to have been about 4.5 to 6.5 times too low, meaning the wells were not developed in general accordance with code.

Page 11 states, "The elevation and horizontal location of each groundwater monitoring well were surveyed with respect to a known or designated benchmark on the Property. Elevations of the ground surface and top of the PVC well casing were surveyed." Survey data must be relative to mean sea level to meet code requirements. No survey data were provided in the report.

The discussion of quality control on page 13 should be more thorough. TRG quotes a partial list of the data qualifier language from the laboratory reports. The discussion should include an evaluation of how the data qualifiers affect the reliability of the data. Some significant findings that could affect the site evaluation:

- Chromium was detected in the method blank that is applicable to most soil samples. Note, page 13 states, “All analytes were below the report limit in the method blank.”
- One sample, TW-13 had to be re-analyzed, and that was done beyond the hold time.
- TRG did not collect all the duplicate and field blank samples prescribed in their workplan.
- The duplicate sample results discussed near the top of page 13 are not included in the table.

Page 14 states, “Seven soil samples were analyzed for RCRA Metals during the Phase II ESA and SI Investigation activities. There were no RCRA metals detected at concentrations greater than the Background Threshold Value, GW RCL, Non-Industrial DC RCL, or Industrial DC RCL.” These statements are inaccurate for the following reasons:

- There were 24 samples collected in total.
- TRG SB-8 (0-2’) and TRG SB-13 (0-2’) exceed the Background Threshold Value for chromium.
- Nearly all arsenic results exceed the GW RCL.

Page 15 states, “Table 3 contains groundwater elevation and water quality/natural attenuation parameter data that were measured in the field during groundwater monitoring in October 2021 and March 2022.” This statement is not accurate. There are no groundwater elevation data or survey data on the table. There is no data from March 2022 on the table.

Page 15 incorrectly states, “...all laboratory analytical data for groundwater samples collected at the Site during Phase II ESA and Site Investigation activities conducted in January 2021, October 2021, and March 2022.” The data for the duplicate sample from MW-6 is not included on the table.

The presentation of the RCRA metals results on pages 15 and 16 is difficult to follow, is not concisely summarized in the data table, and misses a major finding.

- Most importantly, the finding that chromium results vary considerably from round-to-round is not discussed.
- The statement that “concentrations reported for total chromium are comprised mostly of hexavalent chromium.” is not well supported by the data, as discussed above.
- The statement, “Arsenic was the only other RCRA metal [besides chromium] detected at concentrations that exceeded its PAL” is not accurate. Lead was detected above the PAL in TW-1 during January 2021.

The discussion of supply wells found on pages 17, 18 and 19 appears inconsistent.

- Page 16, states “The nearest water supply well is located 0.16 miles to the west of the Property.”
- Pages 17 and 18 state, “There are also no potable water supply wells within 1,000 feet of the Property. Therefore, potential contaminant migration to water wells is not considered a significant risk.”

TRG’s evaluation does not appear to meet the code requirement. Wis. Admin. Code §NR 716.07 requires “Potential or known impacts to receptors, including public and private water supplies; buildings and other cultural features; and utilities or other subsurface improvements. This evaluation shall include mapping the location of all water supply wells within a 1,200– foot radius of the outermost edge of contamination. More information should be provided about the water supply well that is 0.16 miles (845 feet) away from the property.

Page 20 includes a confusing discussion of the status of investigation related wastes and states “The drums **were** stored on site in a secure location. Millennium Forms **will** coordinate waste transportation directly with the disposal facility and/or treated using the on-site wastewater treatment system.” (emphasis added) Discuss whether the disposal was completed or is planned.

Page 22 references four “Laws and regulations that are applicable to this cleanup...” The Department recognizes this is not likely intended to be an exhaustive list, but it is worth noting that most of the 27 chapters of the Wis. Admin Code NR 700 series applies to this case, as other regulations incorporated by reference in those chapters, (e.g. Wis. Admin. Code ch. NR 141).

Page 22 states, “No Action is not an effective measure in controlling or preventing the exposure of receptors to contamination at the Site.” This sentence implies there are on-going exposures to receptors. However, the analysis provided in Section 6.2 of the report appears to conclude no on-going exposures, specifically:

- “...the potential for direct contact exposure is not considered a significant risk.”
- “...potential contaminant migration to water wells is not considered a significant risk.”
- “...the vapor pathway is not complete, and does not pose a risk to human health.”

This issue is highlighted here as an inconsistency that needs correction.

Wis. Admin Code Ch. NR 720, and Wis. Stats. Ch. 292 require restoration of the environment and not a solely risk-based approach to cleanup.

Remedial alternative #3, TRG’s recommended approach, would need to be supported with a design report, per Wis. Admin Code ch. NR 724. Apart from the code requirements for that report, some questions that should be answered include:

- What is the significance of the impacted concrete? Is it the primary source of contamination?
- Does alternative #3 include removal of impacted soil or just impacted concrete?
- The alternative appears to include removal of impacted concrete *and* treatment. This appears to be a combination of alternatives, and not an alternative by itself. Could treatment supplement alternative #2?
- How is this emulsion ‘self-distributing’?
- How much emulsion is needed and how is it applied?
- Discuss the need for on-going monitoring and measurement of the effectiveness of the emulsion. Is post-treatment soil sampling recommended? Is the groundwater baseline chemistry adequate to gauge success of treatment?
- Discuss how the potential discharge(s) from the on-going operations will be addressed.

### Figures, Tables, and Appendices

Figure 2, the site map does not meet Wis. Admin Code § NR 716.15 (2)(c) 6 requirements. For instance, the underground utilities are not shown on the map and the known and potential hazardous substance sources are not shown on the map.

Figure 3, the soil contamination map, does not have sufficient clarity or detail. For example:

- The map does not include a scale, as required under Wis. Admin Code § NR 716.15 (2)(a) 2.
- The Department estimates the soil source areas make up only 2% of the page, and so the map is not of appropriate scale, as required by Wis. Admin Code § NR 716.15 (2)(a) 1.
- There are no isoconcentration lines included on the figure, just a line showing the non-industrial residual contaminant level, so the map does not meet the requirements of Wis. Admin Code § NR 716.15 (2)(b) c.
- The map should also be the primary reference for estimating contaminant mass and evaluating data gaps, and it cannot be used for either purpose.

Figure 4, the groundwater contamination map is not code compliant.

- Isoconcentration lines should be dashed or include a question mark where the extent is inferred (e.g. TW-3), per Wis. Admin Code § NR 716.15 (2)(a) 4.

- The scale of the map is too small for clarity, similar to the scale issue with figure 3.
- The map seems to be a composite of different sampling dates and does not address the issue of variable results.

The two groundwater flow maps, both titled figure 5, are not to industry standard and do not comply with Wis. Admin Code § NR 716.15 (2)(b).

- Provide the datum used.
- The values should be groundwater elevation relative to mean sea level.
- The results seem to be depth to water and not water elevation.
- The data are not contoured.
- The basis of the flow direction arrows is unclear.
- The plotted depth data for October 2021 at MW-7 does not match the result in Table 4.
- Not all of the well data is shown for the October 2021 round.

Figure 6 and 7, the geologic cross sections, contain errors and do not meet code requirements in Wis. Admin Code § NR 716.15 (2)(d).

- The chemistry data and sample depths need to be shown.
- The well screen intervals should be shown.
- The Report shows known RCL exceedances being present only under the building. The contaminant distribution does not match Figure 4.
- What is shown at TW-1 with the inferred RCL exceedance? Discuss why this is inferred.
- The sections should show all borings within the line of section, not just a select few.
- The depth to water should not be inferred. Use data to support this interpretation.
- The elevations need to be referenced to MSL.
- Soil descriptions must match the boring logs. For example, at TRG SB-5, the soil descriptions on the two cross sections are not the same and neither depiction agrees with the data on the soil boring log. Similarly, TRG MW-4 boring log does not match cross section.

Table 3, “Groundwater Field Water Quality Parameters” does not include any 2022 data.

Table 4, “Hydraulic Conductivity Measurements and Calculations”:

- Discuss whether the time vs. drawdown analysis accurate. The groundwater depths used in drawdown tests should be relative to static and not total depths. Based on the data as presented, the curve fit seems arbitrary and the time to reach zero head is infinite.
- Drawdown results for only three wells are presented, whereas the workplan stated testing would be performed on six wells. Discuss the deviation from the work plan.
- Provide information on the software package or equations used to calculate the hydraulic conductivity values.
- Provide the assumptions, monitoring well, and aquifer dimensions used within the hydraulic conductivity calculations.
- Only one hydraulic conductivity value is presented. Provide the results for each of the individual tests.
- Provide the water elevations and data used in the gradient calculations.
- Discuss how the hydraulic gradient was calculated. Typically, the hydraulic gradient is the slope of the water table. In this instance, it appears TRG used distances between three wells compared to depth to water at those wells. This does not yield the same results as the true hydraulic gradient at the site, as demonstrated by the fact that the calculated gradients vary by over two orders of magnitude.



There is no table showing the water level elevation data or the survey results. There appears to be no reference to any MSL elevations in the report.

The appendices need to include all boring logs, well construction forms, well development forms and borehole abandonment forms. Much of the information is missing. Section 4.7 of TRG's site investigation workplan stated, "Copies of all soil borings logs, well construction, well development, and borehole abandonment forms, and laboratory analytical reports will be included in appendices."

The boring logs descriptions don't appear meet standards.

- Boring logs don't include origin and don't identify fill materials.
- The use of the unified soil classification system (USCS) designations is not consistent, for example:
  - Silty sand is not ML. ML is silt.
  - Silt with sand is ML, not SM.
  - Silt with clay is ML, not CL.

The borings logs were not each individually reviewed by the DNR and the examples are not intended as an exhaustive list of misclassifications.

The well development forms show the wells MW-4, MW-5, MW-6, and MW-7 were not properly developed, as discussed on earlier in this letter.

The groundwater laboratory report for the 10-15-2021 sampling is missing from the appendix.

Wis. Admin Code § NR 716.13 (7) (c) states, "Responsible parties shall ensure that the following items are documented during the field investigation and are made available to the department upon request: ... (c) Field notes describing in detail the sequence of activities that took place during the field investigation." The Department is requesting TRG to supply a copy of these field notes.

Robert Evangelisti was the Professional Engineer that certified the Report as the professional engineer overseeing the work. Please provide Mr. Evangelisti's contact information, including job title, place of employment, email address, and telephone number.

If you have questions or to set up the conference to discuss this project, please contact me.

Sincerely,



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