



REGION 5

CHICAGO, IL 60604

February 14, 2024

Via E-mail

Denice Nelson
Johnson Controls
5757 N. Green Bay Ave.
Milwaukee, WI 53209

Subject: 2022 Barrier Wall Annual Groundwater Monitoring Report Review
Tyco Safety Products - Ansul Stanton St Fac
U.S. EPA ID NO. WID006125215
1 Stanton Street
Marinette, WI 54143

Dear Ms. Nelson,

The Environmental Protection Agency (EPA) and the Wisconsin Department of Natural Resources (WDNR) have reviewed the 2022 Barrier Wall Annual Groundwater Monitoring Report dated and received on April 15, 2023, submitted for this facility. Prior to the report being approved, the following comments will need to be acknowledged and addressed when applicable:

General Comments:

The purpose of the Barrier Wall Groundwater Monitoring Annual Reports is to summarize the prior year's work, document site conditions, and provide data that adequately demonstrates the performance of the barrier wall. The quarterly reports should be the basis for much of the annual report, and relevant comments herein should be considered for incorporation in future quarterly reports. These comments are to be considered, addressed, and/or incorporated into future annual reports unless specifically directed to revise the 2022 annual report. The vertical barrier wall (VBW) containment system was designed to prevent highly contaminated groundwater from leaving the site and re-contaminating surface water and sediment in the Menominee River. Given the nature, degree, and extent of arsenic contamination at the site, the VBW system will require monitoring and maintenance in perpetuity or until an action is taken to remove or stabilize the arsenic. The VBW monitoring should evaluate the present effectiveness as well as the long-term effectiveness.

Designing an effective monitoring program is critical in understanding the short-term and long-term efficacy of the system. Traditional features of sites with containment systems including a continuous cap and maintenance of an inward gradient across the entire perimeter do not exist at the Stanton Street site and make evaluation of hydraulic conditions challenging. Multiple lines of evidence have been used at the site in the evaluation of the VBW's efficacy.

These include:

- VBW inspections (limited and where possible)
- Hydraulic conditions (potentiometric surface)
- Hydraulic head differences
- Hydraulic independence
- Total arsenic concentration in groundwater

The interpretation of the data and observations that inform these lines of evidence still leaves some uncertainty in the conclusion that the wall is serving as an effective barrier. Additional information is required to further support this statement. EPA and WDNR are providing the following comments and recommendations to improve the ability of the monitoring and maintenance program to assess the effectiveness of the VBW system, prevent contaminated groundwater from leaving the site, and ensure long term protectiveness. Future reports should build on the current evaluation and lines of evidence by including the following recommendations and any other appropriate methods:

- Develop a water balance for each of the four sections of the containment system and the site as a whole.
 - Include hydraulic conductivity calculations for each of the barrier wall systems that make up the distinct hydraulic units.
 - Include features that may affect containment such as variations in the height of different barrier walls or utility corridors that cross vertical barrier walls.
- Update the Conceptual Site Model (CSM) to reflect current conditions including information from each of the existing lines of evidence studied and the water balance.
- Evaluate if and how the 4 sections of the site are hydraulically connected.
- Demonstrate how groundwater is recovering outside the VBW system following its construction.
 - The focus of the monitoring program has been on conditions within the VBW system with data collected outside the system to inform its effectiveness. Data to illustrate conditions outside the wall should be collected and isoconcentration lines generated.
- Assess the risks associated with surface water and groundwater mixing and potential releases to the river.

The agencies recognize decades of investigation and interim actions have been implemented at the site to address the risks associated with the contaminant mass remaining and encourage Johnson Controls/Tyco to continue to evaluate methods to address the source.

Specific Comments:

1.1 Site Overview – Paragraph 3

- “Additionally, soft sediment in the former 8th Street Slip was removed, the former slip area was filled with clean material and covered with asphalt, and groundwater monitoring was performed to demonstrate the effectiveness of the interim corrective measures.”
 - It should be clarified in the text that although clean fill was used, it was placed in an area with elevated arsenic concentrations in shallow groundwater and that assumptions cannot be made that the material has not come in contact with contaminated groundwater.

3.3 Pump Down Program Performance

- Consider evaluating the water level in each individual well compared to the target elevation. Any individual well with a higher-than-average head may be an indicator that additional assessment is needed.
 - Consider providing individual Pump Down Program system hydrographs for the salt vault and 8th street slip with elevations from each individual well in addition to average well and river elevations.
 - Future quarterly report PDP system hydrographs should also be updated to reflect this comment.

4.2 Phyto-pumping System

- Include the Phyto-pumping system in the water balance for each section of the site and the site as a whole.
 - Evaluate how the system may contribute to a net reduction in the volume of water requiring management at the site.
 - Include the Phyto-pumping system as part of the lines of evidence for site control and its effectiveness.

5. Barrier Wall Effectiveness Evaluation

- “Barrier wall inspections are conducted annually on the land and water sides of the barrier wall to note any damage of the visible portions of the barrier wall and identify any visible leaks or integrity issues that would affect the onsite groundwater management required by the AOC. Additionally, the sheet pile barrier wall along the river is surveyed to document any changes to the barrier wall alignment that may affect its effectiveness.”
 - Describe the scope of the VBW inspection to clarify how much of the wall is observable and able to be inspected.

5.1 2022 Barrier Wall Visual Inspections and Survey

- Inspection of the visible portions of the land and river side of the VBW along the north side of the site is important to identify conditions that may indicate that this portion of the containment system is not functioning as intended.
 - Contracted staff (Endpoint Solutions) conducting the visual inspections should be listed in the report along with their credentials/qualifications (professional engineer, surveyor, etc.).
 - In future annual reports, provide a barrier wall inspection form that documents site conditions with photos and notes as well as the name and credentials of who completed the inspection.
- Define and provide justification for what observations indicate additional action beyond continued monitoring may be necessary. What observations indicate satisfactory condition/performance? List relevant sources for criteria.
- Include discussion of any new/alternative technologies which may produce a more accurate inspection of the underwater portion of the VBW system and may be an alternative to the underwater inspection performed by a diver every five years.

- Include discussion of any new/alternative technologies which may support inspection of the VBW at depth around the salt vault, 8th street slip, and main plant areas.

5.2 Hydraulic Conditions

- Consider interpreting the potentiometric surface in the 8SS and SV to 0.1 feet to capture the influence of the PDP extraction wells.
- List all assumptions used in developing the potentiometric surfaces.
- To adequately characterize the groundwater flow patterns outside the VBW, additional wells are needed upgradient and away from the wall.

5.3 Hydraulic Head Difference

- Provide the technical basis and sources for the interpretation of the magnitude of head differences across the barrier wall. Specifically, the statement that a one-foot head difference is a significant change that would indicate hydraulic independence.
- Provide the technical basis and sources that support the conclusion that the impacts of mounding outside the VBW and PDP extraction in the unconsolidated aquifer are enough to influence HH in the deep/bedrock aquifer.

5.4 Hydraulic Independence

- Provide the technical basis and sources used to evaluate hydraulic independence. To establish hydraulic independence, all inputs and outputs must be considered.
- Based on visual analysis, the transducer graphs indicate the potential for an outward gradient towards the river. The agencies are not convinced that the SerieSEE evaluation has sufficient data quality or selection criteria, to conclude that the groundwater and river are not connected along the Main Plant wall.

Figure 5 – VBW Details and 2022 Inspection

- Figure 5 identifies the approximate locations of notable conditions on the wall that warrant action or continued observation.
 - Please highlight which surveyed dimple points had deflections > 1 inch on this figure.

If you have any questions about this review, please contact me via phone at (312) 353-4374 or through email at Kleinberg.Andrew@epa.gov.

Sincerely,



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