

From: Ziegelbauer, Heather <Heather.Ziegelbauer@jacobs.com>
Sent: Friday, September 13, 2024 2:23 PM
To: Kleinberg, Andrew
Cc: Krueger, Sarah E - DNR; Carey, Angela J - DNR; Sellwood, Alyssa A - DNR; Denice Nelson
Subject: RE: Extraction Well Design Memo

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Andrew, On behalf of Tyco, the below text in green responds to your preliminary comments.

We are hoping to get these extraction wells installed this fall 2024 (after approved by EPA and WDNR), so please let us know if you have any questions or need anything else.

Thanks,

Heather Ziegelbauer, PE* | [Jacobs](#) | Project Manager
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From: Denice Nelson <denice.karen.nelson@jci.com>
Sent: Friday, September 6, 2024 4:00 PM
To: Kleinberg, Andrew <Kleinberg.Andrew@epa.gov>
Cc: Ziegelbauer, Heather <Heather.Ziegelbauer@jacobs.com>; Krueger, Sarah E - DNR <sarah.krueger@wisconsin.gov>; angela.carey@wisconsin.gov; Sellwood, Alyssa A - DNR <alyssa.sellwood@wisconsin.gov>
Subject: [EXTERNAL] Re: Extraction Well Design Memo

Andrew - Per your email below, the work that was scheduled to occur next week was cancelled. No work will begin until all approvals have been obtained from both EPA and WDNR.

We will respond to your preliminary comments early next week.

Denice

Denice Nelson

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From: Kleinberg, Andrew <Kleinberg.Andrew@epa.gov>
Sent: Friday, September 6, 2024 2:30 PM
To: Denice Nelson <denice.karen.nelson@jci.com>
Cc: Heather.Ziegelbauer@jacobs.com <Heather.Ziegelbauer@jacobs.com>; Krueger, Sarah E - DNR <sarah.krueger@wisconsin.gov>; angela.carey@wisconsin.gov <angela.carey@wisconsin.gov>; Sellwood, Alyssa A - DNR <alyssa.sellwood@wisconsin.gov>
Subject: Extraction Well Design Memo

Hey Denice,

We noticed on the Extraction Well Design Memo that it stated that work is scheduled to begin during the week of September 9, 2024. Please note that no work should start until Tyco receives all necessary approvals from both EPA and WDNR.

Additionally, EPA and WDNR had a few preliminary comments we would like addressed before completing our review:

1. Please list the intended purpose for the installation of these extraction wells, specifically if the work is related to ongoing RCRA CA or if its more directly related towards PFAS.
 - a. Any PFAS related work will need concurrence from Alyssa Sellwood of WDNR

Response: As noted in Tyco's August 28, 2024, design package cover letter, the following lists the intended purpose for the extraction wells:

 - **EW-15:** New vertical extraction well in the northwestern corner of the site will extract groundwater outside the vertical barrier wall to limit the discharge of overburden groundwater to the river. This groundwater outside the wall here has elevated arsenic along with PFAS concentrations, therefore is related to both RCRA CA and PFAS.
 - **HW-3 and HW-4:** Additional extraction capacity is needed in the northeastern corner of the Main Plant since existing vertical extraction well EW-4 has a limited capacity, due to the limited thicknesses of water-bearing soils in this area. Adding extraction capacity with the horizontal wells here will support more efficient and timely management of groundwater levels in this portion of the contained area to prevent groundwater-induced surface flooding within the property. These horizontal extraction wells are related to the RCRA CA work.

2. Please indicate how installation of these extraction wells will accomplish the intended purpose specified in your response to comment #1.

Response: The following summarizes how the extraction wells will accomplish the intended purpose:

- **EW-15:** The proposed vertical extraction well has been designed to intercept overburden groundwater (shallow- and medium-depth groundwater, above the glacial till) that contains site-related constituents, including arsenic and PFAS, potentially migrating toward the Menominee River immediately outside the barrier wall. Currently groundwater has the potential to discharge via a limited length of shoreline between the northwestern corner of the Tyco vertical barrier wall and the neighboring Marinette Marine property sea wall. Initial extraction rates are anticipated to range from 2 to 6 gallons per minute (gpm), however hydraulic testing is needed after EW-15 is installed to confirm the well will achieve extraction rates that are effective at limiting discharge of groundwater to the river in this area. The effectiveness of extraction efforts here would be monitored using monitoring well nest MW003 and newly proposed nest MW132 (between the extraction well and the river) and other nearby wells (possibly monitoring well nest MW106). Hydraulic testing will determine if this approach to managing shallow groundwater outside the wall here is feasible. Specifically, the approach will be considered infeasible if rates during testing required to intercept groundwater are significantly higher than the anticipated range of 2 to 6 gpm, as the existing GWCTS would not have the capacity to accommodate the treatment of this water. This approach would also be considered infeasible if the extraction well flow rate is not sufficient to intercept groundwater here.
- **HW-3 and HW-4:** Because the limited capacity at EW-4 is due to the limited thicknesses of water-bearing soils in this area, replacement or addition of another vertical extraction well is unlikely to provide the additional extraction capacity needed. The horizontal installations can target the key water-bearing zone in this area and allow for the installation of significantly more screen length across this zone. This is anticipated to significantly improve the chances of achieving a higher capacity installation. This alignment would also allow for reuse of the existing electrical and conveyance line to the GWCTS that is currently associated with EW-4. As noted in the Design Documents, the horizontal extraction wells will be installed to approximately 6 feet below ground surface to intersect the relatively more permeable zone that is found in this area and maximize yield. It is anticipated that groundwater would be extracted at a combined rate of between 2 and 12 gpm from the new installations, similar to the other Main Plant wells. With this installation the system will be able to affect water levels more quickly in this area. Presently water levels in this area of the site are managed with extraction wells that are a significant distance away in the northwestern (EW-7) and south central (EW-5 and EW-6) portions of the Main Plant. Coupled with modest reductions in flow rates from EW-5 and EW-6, the distribution of extracted groundwater will be more balanced across the Main Plant and the system will be able to react more efficiently to increasing water levels in this portion of the Main Plant.

3. Please discuss any potential impacts the extraction wells may have on the current remedy including requirements to maintain an inward gradient in the vertical barrier wall containment system, the ability to manage groundwater elevations to prevent site flooding and additional demands on GWCTS operations.

Response: The following discuss any potential impacts on the current remedy:

- **Inward Gradient:** Per the RCRA 2009 AOC and 2014 Agreement, the only portions of the site required to maintain a target elevation (which under typical conditions maintains an inward gradient) are the former Salt Vault and former 8th Street Slip. Elsewhere, the system is operated to prevent flooding.
 - Operation of EW-15 outside northwest corner of the site will be monitored with transducers at the nearby monitoring wells to monitor water levels on either side of the wall to aid in operational decisions.
 - Installation of HW-3 and HW-4 is intended to address risk of site flooding as discussed below and is replacing EW-4 to more sustainably meet projected operational flow rates.
- **Ability to manage groundwater elevations and prevent site flooding:**
 - EW-15 is outside of the wall and is not anticipated to significantly impact groundwater levels onsite.
 - The primary objective of HW-3 and HW-4 is to maintain groundwater levels more sustainably in this area of the site to prevent site flooding.
- **Additional demands on GWCTS operations:**
 - The GWCTS was designed with an overall capacity of 60 gpm to enable future optimizations. Based on routine cleaning runs and other needed maintenance, the maximum operational capacity is estimated to be an overall average of 40 to 45 gpm. The GWCTS operations needed to maintain the contained areas (including HW-3 and HW-4) are anticipated to run at an overall average of 26 gpm and that would leave be an additional capacity of 14 to 19 gpm available to accommodate EW-15 and other potential future optimizations, as needed.
 - As noted above in response to comment #2, testing at EW-15 is recommended before connecting it to the GWCTS to confirm the rates needed here can effectively intercept the groundwater within the GWCTS current treatment capacity.
 - Adding HW-3 and HW-4 will replace EW-4. The extracted flowrate from this area of the site was already planned as part of the overall GWCTS operational demands. The rates between the different extraction wells will be adjusted to allow for the most efficient removal based on current groundwater levels.

Please reach out if you have any questions.

Enjoy your Weekend!

Andrew Kleinberg

Project Manager - Geologist

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