

October 30, 2020

Christopher Black  
U.S. Environmental Protection Agency Region 5  
Land, Chemicals & Redevelopment Division  
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**Subject: Response to Agencies Review of 2019 Barrier Wall Groundwater Monitoring Annual Report dated March 17, 2020, Tyco Fire Products LP, Stanton Street Facility, Marinette, Wisconsin, WID 006 125 215**

Dear Mr. Black:

On behalf of Tyco Fire Products LP (Tyco), Jacobs Engineering Group Inc. (Jacobs) has prepared this response to U.S. Environmental Protection Agency (EPA) and Wisconsin Department of Natural Resources (WDNR) (Agencies) comments on the above-referenced document. The comments were provided in a letter attached to an email from Mr. Black delivered on September 30, 2020. For ease of review, the agency comments are presented in italics followed by the Tyco response in plain text.

## Response to Comments

### General Comments

1. **Summary:** *The 2019 Barrier Wall Report was reviewed to verify that the Addendum to the 2015 Barrier Wall Groundwater Monitoring Plan Update submitted June 2019 (2019 BWGMPU) was fully followed. The 2019 Barrier Wall Report was further reviewed to evaluate the effectiveness of the on-site groundwater management system to contain arsenic-impacted groundwater on-site and to determine if any corrective actions are required based on the latest data.*

**Conclusions:** *The review of the 2019 Barrier Wall Report indicates that river level conditions, including unusually high river levels, complicate the evaluation of the efficacy of the barrier wall. Regardless, a number of technical concerns were noted. These concerns included the operation and maintenance of the on-site extraction system, the control of water levels within the Main Plant and Wetland area, and conclusions regarding the SeriesSEE analyses.*

**Response:** Comment noted.

### Specific Comments

1. *As noted in the 2019 Barrier Wall Report (pg. 4-3), operations and maintenance issues resulted in limited run time for the Groundwater Collection and Treatment System (GWCTS) in 2019. The report identifies and discusses a number of issues that were encountered with the GWCTS during 2019. While*

*the Report has not clearly indicated the degree to which the operation of the GWCTS has been impacted by these issues, Table 2 (GWCTS Monthly Extraction Well Average Pumping Rates) indicates that pumping rates from EW-1 and EW-4 appear to have been significantly reduced based on historical pumping rates. Moreover, EW-5 and EW-7 ceased operations in June and April 2019, respectively.*

*The limited operation of the GWCTS in 2019 adversely impacted the hydraulic control of arsenic contaminated groundwater on site. **Tyco should review its operation and maintenance program for the GWCTS and revise this program so as to provide adequate assurances that the GWCTS will provide the necessary hydraulic control of arsenic contaminated groundwater within the barrier wall.***

**Response:** The extraction well concerns and operations and maintenance (O&M) issues were addressed in early 2020 as indicated in the first quarter 2020 report (Jacobs 2020). Extraction rates have been significantly improved during 2020 with minimal O&M issues encountered. Tyco plans to continue operating with the current GWCTS O&M plan while the design for upgrades to the existing GWCTS will begin following issuance of the Wisconsin Pollution Discharge Elimination System (WPDES) permit. The WPDES permit variance is under public comment review and has an anticipated finalization date of December 1, 2020. Per the permit posted for public review, the upgrades are required to be completed by November 30, 2022, and a new O&M plan will be prepared as part of the upgrade activities.

The *Resource Conservation and Recovery Act Administrative Order on Consent* between Tyco and EPA, dated February 26, 2009 (EPA 2009) required construction of barrier walls to contain onsite groundwater contaminated with arsenic to the maximum extent possible. Construction of a GWCTS consisting of mechanical pumping and phyto-pumping systems also was required, with operation "such that the groundwater is maintained onsite at depths below ground surface that prevents surface flooding of the facility." While the *Agreement on Resolution of 2013 Fiver Year Review Technical Issues* (AOR), dated April 23, 2014 (EPA 2014), required a pump down program (PDP) to provide hydraulic control for the former Salt Vault and former 8th Street Slip cells, Section I.A.2 specifically excluded the Wetlands Area and Main Plant areas from this amended PDP requirement. This was done because the existing pumping from the Wetlands Area and the associated phyto-pumping adequately reduced water levels in the Wetlands Area, and risks to building structural integrity and settlement in the Main Plant precluded more aggressive groundwater extraction. In lieu of lowering groundwater elevations to a target elevation or below surrounding river and groundwater levels, additional barrier wall integrity measures were prescribed for the Main Plant area in the 2014 AOR. These included:

- Evaluating the potential amount of groundwater migration that might impact the ability of river sediment to maintain the 20 parts per million remedial action objective which was submitted in a memorandum on July 30, 2014 (*Supplemental Evaluation: Potential for Recontamination of Menominee River Sediments due to Groundwater Migration from the Main Plant Area* [CH2M HILL Engineers, Inc. {CH2M} 2014]). EPA provided a response to the memorandum on October 2014 (EPA 2014), and Tyco responded to EPA comments in April 2015 (CH2M 2015).
- Performing a groundwater dye test adjacent to the barrier wall which was ultimately replaced with enhancements to the hydraulic monitoring program. After a series of comments and responses to comments on the proposed dye testing, performing a pilot dye test, evaluating dye test alternatives, and conducting extensive evaluation of an alternative evaluation approach using passive arsenic sampling, Tyco and the Agencies agreed to implement an enhanced hydraulic monitoring and data evaluation approach in lieu of the dye testing. The agreed upon approach was documented in the June 2019 *Addendum to 2015 Barrier Wall Groundwater Monitoring Plan*

*Update* (Jacobs 2019). This work included an underwater wall visual wall inspection using SCUBA, an expanded monitoring well network with continuous hydraulic head monitoring and hydrograph analysis using the SeriesSEE program.

2019 presented several O&M issues that were exacerbated by high river levels and overtopping of the drainage weirs which led to significant rises in the water table. While this flooding has continued in 2020, system operations thus far have been significantly improved. As stated above, it is Tyco's intention to continue to operate the system at its present extraction and treatment capacity into the near future (averaging 12 gallons per minute in September 2020 during system operations, from the Main Plant and Wetlands Area only) to maintain groundwater levels below the ground surface. Pending WPDES permit approval, additional system upgrades required to handle increased arsenic loading associated with onsite treatment of the PDP water are anticipated to improve overall system efficiencies and run times, which will allow for improved management of the Main Plant water levels which, prior to 2019, typically had been around 2 to 4 feet lower than where they were in 2019 and the first half of 2020.

Tyco has taken several measures to help control the high river levels overtopping the weirs onsite. Tyco installed a Muscle Wall barrier along the Main Plant portion of the sheet pile barrier wall (approximately 1,500 linear feet) the week of April 20, 2020 to limit river water coming onsite. Openings in the Muscle Wall were left at the four weir locations to allow for stormwater management; the openings in the Muscle Wall were constructed so river water could be blocked and allow management of river water and stormwater, as needed. In addition, temporary weir gates, that allow the weirs to be closed off at the sheet pile wall when needed, were installed at the two western-most weirs in August 2020, and the eastern-most weir had a gate installed in September 2020. A fourth weir does not require a gate because the ground elevations adjacent to the weir are higher in this area.

Permanent adjustable gates for three of the four weirs were constructed and installed the week of October 5, 2020. In addition, super sacks filled with clean sand from offsite were temporarily placed on top of three catch basins near Building 29 in the southwestern corner of the site, and a bypass was installed in one of the catch basins. During high river levels, river water occasionally backs up at these catch basins, and the super sacks and bypass help limit the amount of river water that surfaces. The bypass and super sacks were removed in mid-September 2020 as river levels were low enough that back ups were no longer a concern. Long term, Tyco will be implementing a stormwater improvement plan as part of the WPDES permit that will abandon the subsurface stormwater lines and manage stormwater through aboveground surface flow, as needed.

- The 2019 Barrier Wall Report (pg. 4-8) acknowledges that "cross-gradient monitoring well hydraulic heads along the western (Main Plant) area of the site were generally higher inside the barrier wall than outside the barrier wall during both the June and October 2019 monitoring events." **This indicates that flow across the western boundary may be occurring.** Such a flow pattern is consistent with the potentiometric contours depicted in Figure 6A and 7A. Such a flow pattern should be acknowledged, and arsenic migration across the western barrier wall carefully examined. **Operation of an effective extraction system in the Main Plant area should help to minimize any such flow and contaminant migration across western portion of the barrier wall (see Comment No. 1).***

**Response:** Comment noted. As set forth in the 2015 BWGMPU and 2019 Addendum, multiple lines of evidence are considered as part of the barrier wall effectiveness evaluations that include not only the direction of hydraulic gradients, but also the magnitude of the head differences across the wall (as depicted on Figure 4A of Appendix C of the 2019 Barrier Wall Report, large enough to indicate barrier

effectiveness), and intrawell arsenic concentration trends (stable at wells outside the western barrier wall). Based on evaluation of multiple lines of evidence, the western barrier wall appears to be operating effectively. Also note that hydraulic heads on the western boundary of the barrier wall are likely affected by grading and stormwater drainage issues in this area. The southwest corner has catch basins that have occasional river water backup along Stanton Street adjacent to Building 29. In the northwest corner near monitoring well nests MW003 and MW106 there is a low-lying grassy area where surface water can pond and infiltrate. These areas along the western boundary will be modified as part of the WPDES permit stormwater improvements following issuance of the permit. These modifications should allow for less infiltration and result in improved evaluations of the wall effectiveness in this area. The western boundary will continue to be monitored and evaluated in accordance with the 2015 BWGMPU and 2019 Addendum. See response to Specific Comment 1 for details on extraction system operations.

- 3. The 2019 Barrier Wall Report (4-9) acknowledges that "a comparison of hydraulic heads between site wells adjacent to the Menominee River and staff gauge SG4 data collected in June 2019 (based on transducer data) and October 2019 indicate hydraulic heads were generally higher than the river in the Main Plant and Wetlands Area and lower than the river in the former Salt Vault and former 8th Street Slip areas." While it is understood that unusually high river levels occurred during the 2019, under these conditions it appears that Tyco is relying on the limited permeability of the barrier wall to limit discharge of arsenic into the Menominee River. **A more aggressive groundwater extraction program from within the Main Plant area should be implemented to minimize any potential for groundwater flow across the barrier wall into the river (see Comment No. 1).***

**Response:** See response to Specific Comment 1, and in accordance with the relevant agreements between the Agencies and Tyco, the containment remedy is not intended, nor was it designed to lower groundwater elevations in the Main Plant to below the river levels/outside groundwater levels. Extraction of groundwater is performed to prevent surface flooding of the facility. More aggressive pumping poses risks to the structural integrity of existing buildings and settlement that may affect infrastructure as a whole. In addition, in accordance with the approved remedy (2009 AOC) and subsequent agreements (2014 AOR), the limited permeability of the barrier wall (as demonstrated using the data and evaluations prescribed in the 2015 updated BWGMPU and 2019 Addendum) is the primary means for limiting discharge of arsenic to the Menominee River in the area of the Main Plant. The SeriesSEE analysis and visual underwater inspection discussed in the 2019 Barrier Wall Report indicate the sheet pile barrier wall was structurally intact, and there was not a discernable hydraulic connection between the river and Main Plant area during periods when river overtopping of the weirs was not occurring (that is, the wall is acting as designed).

- 4. The SeriesSEE analysis of the continuous hydraulic head data from monitoring wells located adjacent to the barrier wall/river in the Main Plant area provided mixed results, with apparent hydraulic connections with the river across the barrier wall at some locations and not at others. The analysis was complicated by a number of factors including limited variability of river water levels and high river levels that resulted in the inundation of certain areas within the plant. The 2019 Barrier Wall Report (pg. 4-14) acknowledges that "while a hydraulic connection was indicated at some wells in the Main Plant along the Main Channel for a portion of 2019, the connection appears to be related to high river levels creating localized flooding rather than deficiencies in the barrier wall." However, the Report further concludes that "the SeriesSEE method identified a hydraulic connection during known periods at the wells closest to where high river levels were overtopping the weirs, as would be expected, thereby verifying the suitability of the approach for detecting a hydraulic connection." However, given the unusual circumstances during the SeriesSEE analysis (including limited fluctuations in river water*

*levels and the high river water levels), conclusions regarding the efficacy of the SeriesSEE analysis appear premature. Further evaluation of the analysis should continue using 2020 hydraulic data. Future reports should contain thorough documentation of the SeriesSEE analysis including data sets, software input parameters and a discussion of the filters used.*

**Response:** Tyco agrees that further evaluation of the efficacy of the SeriesSEE analysis should continue; note that in 2020, river and groundwater conditions similar to those in 2019 were observed, so complicating factors will likely also be observed in much of the 2020 data. As recommended in the 2019 Barrier Wall Report, evaluation of ideal parameters for SeriesSEE analysis should be conducted once river levels have fallen and additional data can be collected from wells outside the barrier wall. Tabular input and output data sets, discussion of filtering of data, and discussion of methodology (such as input parameters) will be included in future annual reports.

We trust the enclosed responses address EPA's comments. Please contact Jeffrey Danko at 414-524-3344 if you have any question.

Regards,

Jacobs Engineering Group Inc.



Heather Ziegelbauer  
Project Manager

Copies to: Angela Carey/Wisconsin Department of Natural Resources  
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