



March 21, 2024

MS. DENICE NELSON
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Via Email Only to denice.karen.nelson@jci.com

SUBJECT: Response to *Site Investigation Status Report*
JCI/Tyco Stanton (PFAS), 1 Stanton Street, Marinette, WI
ChemDesign (PFAS), 2 Stanton Street, Marinette, WI
BRRTS #02-38-581955 and #02-38-583852

Dear Ms. Nelson:

On Feb. 16, 2024, the Wisconsin Department of Natural Resources (DNR) received the *Site Investigation Status Report* (the "SI Status Report") submitted by Arcadis U.S., Inc. (Arcadis), on behalf of Johnson Controls, Inc., and Tyco Fire Products LP (JCI/Tyco). The report was accompanied by the fee required under Wisconsin Administrative Code (Wis. Admin. Code) § NR 749.04(1) for DNR review and response. The SI Status Report summarized results for the on-going investigations of discharges of per and polyfluoroalkyl substances (PFAS) for both BRRTS 02-38-581955 and 02-38-583852¹ (collectively referred to herein as the "Stanton Site").

The DNR reviewed the SI Status Report and provides recommendations herein for next steps in the site investigation for the Stanton Site. JCI/Tyco should provide a site investigation workplan within 60 days of receipt of this letter with its proposed next steps in the site investigation (Wis. Admin. Code § NR 716.09(1)).

Background

The Stanton Site includes multiple parcels, of which, JCI/Tyco currently owns approximately 51-acres along the Menominee River. An adjacent 15-acre parcel, previously owned by JCI/Tyco, is now owned by KKIL Stanton LLC (KKIL) and contains an office building and a parking lot. JCI/Tyco retains responsibility for the PFAS contamination on this parcel caused by JCI/Tyco's historical discharges of PFAS.

The PFAS contamination at the Stanton Site is associated with discharges from JCI/Tyco's and ChemDesign's operations. Since around 1964, JCI/Tyco has blended and packaged PFAS-containing aqueous film forming foams (AFFF), and currently they also manufacture fire extinguishers and other fire suppression system hardware at the Site. JCI/Tyco also conducted fire training on the parcel currently owned the KKIL in the 1950s through early 1960s. ChemDesign is a synthetic organic chemistry toll service provider and since 1983 it has leased approximately 7.4-acres of the property from JCI/Tyco. Starting in 2005, ChemDesign has provided reactor space to process a series of different perfluorinated compound intermediates from raw materials for JCI/Tyco. While the specific discharge mechanisms for PFAS at the Stanton Site are not defined, JCI/Tyco and ChemDesign have

¹ ChemDesign Product Inc. (ChemDesign) leases 12 buildings and two tank farms on approximately 7.4 acres of the Stanton Street property from JCI/Tyco. ChemDesign is the responsible party for PFAS discharges from their operations under BRRTS 02-38-583852. However, because ChemDesign's operations are co-located with JCI/Tyco's on the property, JCI/Tyco has included potential releases and evaluation of PFAS for BRRTS 02-38-583852 in this SI Status Report.

indicated that the PFAS contamination is likely from incidental discharges of AFFF and PFAS-containing materials throughout their history of use on the property.

Summary of Prior Submittals

Historically, much of the property was investigated and underwent Resource Conservation and Recovery Act (RCRA) corrective action measures for arsenic contamination, which is tracked under BRRTS case #02-38-000011. The corrective actions include a hydraulic barrier wall that encompasses a large portion of the 51-acre property.

JCI/Tyco has suggested that the RCRA corrective action measures for arsenic will also control contaminant migration and address risk associated with PFAS. However, because the discharge sources and transport pathways for the PFAS contamination at the Site differ from the arsenic, a site investigation for PFAS completed in accordance with Wis. Admin. Code ch. NR 716 is required. The nature, degree and extent of the PFAS contamination must be defined (Wis. Admin. Code § NR 716.11(3)(a)) to evaluate effectiveness of the current corrective action measures and evaluate remedial actions to address PFAS contamination (Wis. Admin. Code § NR 716.11(3)(b)).

The DNR has received the following submittals documenting site investigation activities for PFAS at the Site.

Submittal	DNR Response	Comments/Notes
July 6, 2020, <i>Interim Site Investigation Report</i> . BRRTS #02-38-581955	Aug. 31, 2021	<ul style="list-style-type: none"> - Six groundwater and eight soil samples (inside) and 12 groundwater (outside), including three bedrock wells. - Samples analyzed for 14 PFAS compounds. Concentrations of PFOA up to 9,100 ppt (inside) and over 1,000 ppt in bedrock. - Additional investigation needed to address data gaps on affected media, degree and extent of impacts, migration pathways and to expand testing to include 36 PFAS.
Aug. 11, 2020, <i>Conceptual Site Model</i> . BRRTS #02-38-581955		
Aug. 11, 2020, <i>Aerial Deposition Evaluation Report</i> . BRRTS #02-38-581955		
Mar. 22, 2021, <i>Site Investigation Workplan</i> . BRRTS #02-38-581955		
Jan. 12, 2022, <i>Limited Site Investigation Report</i> . BRRTS# 02-38-583852	Mar. 4, 2022	<ul style="list-style-type: none"> - Eleven soil and groundwater samples for 36 PFAS from temporary direct push borings (inside). - Highest concentrations were 6:2 fluorotelomer sulfonate² (FTS); greater than 100,000 ppt in soil and groundwater. - Future work to be combined with BRRTS 02-38-581955.
Feb. 7, 2022, <i>Response to DNR’s Aug. 31, 2021 Comments</i> . #02-38-581955	n/a	<ul style="list-style-type: none"> - Summary of RCRA remediation measures and controls. - Summary of historical and current activities related to PFAS. - Review of changes in shoreline and land development. - Overview of planned upgrade to stormwater management.

² 6:2 FTS was not included in the analyte list of 14 PFAS previously tested on the Stanton Site.

Submittal	DNR Response	Comments/Notes
Mar. 22, 2022, <i>Site Investigation Status Report</i> . BRRTS #02-38-581955 and #02-38-583852	May 19, 2022	<ul style="list-style-type: none"> - Sampled 45 groundwater monitoring wells for 36 PFAS; including 13 (inside), 20 (outside) and 12 bedrock wells. - 6:2 FTS makes up highest proportion of PFAS (inside). 6:2 FTS also detected outside but decrease with distance from the barrier wall. - PFAS in bedrock likely migrated from Fire Technology Center (FTC). Further testing needed to evaluate if PFAS from Site is also contributing to PFAS in the bedrock. - Stormwater discharging to Menominee River has PFOA over 200 ppt and PFOS over 40 ppt. - Additional investigation recommended to define extent of contamination in groundwater outside the wall, evaluate if the KKIL property contains PFAS source areas related to historical AFFF use and evaluate PFAS discharge to the Menominee River.

NOTE:

inside or (outside) = samples collected from locations inside (or outside) the hydraulic barrier wall that was installed in 2010 for the RCRA site.

Summary of SI Status Report

On Mar. 22, 2022, JCI/Tyco submitted a *Site Investigation Work Plan* with its plans for next steps in the investigation. The DNR provided review comments and recommendations in a letter dated May 19, 2022. The site investigation activities and evaluations presented in the most recent SI Status Report were completed based on that 2022 *Site Investigation Work Plan* and the DNR’s response.

Between July 2022 and Oct. 2023, JCI/Tyco performed additional work in the site investigation that included the following:

- Collected soil and groundwater samples from six temporary vertical aquifer profile (VAP) points; five around the former fire training area now part of the KKIL parcel and one in the right-of-way on 8th Street.
- Collected one round of groundwater samples from 25 NR 141 monitoring wells outside the barrier wall (including four new wells).
- Collected groundwater samples from 11 bedrock wells, both inside and outside the barrier wall.
- Measured groundwater levels in coordination with others to improve interpretation of localized groundwater flow patterns around the hydraulic barrier wall.
- Collected two rounds of surface water samples from eight locations in the Menominee River.

JCI/Tyco presented its findings and conclusions in the SI Status Report, which included the following:

- The KKIL property contains PFAS contamination, but the concentrations were not indicative of historical AFFF use or training on this parcel. The PFAS contamination was attribute, in part, to fill materials.
- Groundwater with 6:2 FTS, perfluorooctanoic acid (PFOA), four other perfluorocarboxylic acids and perfluorooctane sulfonate (PFOS) is indicative of PFAS discharges from the Stanton Site. The 6:2 FTS is a useful marker to distinguish PFAS coming from the Stanton Site as compared to other upgradient sources.
- PFAS detected in the shallow bedrock is predominantly associated with migration of PFAS from the FTC and is interpreted to discharge to the Menominee River.

- Groundwater in the overburden outside the barrier wall, flows around the wall and discharges into the Menominee River, east of the facility. However, to the north of the Stanton Site, a localized preferential flow pathway (a former log run) influences the groundwater flow direction and causes groundwater to flow toward the northwest before discharging to the river.
- The flux of PFAS into the Menominee River is not causing the surface water concentrations of the river to exceed Wisconsin's current surface water criteria of 95 ppt for PFOA and 8 ppt for PFOS.

DNR Review and Recommendations

JCI/Tyco did not include recommendations or propose next steps in this SI Status Report. However, it is the DNR's understanding that JCI/Tyco is interested in establishing concurrence with the DNR on the nature, degree and extent of PFAS contamination from the Stanton Site. The DNR reviewed the SI Status Report and recommends additional sampling and evaluation to define the nature, degree and extent of PFAS contamination. The DNR's recommendations are summarized below.

Unconsolidated Aquifer – Outside Containment Wall:

In the SI Status Report, JCI/Tyco concluded that historical AFFF use or testing did not contribute to the PFAS contamination detected on the parcel currently owned by KKIL and that the PFAS contamination from the Stanton Site that is in the groundwater outside the barrier wall is limited to the unconsolidated aquifer in a narrow zone that flows around the barrier wall and discharges to the Menominee River.

The DNR agrees that the conceptual site model (CSM) and data collected to date supports these general conclusions; however, some refinements and further evaluation are recommended to move toward concurrence with the DNR on the interpretation of the specific extent of PFAS contamination from the Stanton Site.

- **Recommendation #1:** Present isoconcentration contours for 6:2 FTS (down to concentration of 10 ppt or similar) to help illustrate how the extent of PFAS contamination from the Stanton Site was delineated or differentiated from upgradient sources.

The presence of 6:2 FTS can help to determine the extent of PFAS contamination attributable to the Stanton Site; 6:2 FTS is the PFAS with the highest concentration in shallow groundwater inside the barrier wall on the property, it is typically associated with AFFF and not with other PFAS sources and it is known to degrade to short-chained perfluorocarboxylic acids in aerobic environment. Thus, detections of 6:2 FTS in the unconsolidated aquifer around the barrier wall are most likely attributable to discharges from the Stanton Site and not to migration of PFAS from other upgradient sources.

- **Recommendation #2a:** Continue to include KKIL parcel in the CSM and include the boundary of this parcel on maps and figures for the Stanton Site. The KKIL parcel was previously part of JCI/Tyco's Stanton facility and is considered part of the Stanton Site. (A figure from JCI/Tyco's 2020 *Site Investigation Work Plan* that shows the former approximate property boundary is attached.)

The property immediately west of the Stanton Site is also a BRRTS site (BRRTS 02-38-587281 or "Marinette Marine"). In Section 4.5 of the SI Status Report, JCI/Tyco indicates that Marinette Marine is upgradient and side-gradient of the Stanton Site. *The DNR disagrees with this conclusion.* When the KKIL parcel is included in the CSM, Marinette Marine is downgradient and side-gradient from the Stanton Site. The groundwater flow paths presented in the SI Status Report show that groundwater moves from the Stanton Site onto the Marinette Marine property, and not vice versa.

- **Recommendation #2b:** Include PFAS detected on the KKIL property in the isoconcentration contours depicting the extent of contamination for the Stanton Site. PFAS was detected in the VAP samples

JCI/Tyco collected on the KKIL parcel, and JCI/Tyco has attributed these, in part, to “fill.” The PFAS detected in four of the five VAP groundwater samples include 6:2 FTS at concentrations greater than 100 ppt, indicating that the source of the PFAS is the Stanton Site. Even if the PFAS are attributable to “fill,” it is most likely that this fill originated from and/or was impacted by discharges at the Stanton Site. As such, the isoconcentration contours used to define the extent of contamination should include the area characterized by vertical aquifer profiles VAP-66 to VAP-69. A permanent NR 141 monitoring well is recommended to better define the extent of contamination in this area.

- **Recommendation #2c:** Use groundwater flow paths and relative PFAS concentrations to refine interpretation of where PFAS from Stanton Site has migrated onto the Marinette Marine property. PFAS were detected in soil and groundwater on the Marinette Marine property. While these PFAS may be attributed in part to discharges that occurred on the Marinette Marine property, the relative concentrations of PFAS detected on Marinette Marine are similar to those detected in samples JCI/Tyco collected on the KKIL parcel. The flow paths for groundwater originating on the Stanton Site (including the KKIL parcel) extend onto the Marinette Marine property and indicate that the Stanton Site can contribute to the PFAS detected in the groundwater on this adjacent parcel.
- **Recommendation #3:** Sample groundwater east of the 6th Street Slip to define the extent of PFAS contamination to the southeast along the Menominee River. At monitoring well MW022M, 6:2 FTS was detected at 190 ppt, which suggests that the PFAS is from the Stanton Site and is not from migration of an upgradient source. The concentration of PFOA was also higher in monitoring well MW022M (71 ppt) as compared to the next upgradient monitoring well MW129M-45 (41 ppt), further supporting that PFAS from Stanton Site is contributing to the PFAS contamination detected at this location. Additional testing east of monitoring well MW022M may help to confirm if the 6th Street Slip represents the boundary of PFAS from the Stanton Site or if the PFAS contamination extends farther to the southeast.

Shallow Weathered Bedrock:

In the SI Status Report, JCI/Tyco concludes that the PFAS detected in the shallow bedrock below the Stanton Site are from migration of PFAS from the FTC and this PFAS-contaminated groundwater discharges to the Menominee River. Assuming that data from the site investigation continues to indicate the FTC is the source of PFAS contamination to the shallow bedrock, then reporting on the monitoring of the shallow bedrock can be done under the site investigation for the FTC and does not need to be duplicated for the Stanton Site.³

The DNR agrees that the FTC appears to be the primary contributor to the PFAS detected in the shallow bedrock but recommends that JCI/Tyco provide additional data to bolster this conclusion. The basis for this recommendation is described below.

Previously, in the Mar. 2022, SI Status Report, two bedrock monitoring wells (MW040D and MW108D) on the Stanton Site were found to have high concentrations of 6:2 FTS (e.g., greater than 1,000 ppt), which were an order of magnitude greater than what was detected in upgradient bedrock monitoring wells. The DNR questioned whether this was evidence of migration of PFAS-impacted groundwater from the overlying unconsolidated aquifer at the Stanton Site. JCI/Tyco said it was not migration from the Stanton Site and it attributed these high concentrations to faulty well construction. To test this conclusion, JCI/Tyco selected other bedrock monitoring wells within the barrier wall on the Stanton Site to sample during the most recent, Nov. 2022, monitoring event.

³ In that investigation, additional work is recommended to bolster and confirm the CSM presented by JCI/Tyco, that PFAS in the shallow bedrock discharges to the surface water at the Menominee River.

In the samples collected in Nov. 2022, the concentration of 6:2 FTS in the shallow bedrock below the Stanton Site were on the order of 100 ppt, which is in line with concentrations detected in upgradient bedrock monitoring wells. Based on this, the DNR agrees that the CSM and body of data collected to date supports that migration of PFAS from the FTC is likely the primary contributor to PFAS detected in the shallow bedrock below the Stanton Site. (Degradation of 6:2 FTS is slow to occur in anerobic environments, so its persistence and migration in the more confined bedrock layer from the FTC is feasible as compared to the unconsolidated aquifer.)

However, the recent groundwater samples collected from the shallow bedrock still showed an increase (albeit less pronounced) in the concentration of 6:2 FTS in monitoring wells sampled on the Stanton Site (e.g., MW042D) as compared to upgradient wells (e.g., MW125D-60 and PW-28-75). This pattern could be an artifact of sampling a heterogenous and anisotropic media like the weathered bedrock, but it also could be evidence that the Stanton Site contributes to some of the PFAS detected in the bedrock below the Stanton Site. Further evaluation is recommended to determine whether this is a contribution of significance.

- **Recommendation #4:** Provide a response as to whether the faulty well construction could be contributing to migration of PFAS into the shallow bedrock below the Site? If poor well construction is not a potential pathway for contaminant migration, please describe how and why.
- **Recommendation #5:** Install another bedrock monitoring well along Carney Boulevard in the area between monitoring well MW125D-60 and Shore Drive. JCI/Tyco's conclusion that the Stanton Site does not have an appreciable contribution to the PFAS in the shallow bedrock, would be bolstered if a bedrock well upgradient of the Stanton Site in this area had concentrations of 6:2 FTS (and PFOA) that were similar to, or greater than, those detected in the shallow bedrock at the Stanton Site.

Menominee River:

The PFAS-impacted groundwater in the unconsolidated aquifer that is not contained by the barrier wall, discharges to the Menominee River. The concentrations of PFAS measured in the surface water in the Menominee River have been below Wisconsin's current surface water standards for PFOA and PFOS. Sediment along the bed of the river has not been tested to evaluate if PFAS is present in this media.

While the resulting concentrations of PFAS in the surface water of the river remain low, this outcome is primarily because of the dilution that occurs when the groundwater enters this large body of fast-moving surface water. JCI/Tyco should collect sufficient data in its investigation to evaluate the flux of PFAS to the Menominee River and select interim or remedial actions that may be needed to limit the discharge of PFAS from groundwater into the river.

Soil and Unconsolidated Aquifer Inside Barrier Wall:

Sampling results for PFAS in the soil and unconsolidated aquifer inside the barrier wall were presented in JCI/Tyco's and ChemDesign's prior submittals, but further evaluation was not included in this SI Status Report. A complete site investigation will require having sufficient information to estimate the mass of contamination in the source area (Wis. Admin. Code § NR 716.11(3)(d)) and evaluate potential pathways for migration, including drainage improvements (Wis. Admin. Code § NR 716.11(5)(a)).

Maps and cross-sections with isoconcentrations to depict the degree of PFAS contamination in the soil and unconsolidated groundwater within the barrier wall are required (Wis. Admin. Code § NR 716.15(4)). These visual aids are needed to ensure that environmental media within the barrier wall is properly managed so as to prevent migration of PFAS to the environment outside of the barrier wall. This includes, but is not limited to, PFAS migration that can occur from excavation and movement of soil, from water discharged from dewatering and other groundwater management activities and from stormwater runoff.

In the case of stormwater, PFAS has been detected in the stormwater that discharges from the Stanton Site to the Menominee River at concentrations that exceed Wisconsin's current surface water standards. The DNR understands that JCI/Tyco recently completed upgrades to its stormwater management, with the goal of limiting contaminant migration in stormwater moving off the Stanton Site. Monitoring of the stormwater for PFAS is required as part of this site investigation, especially given that stormwater has been documented to be a contaminant migration pathway for PFAS at the Stanton Site (Wis. Admin. § NR 716.11(5)(a)). If PFAS concentrations in the stormwater remain over surface water standards, then additional characterization to evaluate the source of the PFAS in stormwater and to select interim or remedial actions will be required (Wis. Admin. Code § NR 716.17(3)).

Next Steps

Additional work is required for JCI/Tyco to meet the objectives of a complete site investigation for PFAS at the Stanton Site (Wis. Admin. Code § NR 716.01). Within 60 days of receipt of this letter JCI/Tyco should submit a Site Investigation Work Plan describing its next steps for the site investigation (Wis. Admin. Code § NR 716.09(1)).

In that Site Investigation Work Plan, the DNR recommends that JCI/Tyco include the additional evaluations and field investigations summarized in this letter. This includes the specific recommendations to help define the nature, degree, and extent of contamination outside the barrier wall, the general recommendations to collect additional data as needed to estimate the mass and map the degree of contamination within the barrier wall and to evaluate and select remedial actions, as needed, to address the PFAS contamination at the Stanton Site.

If you have any questions, please contact me at Alyssa.Sellwood@wisconsin.gov or (608) 622-8606.

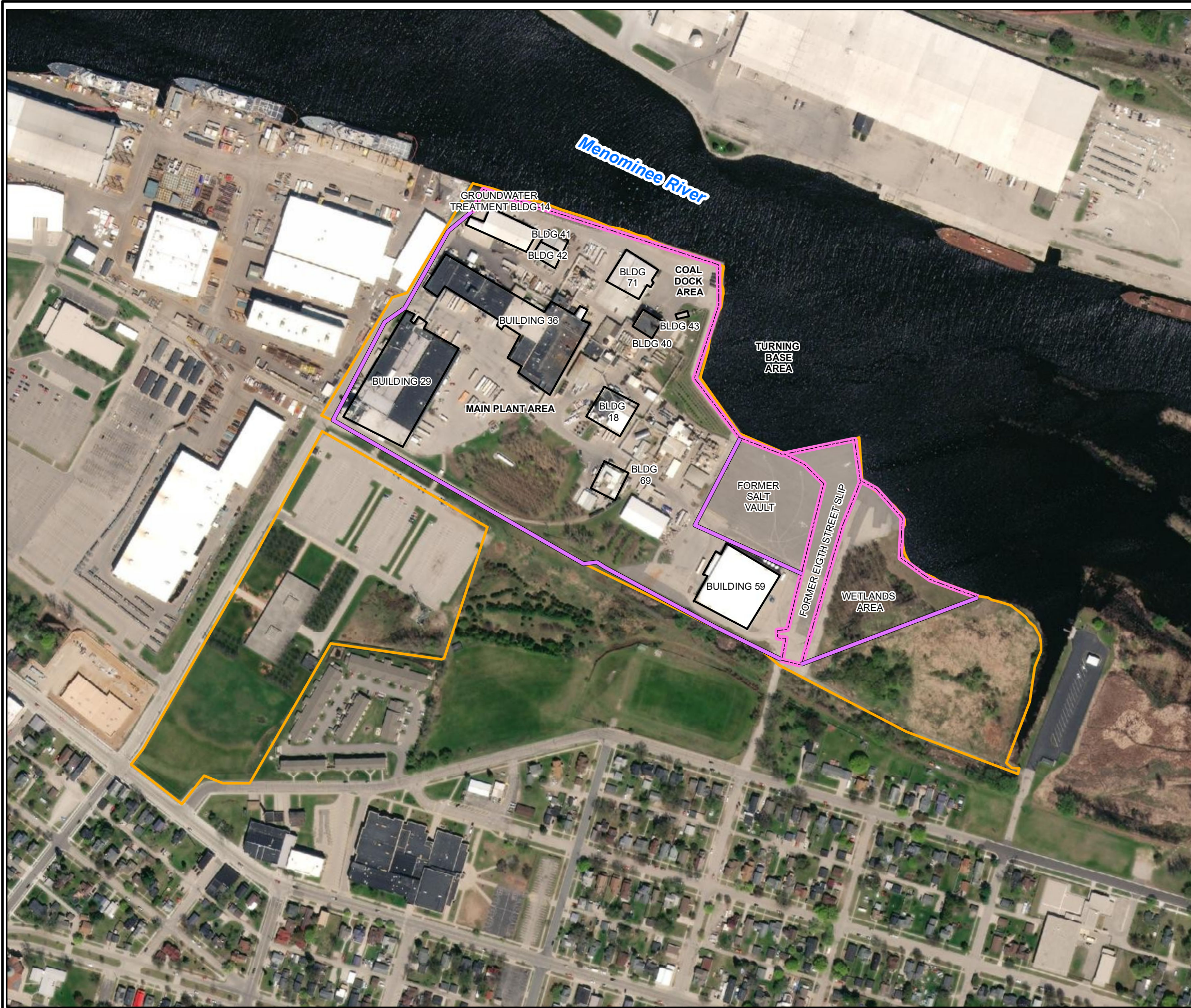
Sincerely,



Alyssa Sellwood, PE
Water Resources Engineer
Remediation & Redevelopment Program

Attachments: Figure 2 Site Layout (from JCI/Tyco's 2020 Site Investigation Work Plan)

cc: Jodie Thistle, DNR (via email: Jodie.Thistle@wisconsin.gov)
Sarah Krueger, DNR (via email: Sarah.Krueger@wisconsin.gov)
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LEGEND:

- APPROXIMATE SITE PROPERTY BOUNDARY
- SHEET PILE WALL
- SLURRY WALL

NOTES:

1. ROAD DATA SOURCE: OPEN STREET MAP, ACCESSED FALL 2017.
2. SERVICE LAYER CREDITS: SOURCE: ESRI, DIGITALGLOBE, GEOEYE, EARTHSTAR GEOGRAPHICS, CNES/AIRBUS DS, USDA, USGS, AEROGRIID, IGN, AND THE GIS USER COMMUNITY



TYCO STANTON STREET FACILITY
 MARINETTE, WISCONSIN
 SITE INVESTIGATION WORK PLAN

SITE LAYOUT

