

RE: Town of Peshtigo

Sellwood, Alyssa A - DNR <alyssa.sellwood@wisconsin.gov>

Mon 6/17/2024 4:37 PM

To: Town of Peshtigo Chair <topchair@townofpeshtigo.org>

Cc: Thistle, Jodie M - DNR <jodie.thistle@wisconsin.gov>

Good Afternoon Jennifer -

For your June 2024 monthly board meeting, folks may be interested in the following updates regarding PFAS contamination in the area:

- JCI/Tyco's [June 2024 GETS Progress Report](#):
 - JCI/Tyco has proposed five new extraction wells for the GETS.
 - The current and proposed locations of GETS extraction wells are shown on Figure 15 (last page) of report.
 - The DNR will review and respond to the GETS Progress Report and any permit changes that JCI/Tyco submits for its modifications to the GETS.
 - JCI/Tyco anticipates the GETS modifications will be put on-line by March 2025.
- DNR Responded to the [Ditch A](#) and [Ditch B](#) Surface Water Treatment System Progress Reports
 - These two systems continue to treat the surface water that they capture for PFAS.
 - However, PFAS concentrations downstream of the systems can still exceed Wisconsin surface water standards.
 - The elevated PFAS detected downstream are from primarily from water that is not captured by the systems (i.e., high streamflow events or groundwater flowing into the ditches after the treatment systems.)
 - One of JCI/Tyco's objectives for adding the new GETS extraction wells is to reduce PFAS in the groundwater that can flow into these ditches.

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Alyssa Sellwood, PE (WI)

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Date: June 3, 2024
BRRTS No.: 02-38-580694
Our Ref: 30129347

Subject: **GETS Semi-Annual Monitoring** –
November 13, 2023 through May 12, 2024
Tyco FTC PFAS, 2700 Industrial Parkway South, Marinette, WI

Dear Ms. Sellwood,

This letter report is the Semi-Annual Monitoring (SAM) representing the third short term monitoring and performance summary of the Groundwater Extraction and Treatment System (GETS) spanning the first 18 months of operation. The additional data requested in the February 2, 2024 correspondence from the WDNR is included where available. This report summarizes the performance data, operating data, and system optimization performed from the start of the GETS (November 14, 2022) through May 12, 2024. As detailed in the *Long-Term Monitoring Plan for the Groundwater Extraction and Treatment System* (Arcadis, 2021), the STM phase began following the first 6 months of the GETS operation. The GETS began operating November 14, 2022. The GETS STM began on May 15, 2023 and will continue through May 11, 2025 when it will transition to a future long term monitoring plan that will be prepared under separate cover. Reporting during short term monitoring is every six months. This is the third of five planned STM reports.

SUMMARY OF DATA

In 18 months of operation, the GETS has removed approximately 6.00 kg of PFOA plus PFOS from groundwater prior to entering ditch B (See Figure 10 and Table 14). The treatment system is operating as intended to remove PFAS from extracted groundwater and reducing concentrations of PFOA and PFOS in Ditch B. Various system optimization activities have been ongoing since initial startup to increase the treatment capacity of the GETS to treat more water, modify the pretreatment filtration process and filtration media to remove more iron, manganese and organic matter from the water, and the GAC vessels were re-plumbed to permit changing the sequence of the vessels in the treatment train. This last change to the system assures the last vessel closest to the outfall always contains the “freshest” GAC with the least PFAS adsorbed to the media, reduces GAC use and carbon footprint, and provides a higher level of assurance the effluent will meet criteria. Collectively, these initial optimizations have improved the treatment capacity permitting groundwater pumping to increase approximately 20%. Additional optimization activities are further discussed below and include supplemental wells and treatment process upgrades to further increase the rate of water pumping and treatment.

Tables 1 through 14 summarize the available operational data and monitoring activities for this reporting period. Tables 1 through 7 summarize the operational data for the GETS and the extraction wells, while Tables 8 and 9 summarize Ditch B Flow and concentration data. Table 10 summarizes observed groundwater and surface water

interaction in Ditch B. Tables 11 through 13 contain the chemistry and water level data from monitoring wells and surface water locations outlined in the *Long-Term Monitoring Plan for the Groundwater Extraction and Treatment System* (July 2021) approved in October 2021. Table 14 summarizes the mass of PFOA and PFOS that have been removed by the GETS during the first 18 months of operations. Figure 1 is a local site map near the GETS identifying the treatment plant, the extraction wells and the monitoring network. Figure 2 summarizes flow in Ditch B and local precipitation. Figures 3 through 5 summarize water levels and pumping rates at the extraction wells. Figures 6 and 7 summarize groundwater elevations. Figure 8 summarizes PFOA and PFOS concentrations in Ditch B while Figure 9 summarizes PFOA and PFOS removal by the GETS. Figures 10 through 13 present PFAS concentrations in groundwater.

GETS Operational Data

The treatment rates and groundwater pumping varied during the first 8 weeks of GETS operation while final system testing was completed. The GETS has been running continuously since the afternoon of January 11, except for brief periods for routine maintenance. The average treatment rates each week are summarized in Table 6. The average weekly treatment rates has gradually increased from 190 gpm in Week 11 (January 2023) to approximately 240 gpm in Week 78 (May 2024). It should be noted that there are small differences between the total volumes of water at the influent of the GETS, the effluent of the GETS, and total volume discharged to Ditch B reported on Table 6. For example, during week 20, the average treatment rate (211.6) equals the discharge to Ditch B, which equals the total pumping from the extraction wells (215.1). The small discrepancies reflect storage in the treatment system, the piping, and differences in the accuracy of the 10 flow meters used to make the calculations. These differences account for approximately a 1% bias between extraction well pumping and discharge to Ditch B, i.e., the measured total flow from the extraction wells is greater than the measured discharge to the ditch.

Groundwater Concentrations

Groundwater concentrations in monitoring wells and extraction wells are summarized in Tables 5 and 13. During the eighteen months of GETS operations, 300 samples were collected from monitoring wells and 172 samples were collected from the extraction wells. Over the eighteen-month collective data set, the influent concentration of PFOA plus PFOS to the GETS (Table 7) through Week 66 trended downward, as reflected by the similar downward trend in the weekly mass removed of PFOA plus PFOS (Figure 9). Recent optimization activities have included increased pumping rates, which has resulted in an increase in mass removal over the last 6 weeks of the reporting period. As a result of these activities, there has also been changes in plume concentrations over the reporting period. Figures 10 and 11 compare shallow groundwater concentrations (less than 18 feet of the land surface) over the past 6 months. Shallow groundwater concentrations of PFOA plus PFOS at these locations have declined at 7 of the 10 locations. The small increase at three locations is likely a result of redistribution of mass within the capture zone of the extraction wells. The deep groundwater concentrations are shown in Figures 12 and 13. The recent data shown in Figure 13 also show a pattern of changes with the 11 wells east and south of the plume center (PZ-30-59, PZ-57-38, PZ-32-72, PZ-31-53, PZ-31-40, PZ-24-47, PZ-58-50, EX-9, EX-7, EX-6, EX-5) decreasing in concentrations over the past 6 months. The 16 wells in the center and to the immediate east-northeast of the plume center have increased in concentrations likely due to the natural tendency for plumes to redistribute during pumping along focused flow paths. The increases to the east-northeast indicate an opportunity to capture more water within this area as discussed in greater detail below. Note the changes in concentrations discussed above were not evaluated statistically as valid statistical analysis typically require 8 or more sampling

events at each location, and at the current time no monitoring wells have been sampled more than 6 times. It is anticipated a statistical analysis of key wells will be included in the next semi-annual monitoring report.

Surface Water & Stream Bed Piezometer Data

PFAS Concentrations in surface water are monitored at multiple locations in Ditch B between Industrial Parkway and Location L-03 downstream of the Ditch B surface water treatment system. These data are summarized in Table 9 and Table 13. Table 9 and Figure 9 summarize the weekly samples at the influent to the Ditch B treatment system. These data continue to show PFAS concentrations decreased in the ditch after the GETS became operational. The sample collected April 1 (Week 73) had 107 ng/L of PFOA plus PFOS, the lowest concentration measured during this reporting period. Seven synoptic rounds of samples were collected from Ditch B upgradient of the Ditch B treatment system between September 8, 2022 and April 24, 2024. These data show a gradual decrease in PFAS concentrations over this period. Generally, surface water samples collected down gradient of the Ditch B treatment system at SW-L03 since September 2023 have been low. Only two samples have been greater than non-detect for PFOA and PFOS. The February 2024 results were 13 PFOA and ND for PFOS while April samples were 110 PFOA and 14 PFOS during high flow conditions.

Streambed piezometers placed at 7 locations, L-09, M-01, M-04, M-07, M-09, U-03, and U-10 were used to measure water levels. The water levels inside and adjacent to each piezometer are summarized in Table 10. The data in column 'delta' at each location show the transition of Ditch B from "gaining" (positive) to "losing" (negative). Comparing April 2024 conditions to May 2023 conditions show reduced positive gradients as the zone of influence of the extraction wells has continued to develop and reduce upwelling of groundwater into Ditch B. Groundwater samples were collected at 5 locations, M-01, M-04, M-07, M-09 and U-03. Groundwater concentrations in streambed piezometers were highest in the center of the monitoring network near M07 and M09 (Figure 11). A review of surface water concentrations with streambed piezometer data indicates the area near M09 contributes the majority of the PFOA and PFOS to Ditch B. This area is consistent with the observation above related to the observed increases in groundwater to the east-northeast of the immediate center of the plume, further supporting potential for capturing more water within this area.

As part of the ongoing optimization evaluations, supplemental surface water samples were collected from Ditch B near the intersection with Pierce Avenue (location M09) on April 22, 2024 concurrent with the routine surface water samples within the ditch. The supplemental surface water samples evaluated a tributary (called the northern tributary) to Ditch B that flows from the City of Marinette. Previous monitoring of the northern tributary was performed upstream of the confluence of the tributary and Ditch B at the intersection of Cleveland Avenue (SW-32) in 2018 and 2019. PFOA and PFOS concentrations were detected at concentrations below current applicable surface water standards during those sampling events. The northern tributary was sampled at a different location during the supplemental sampling event, at Pierce Avenue near the confluence of the tributary and Ditch B. The data from the northern tributary as it entered the main Ditch B waters contained 3,300 ng/L PFOA and 240 ng/L PFOS. Confirmation samples were collected on May 1, 2024 and those results indicated 820 ng/L PFOA and 52 ng/L PFOS was present within the northern tributary water at that location. Additional samples were collected along the northern tributary on May 8, 2024 moving upstream from Pierce Avenue towards and beyond Cleveland Avenue. Concentrations of PFOA and PFOS were below applicable surface water standards at and upstream of Cleveland Avenue, similar to the 2018 and 2019 results. PFOA and PFOS were above applicable surface water standards in the northern tributary between Cleveland Avenue and Pierce Avenue. These findings are consistent with the latest plume contours developed using the most recent GETS monitoring data (Figure 13), and the data coupled with the above observations were used to locate placement of additional extraction wells as part of the

optimization activities described below. In addition, three surface water sampling locations along the northern tributary will be added to the ongoing GETS surface water monitoring activities (upgradient, midpoint and confluence; sample locations SW-P5, SW-P4, and SW-P1 on Figure 11), as discussed further in Appendix A.

Extraction Well Data

Water level data were periodically downloaded from the transducers installed in the monitoring wells adjacent to the extraction wells. These data are shown on Figures 3, 4, and 5. The changes in water levels on the figures coincide with changes in pumping rates of the extraction wells, precipitation events, and snow melt. The graphs on the figures are organized based on location relative to Ditch B. Figures 3 and 4 summarize water levels near the 6 extraction wells along Ditch B organized from north to south. Prior to continuous operations, water levels were highest at MW-EX-3 (592 feet) in the north, decreasing to 590 feet PZ-52-41 (EX-7), and increasing to 591.5 feet at PZ-53-40 (EX-9). This u-shaped pattern of water levels forms a trough in the water table, focusing groundwater eastward. This u-shaped pattern has remained unchanged during continuous operations with water levels declining by an average of 1.35 feet near the extraction wells. Figure 5 presents graphs of the three extraction wells upgradient of Ditch B. Groundwater elevations at these wells are approximately 5-feet higher than the wells along Ditch B. Fall water levels near wells EX-1 and EX-8 have declined to approximately 593 ft, approximately 5 feet less than maximum elevations in 2023. EX-2 has declined approximately 3 feet from maximum elevation to approximately 595 ft. Figures 3, 4 and 5 show a temporary increase in water levels from snow melt and significant rainfall events during the month of April. Data from the end of May show a decline in water levels near extraction wells EX-3, EX-4, EX-5, EX-6, AND EX- 7 to elevations observed in March, before the water level increases observed during April. The average weekly water levels near each extraction well are summarized in Table 4.

Extraction wells EX-1 and EX-5 have recently undergone maintenance. The conveyance line from EX-1 to the GETS was cleaned in August to remove biological growth. The cause of the growth is not known but may be from degradation of naturally occurring organic material that is further exacerbated by residual emulsified vegetable oil that was used in this area in 2017 to degrade low levels of chlorinated compounds. Pumping rates were restored after the cleaning. These wells and associated conveyance lines will require cleaning as part of normal operations, therefore optimization activities (discussed below) will be conducted to more readily enable routine maintenance. The pump in EX-5 had a mechanical failure at the end September 2023 and was replaced. The changes these events had on pumping rates and water levels can be seen on Figures 3 and 5.

The recurring maintenance issues at EX-1 and EX-2 were address by reengineering access and installing new wells. Extraction wells EX-1S and EX-2S were installed adjacent to EX-1 and EX-2. The new wells have larger well vaults permitting better access and are larger in diameter (8-inches versus 6-inches). The new wells have been online since February 2024. Well cleaning and redevelopment also occurred at EX-3 and EX-4 in February 2024. These maintenance and optimization activities have allowed pumping rates from EX-1S, EX-2S, and EX-3 to increase. As a result, the nominal treatment rate of the GETS has increased this period to approximately 240 gpm.

Monthly water chemistry data from the operating extraction wells are summarized in Table 5. One-hundred and seventy two samples were collected during 19 sampling events to assess PFOS and PFOA concentrations in the extraction wells. The data results for the May 2024 sampling event are pending from the laboratory at the time of this report. Three extraction wells, EX-4, EX-6 and EX-9, were not operating during all samplings and surrogate samples were collected from adjacent monitoring wells MW-EX-4, PZ-51-38 and PZ-53-40, respectively, when necessary. The groundwater data show peak concentrations along Ditch B are being captured by wells EX-5, EX-

6, and EX-7. These three wells and EX-8 upgradient, are capturing the center of the PFAS plume moving eastward and are in the center of the trough in the water table between EX-3 and EX-9. Concentrations in EX-6, EX-7, and EX-8 are consistently greater than 10,000 ng/L of PFOA plus PFOS and have not changed significantly since GETS operations began. The concentration of PFOA plus PFOS in 4 operating extraction wells, EX-1, EX-2, EX-3, and EX-4 are less than 10,000 ng/L but have increased in concentration over this reporting period due to increased pumping rates. Concentrations in EX-5 have decreased during this reporting period. EX-9 is only operated for sampling purposes. The operation of EX-9 for remediation was not started when the GETS began operations as PFAS concentrations are much lower than at the other extraction wells. Concentrations in EX-9 have declined to 37 ng/L PFOA and 2.6 ng/L PFOS.

Water levels are no-longer being collected at PZ-52-41 near EX-7. The piezometer was abandoned on August 24 2023 during reconstruction of Edwin St. by the City of Marinette. The replacement well, PZ-52-41R was installed on April 20, 2024. Sampling results and water levels will be included in the next semi-annual monitoring report.

The weekly influent concentrations of PFOA plus PFOS and the total weekly pumping from the extraction wells were used to estimate the mass removed by the GETS during the 18 months of operations. The data is presented on Figure 9 and summarized in Table 14. The calculations estimate that 6.00 kg of PFOA plus PFOS were removed by the GETS through May 12, 2024.

Summary of Cumulative Data

Table 11 presents groundwater and surface water elevations since GETS startup. Figures 6 and 7 present groundwater elevations for current previous time periods. Figure 6 present May 2023 water from last spring while Figure 7 presents April 2024 water levels. A comparison of the figures shows the effects of heavy rains and snow melt in spring 2024 had a smaller effect on water level increase than in 2023. The lesser effect is attributed to the increase in pumping at EX-1S and EX-2S this past winter. There has also been observed more than a 2-foot decrease in water levels in all monitoring wells across the investigation area. This large areal decline is attributed to a decline in water levels in Green Bay.

GETS Optimization

The objective of the GETS is to prevent PFAS present in groundwater from entering Ditch B and to ultimately replace the Ditch B system as a long-term solution. As such, optimization of the GETS began in July 2023 and included:

- Increased pumping in key wells to enhance capture of PFAS.
- Infrastructure improvements to enable routine maintenance related to ongoing biological growth within the wells and conveyance lines and restoration of pumping capacity (EX-3 and EX-4).
- Installation of supplemental extraction wells EX-1S and EX-2S near the existing EX-1 and EX-2 wells. The new wells and associated vaults permit easier access for periodic rehabilitation to address future biological accumulation in the conveyance piping.

Further optimization are planned at three locations based on recent groundwater and surface water data.

1. Ditch B: Additional pumping near EX-3 and EX-4 to further reduce PFAS concentrations in Ditch B and to mitigate the concentrations detected in the northern tributary;

Alyssa Sellwood, P.E.
Wisconsin Department of Natural Resources
June 3, 2024

2. Shallow Bedrock: Pumping from a shallow bedrock extraction well near EX-4 to capture and address the shallow bedrock PFAS plume that is not discharging to Ditch B, therefore not currently captured by the GETS;
3. Ditch A: Extraction along Ditch A on Tyco property to prevent shallow groundwater from affecting Surface water, similar to the Ditch B interim remedial objective.

These supplemental optimization activities are shown on Figure 15, their objectives and associated monitoring program are discussed in Appendix A.

Sustainability Summary

The GETS has a net 0 impact on water in operations by design. All groundwater removed by the system is returned to the environment via discharge to Ditch B. Approximately 8.5 million gallons of water are treated per month as a result of GETS operations. 147.7 million gallons of water have been treated as of May 12, 2024.

Granular Activated Carbon (GAC) and Calgon CalRes resin are the primary filtration media employed by the GETS. System operations to date required 200,000 pounds of virgin GAC while also using 180,000 pounds of regenerated GAC. As of October, 2023, all spent GAC is sent for regeneration and reuse utilizing one carbon pool from the Site. 36,000 pounds of Calgon CalRes (resin media) has been employed by the GETS to date, with 24,000 pounds disposed offsite.

As of May 14, 2024, 785,886 kilowatt hours (kWh) of energy had been consumed by the GETS building and it's ancillary power drop locations for the extraction wells.

CONCLUSION

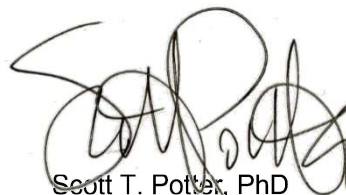
Some analytical data collected the first weeks of May are not available for reporting this period and will be included in the next semi-annual report. The next GETS Short Term Monitoring Report will summarize the first 2 years of operation; from November 14, 2022 to November 11, 2024. GETS Short Term Monitoring Report #4 will be provided December 13, 2024. If you have questions or comments, please reach out.

Sincerely,

Arcadis U.S., Inc.



Matthew C. Coleman
Project Communications Manager



Scott T. Potter, PhD
Project Lead/Technical Expert

Email: Matthew.Coleman@arcadis.com
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CC. D. Nelson
S. Wahl



May 29, 2024

MS. DENICE NELSON
JOHNSON CONTROLS, INC
5757 N. GREEN BAY AVENUE
MILWAUKEE, WI 53209

Via Email Only to denice.karen.nelson@jci.com

SUBJECT: Semi-Annual Operation, Maintenance, and Optimization Progress Report #10
Ditch A Interim Action Treatment System (July 1 – Dec. 31, 2023)
JCI/Tyco FTC PFAS, 2700 Industrial Parkway South, Marinette, WI
BRRTS #02-38-580694

Dear Ms. Nelson:

On April 26, 2024, the Wisconsin Department of Natural Resources (DNR) received the *Semi-Annual Operation, Maintenance and Optimization Progress Report #10* (O&M Progress Report #10) for the interim action to treat surface water in Ditch A at the above-referenced site (the "Site"). The report was submitted by Arcadis U.S., Inc. (Arcadis), on behalf of Johnson Controls, Inc., and Tyco Fire Products LP (JCI/Tyco) and was accompanied by the fee required under Wisconsin Administrative Code (Wis. Admin. Code) § NR 749.04(1) for DNR review and response.

The DNR's review of O&M Progress Report #10 finds that the Ditch A treatment system removes per- and polyfluoroalkyl substances (PFAS) from the surface water it captures and treats. However, the Ditch A system can only capture water during times of measurable streamflow in Ditch A, which was only during 9 days over this last reporting period. Previous sampling results indicated PFAS impacted groundwater occasionally enters Ditch A at points downstream of the treatment system. JCI/Tyco is currently commissioning another interim remedial action – the groundwater extraction and treatment system (GETS) – and has stated it plans to modify the GETS to directly capture and treat PFAS-impacted groundwater near Ditch A. Operation of the Ditch A treatment system should continue during this optimization period for the GETS. Decisions on future operations of the Ditch A system will be based on the outcome of GETS optimization and the downstream sampling results for Ditch A.

Background

JCI/Tyco is investigating and responding to the discharge of PFAS to the environment at the JCI/Tyco Fire Technology Center (FTC), located at 2700 Industrial Parkway South in Marinette, Wisconsin. The discharge occurred as the result of fire suppressant training, testing, research and development of PFAS-containing aqueous film forming foams (AFFF) at the Site starting in the early 1960s.

An intermittent surface water drainage feature identified as Ditch A flows south through the FTC property to the Little River in the town of Peshtigo. In Jan. 2019, JCI/Tyco began an interim remedial action to treat surface water in Ditch A on the FTC property after testing confirmed it contained high concentrations of PFAS – perfluorooctanoic acid (PFOA) and up to 6,000 parts per trillion (ppt) and perfluorooctanesulfonic acid (PFOS) up to 1,100 ppt.

The interim remedial action for Ditch A occurs at the southern edge of the FTC property. Surface water flowing in Ditch A is captured at a check dam and treated using suspended solids settling, bag filtration and granular activated carbon (GAC). The treated water is then discharged back to Ditch A downstream of the check dam under a Wisconsin Pollutant Discharge Elimination System (WPDES) General Permit (WI-0046566-07-0) and the associated coverage letter, which specifies the effluent criteria and monitoring requirements.

The system is designed to treat a maximum flow rate of 100 gallons per minute (gpm). The system can treat most of the surface water moving through Ditch A at this location. Occasional high flow events or downtime for system repairs may allow surface water to overtop the check dam and some surface water to go untreated; these events are minimal. The system only operates when there is measurable streamflow; the system is shut down when the ditch is frozen or runs dry, which typically occurs fall through winter each year.

NR 205 WPDES Permit

The effluent from the Ditch A treatment system is regulated under WPDES General Permit No. WI-0046566-07-0 and the associated coverage letter (updated June 4, 2021). The DNR's Wastewater Program administers the WPDES permit and reviews the monthly electronic discharge monitoring reports submitted by JCI/Tyco. A review of the permit reporting is not included with this letter.

Summary and DNR Review of O&M Progress Report #10

System Operation and Performance

JCI/Tyco's O&M Progress Report #10 for Ditch A covered the period from July 1 to Dec. 31, 2023. The Ditch A treatment system operated during times of measurable flow, which occurred during 9 days of the reporting period. There were no overtopping events recorded during these times of flow.

The system was shown to be effective at removing PFAS from the surface water it captured and treated. Surface water coming into the system had concentrations up to 300 ppt for PFOA and up to 190 ppt for PFOS, and PFOA and PFOS were not detected in the treated water exiting the system. JCI/Tyco calculated that the Ditch A treatment system removed 0.0011 pounds of PFOA and 0.0006 pounds of PFOS from 480,000 gallons of water treated during the reporting period. Cumulatively, since startup of the system began in Jan. 2019, JCI/Tyco calculates that approximately 0.89 pounds of PFOA and 0.46 pounds of PFOS have been removed from the approximately 121 million gallons of water treated by the Ditch A system.

Routine system maintenance that occurred during this reporting period included removal of accumulated sediment, replacement of spent bag filters and replacement of spent GAC. The spent bag filters were collected in drums and disposed by End Point Solutions, and the spent GAC was reactivated by Tetrasolv Filtration, Inc. Documentation of the handling of these waste materials was included in Appendix E.

Surface Water Long-Term Monitoring

JCI/Tyco collected samples downstream of the Ditch A treatment system at surface water sampling point SW-40. Samples were only collected when measurable streamflow was observed, which was in July and August 2023. The concentrations of PFOA were below the Wis. Admin. Code § NR 102.04 surface water standards of 95 ppt in both samples and the concentration of PFOS was below the Wis. Admin. Code § NR 102.04 surface water standards of 8 ppt for PFOS in the August sample, but slightly

over (11 ppt) in July. JCI/Tyco attributed the elevated concentration of PFOS detected in July 2023 to the short time between when the system resumed operations after a rain event and sample collection.

Monthly sampling at surface water sampling point SW-26 was scheduled to be added to the monitoring program in July 2023; however, measurable flow was not observed at this location and so no samples were collected during this reporting period. Surface water sampling point SW-26 is the next sampling location downstream from surface water sampling point SW-40 and recent testing in the ongoing site investigation indicated that PFAS from the FTC was entering Ditch A downstream of the treatment system, allowing for the continued migration of PFAS into the town of Peshtigo.

In its response to O&M Progress Report #9, the DNR advised that JCI/Tyco may need to consider other remedial actions or modification to the current interim remedial action for Ditch A to minimize the migration of PFAS in surface water into the town of Peshtigo from the FTC.

Next Steps

JCI/Tyco has stated that it is evaluating modifications to the current GETS to be able to capture and treat PFAS-impacted groundwater before it enters Ditch A. This modification of the GETS could be an addition to, or a replacement of the Ditch A treatment system, depending on its ability to control PFAS migration in Ditch A. With this understanding, the DNR accepts JCI/Tyco's plan to evaluate if modifications to the GETS can reduce concentrations of PFAS flowing downstream in Ditch A.

While the modifications to the GETS are developed, JCI/Tyco should continue to operate the Ditch A treatment system and submit semi-annual O&M Progress Report in accordance with the approved operation, maintenance and monitoring plan for the Ditch A treatment system (Wis. Admin. Code § NR 724.13 (3), including monthly sampling for PFAS at downstream surface water sampling point SW-26.

As a reminder, this Site is subject to an enforcement action and therefore all submittals to the DNR under Wis. Admin. Code chs. NR 700-799 and submittals directed by the DNR must be accompanied by an Wis. Admin. Code ch. NR 749 fee per Wis. Stat. § 292.94. These fees are not pro-ratable or refundable per Wis. Admin. Code § NR 749.04(1). If you have any questions about whether to include a fee with a submittal, please contact DNR staff prior to submitting a document without a fee.

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

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



May 29, 2024

MS. DENICE NELSON
JOHNSON CONTROLS, INC
5757 N. GREEN BAY AVENUE
MILWAUKEE, WI 53209

Via Email Only to denice.karen.nelson@jci.com

SUBJECT: Semi-Annual Operation, Maintenance, and Optimization Progress Report #9
Ditch B Interim Action Treatment System (July 1– Dec. 31, 2023)
JCI/Tyco FTC PFAS, 2700 Industrial Parkway South, Marinette, WI
BRRTS #02-38-580694

Dear Ms. Nelson:

On April 22, 2024, the Wisconsin Department of Natural Resources (DNR) received the *Semi-Annual Operation, Maintenance and Optimization Progress Report #9* (O&M Progress Report #9) for the interim remedial action to treat surface water in Ditch B at the above-referenced site (the "Site"). The report was submitted by Arcadis U.S., Inc. (Arcadis), on behalf of Johnson Controls, Inc., and Tyco Fire Products LP (JCI/Tyco) and was accompanied by the fee required under Wisconsin Administrative Code (Wis. Admin. Code) § NR 749.04(1) for DNR review and response.

The DNR's review of O&M Progress Report #9 finds that the Ditch B treatment system removes per- and polyfluoroalkyl substances (PFAS) from the surface water it captures and treats. However, during times when the streamflow is greater than the capacity of the system, some surface water goes untreated. JCI/Tyco is currently commissioning another interim remedial action – the groundwater extraction and treatment system (GETS) – to reduce PFAS concentrations in Ditch B, with the goal that the Ditch B treatment system will no longer be needed. Operation of the Ditch B treatment system should continue during this optimization period for the GETS. Decisions on future operations of the Ditch B system will be based on the outcome of GETS optimization and the downstream sampling results for Ditch B.

Background

JCI/Tyco is investigating and responding to the discharge of PFAS to the environment at the JCI/Tyco Fire Technology Center (FTC), located at 2700 Industrial Parkway South in Marinette, Wisconsin. The discharge occurred as the result of fire suppressant training, testing, research and development of PFAS-containing aqueous film forming foams (AFFF) at the Site starting in the early 1960s.

A surface water drainage feature identified as Ditch B begins north of the FTC and flows east toward Pierce Avenue, where it turns and flows southeast and eventually discharges into the Bay of Green Bay. In Oct. 2019, JCI/Tyco began an interim remedial action to treat surface water in Ditch B after testing confirmed it contained high concentrations of PFAS – perfluorooctanoic acid (PFOA) up to 3,800 parts per trillion (ppt) and perfluorooctanesulfonic acid (PFOS) up to 190 ppt.

The interim remedial action for Ditch B includes a treatment system located at 925 Pine Beach Road in Marinette, which is downstream from the FTC property and approximately 1,250 feet upstream from the

Bay of Green Bay. The system captures surface water flowing in Ditch B and treats the captured water using suspended solids settling, bag filtration and granular activated carbon (GAC). The treated water is then discharged back to Ditch B under a Wisconsin Pollutant Discharge Elimination System (WPDES) General Permit (WI-0046566-07-0) and the associated coverage letter, which specifies the effluent criteria and monitoring requirements.

The Ditch B treatment has the capacity to treat up to approximately 700 gallons per minute (gpm); whereas, the streamflow in the ditch frequently exceeds this flow rate. During times when the streamflow exceeds the system's operating capacity a portion of the surface water flowing in Ditch B goes untreated; these are frequent events.

In Nov. 2022, JCI/Tyco began operating another interim remedial action – the GETS – and JCI/Tyco has stated that one of its goals from operation of the GETS is to reduce the PFAS concentrations in Ditch B to the point with operation of the Ditch B treatment system is no longer needed. Surface water monitoring data from Ditch B will be used to help make that determination.

NR 205 WPDES Permit

The effluent from the Ditch B treatment system is regulated under WPDES General Permit No. WI-0046566-07-0 and the associated coverage letter (updated Apr. 29, 2021). The DNR's Wastewater Program administers the WPDES permit and reviews the monthly electronic discharge monitoring reports submitted by JCI/Tyco. A review of the permit reporting is not included with this letter.

Summary and DNR Review of O&M Progress Report #9

System Operation and Performance

JCI/Tyco's O&M Progress Report #9 covered the period from July 1 to Dec. 31, 2023. During the reporting period, the system treated approximately 175 million gallons of surface water from Ditch B. However, JCI/Tyco calculated the total flow volume in the ditch to be around 289 million gallons, which means that some 113 million gallons of surface water in Ditch B went untreated.

The system was shown to be effective at removing PFAS from the surface water it captured and treated. Surface water coming into the system had concentrations up to 360 ppt for PFOA and up to 58 ppt for PFOS; the treated water exiting the system had concentrations less than 6.1 for PFOA and less than 0.62 for PFOS.

JCI/Tyco calculated that the Ditch B treatment system removed 0.28 pounds of PFOA and 0.048 pounds of PFOS from 158 million gallons of water treated during the reporting period. Cumulatively, since startup of the system began in Oct. 2019, JCI/Tyco calculates that approximately 10 pounds of PFOA and 0.81 pounds of PFOS have been removed from the approximately 1.1 billion gallons of water treated by the Ditch B system.

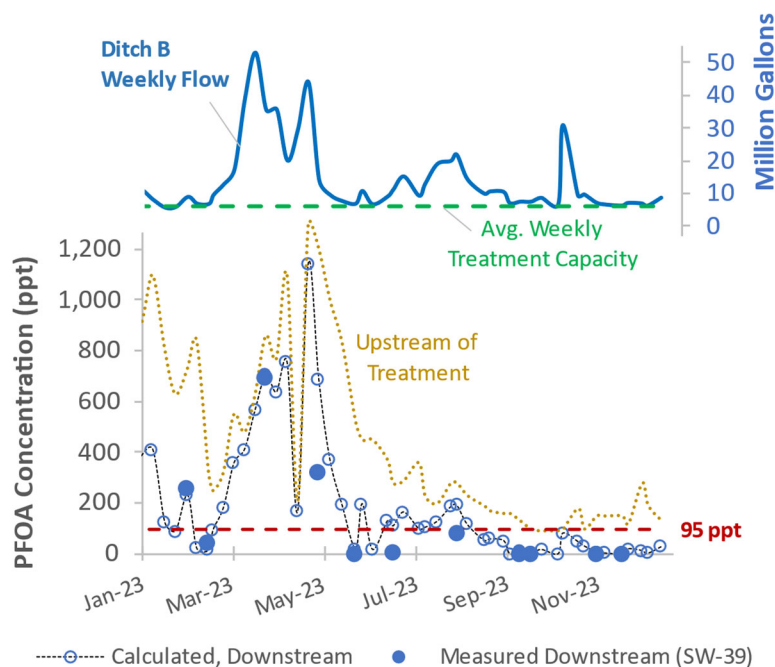
Routine system maintenance that occurred during this reporting period included removal of accumulated sediment, replacement of spent bag filters and replacement of spent GAC. The spent bag filters were collected in drums and disposed by End Point Solutions, and the spent GAC was reactivated by Tetrasolv Filtration, Inc. Documentation of the handling of these waste materials was included in Appendix E. Other maintenance during this reporting period included replacement of the pressure transducer in the stilling well used to estimate stream flow and replacement of two steel laterals within two of the GAC vessels. Some system downtime was reported to have occurred during system maintenance.

Surface Water Long-Term Monitoring

JCI/Tyco collected monthly samples of surface water in Ditch B at surface water sampling points SW-39 and SW-L03. Surface water sampling point SW-L03 was added to the monitoring program in August 2023 to evaluate the surface water quality further downstream of the treatment system and closer to the outlet to the Bay of Green Bay. The monthly concentrations of PFOA and PFOS measured at these two monitoring points were consistent throughout the reporting period. The concentrations were below the Wis. Admin. Code § NR 102.04 surface water standards of 95 ppt for PFOA and 8 ppt for PFOS in all the surface water samples, except for PFOS in the samples collected in August 2023. JCI/Tyco attributed the elevated concentration of PFOS to the high streamflow in August, which caused some surface water to bypass the system and go untreated.

In prior review letters, the DNR recommended that JCI/Tyco use the data collected weekly to monitor system operations to also estimate the weekly downstream concentrations of PFAS in the surface water in Ditch B. JCI/Tyco did not include this evaluation in O&M Progress Report #9, so the DNR completed the recommended evaluation using the data provided in the report (Wis. Admin. Code § NR 724.17(4)(a)) – see attached Table A.1 and Figures A.1 and A.2.

The chart below summarizes the results for PFOA in surface water downstream of the Ditch B treatment system relative to the weekly flow volume recorded in the ditch over the last two reporting periods. Although the Ditch B treatment system continues to be effective at removing PFAS from the water it captures and treats, during times of high streamflow when some of the water goes untreated the downstream concentrations of PFOA (and PFOS) have at times exceeded their respective Wis. Admin. Code § NR 102.04 surface water standards.



The frequency and magnitude of these exceedances of PFAS in the downstream surface water diminished during this reporting period (July – Dec. 2023) as compared to previous reporting periods

(e.g., Jan. – June 2023). This is due in part to the lower concentration of PFOA and PFOS in the surface water flowing into the treatment system (also shown as “upstream of treatment” on the chart above and in Figure 4 of O&M Progress Report #9). JCI/Tyco has attributed the lower concentrations of PFAS to the operations of the GETS, which is upstream of the Ditch B treatment system.

Next Steps

JCI/Tyco has stated that as it continues to commission and optimize performance of the GETS, its goal is for the GETS interim remedial action to reduce the PFAS concentrations in Ditch B to the point where the downstream Ditch B treatment system is no longer needed. With this understanding, the DNR accepts JCI/Tyco’s plan to focus its efforts on optimization of the GETS at this time. Following optimization of the GETS, if downstream concentrations of PFAS remain elevated above surface water standards, then JCI/Tyco must evaluate the cause and significance (Wis. Admin. Code § NR 724.17(3m)(f)) and may need to consider other remedial actions or modifications to the current interim remedial actions to meet surface water criteria in Ditch B.

While JCI/Tyco works to optimize the performance of the GETS, JCI/Tyco should continue to operate the Ditch B treatment system and submit semi-annual O&M Progress Report in accordance with the approved operation, maintenance and monitoring plan for the Ditch B treatment system (Wis. Admin. Code § NR 724.13 (3), including monthly sampling for PFAS at downstream surface water sampling point SW-L03.

The DNR also recommends that JCI/Tyco estimate and report out the weekly concentrations of PFOA and PFOS in surface water downstream of the treatment system, as shown in the attached Table A.1 and Figures A.1 and A.2, to provide a more complete picture of concentrations of PFAS in surface water throughout each reporting period.

As a reminder, this Site is subject to an enforcement action and therefore all submittals to the DNR under Wis. Admin. Code chs. NR 700-799 and submittals directed by the DNR must be accompanied by an Wis. Admin. Code ch. NR 749 fee per Wis. Stat. § 292.94. These fees are not pro-ratable or refundable per Wis. Admin. Code § NR 749.04(1). If you have any questions about whether to include a fee with a submittal, please contact DNR staff prior to submitting a document without a fee.

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 Table A.1 – Mass Balance Approach to Estimate Downstream Surface Water Concentrations
 Figure A.1 – Ditch B Downstream Surface Water Concentrations: PFOA
 Figure A.2 – Ditch B Downstream Surface Water Concentrations: PFOS

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

Table A.1
Ditch B Interim Action - Mass Balance Approach to Estimate Downstream Surface Water Concentrations
Calculations by the DNR Using Data JCI/Tyco Reported in O&M Progress Report #9

		Ditch B Flow Volume (gallons)		
Source		JCI/Tyco Table 5	JCI/Tyco Table 5	DNR Calculated ⁽¹⁾
Week Start Date	Week End Date	Estimated Stream Flow (V _{stream})	Treated Discharge (V _{treated})	Estimated Untreated Flow (V _{untreated})
Sunday, July 2, 2023	Saturday, July 8, 2023	11,106,100	6,884,100	4,222,000
Sunday, July 9, 2023	Saturday, July 15, 2023	15,137,700	6,570,800	8,566,900
Sunday, July 16, 2023	Saturday, July 22, 2023	9,215,500	6,706,500	2,509,000
Sunday, July 23, 2023	Saturday, July 29, 2023	12,844,300	7,051,100	5,793,200
Sunday, July 30, 2023	Saturday, August 5, 2023	18,951,800	6,901,600	12,050,200
Sunday, August 6, 2023	Saturday, August 12, 2023	19,911,100	6,793,600	13,117,500
Sunday, August 13, 2023	Saturday, August 19, 2023	21,776,400	6,999,200	14,777,200
Sunday, August 20, 2023	Saturday, August 26, 2023	14,244,700	7,130,000	7,114,700
Sunday, August 27, 2023	Saturday, September 2, 2023	9,882,300	7,136,200	2,746,100
Sunday, September 3, 2023	Saturday, September 9, 2023	10,535,100	6,938,100	3,597,000
Sunday, September 10, 2023	Saturday, September 16, 2023	10,360,100	7,020,300	3,339,800
Sunday, September 17, 2023	Saturday, September 23, 2023	6,928,300	6,924,000	4,300
Sunday, September 24, 2023	Saturday, September 30, 2023	7,394,600	6,942,800	451,800
Sunday, October 1, 2023	Saturday, October 7, 2023	7,377,600	7,099,200	278,400
Sunday, October 8, 2023	Saturday, October 14, 2023	8,546,900	7,035,600	1,511,300
Sunday, October 15, 2023	Saturday, October 21, 2023	6,616,400	6,616,400	0
Sunday, October 22, 2023	Saturday, October 28, 2023	30,938,000	5,967,000	24,971,000
Sunday, October 29, 2023	Saturday, November 4, 2023	9,260,500	6,802,000	2,458,500
Sunday, November 5, 2023	Saturday, November 11, 2023	9,624,700	6,729,600	2,895,100
Sunday, November 12, 2023	Saturday, November 18, 2023	7,124,700	6,782,800	341,900
Sunday, November 19, 2023	Saturday, November 25, 2023	6,523,100	6,523,100	0
Sunday, November 26, 2023	Saturday, December 2, 2023	6,185,700	6,185,700	0
Sunday, December 3, 2023	Saturday, December 9, 2023	6,988,000	6,171,600	816,400
Sunday, December 10, 2023	Saturday, December 16, 2023	6,848,200	6,533,200	315,000
Sunday, December 17, 2023	Saturday, December 23, 2023	6,157,000	6,157,000	0
Sunday, December 24, 2023	Saturday, December 30, 2023	8,607,700	6,861,200	1,746,500
Total (gallons)		289,086,500	175,462,700	113,623,800
Total (million gallons)		289	175	114

Notes:

⁽¹⁾ $V_{untreated} = V_{stream} - V_{treated}$

PFOS Concentrations (ppt)					PFOA Concentration (ppt)			
JCI/Tyco Table 4	JCI/Tyco Table 4	JCI/Tyco Table 6	DNR Calculated ⁽²⁾		JCI/Tyco Table 4	JCI/Tyco Table 4	JCI/Tyco Table 6	DNR Calculated ⁽²⁾
Sample Date	System Influent (Surface Water Pre-treatment)	Effluent (Treated Discharge)	Surface Water Sample (SW-39) Post-Treatment	Estimated Surface Water Post-Treatment	System Influent (Surface Water Pre-treatment)	Effluent (Treated Discharge)	Surface Water Sample (SW-39) Post-Treatment	Estimated Surface Water Post-Treatment
7/3/2023	50	<0.47	< 1.8	19	280	5.1	5.5	110
7/10/2023	40	<0.55		23	290	<0.86		164
7/20/2023	58	<0.46		16	360	<0.72		98
7/24/2023	34	<0.47		15	230	<0.74		< 0.5
8/1/2023	30	<0.53		19	200	<0.83		127
8/10/2023	43	<0.51		28	280	<0.80		184
8/14/2023	54	<0.45	15	37	280	1.9	78	191
8/21/2023	41	<0.47		20	230	<0.73		115
9/1/2023	28	<0.47		7.8	190	<0.75		53
9/5/2023	25	<0.52		8.5	170	<0.82		58
9/14/2023	25	<0.47		8.1	160	<0.74		52
9/18/2023	26	<0.47		0.016	160	<0.75		0.10
9/25/2023	23	<0.46	<1.9	1.4	130	<0.73	<1.9	8
10/2/2023	20	<0.54	<2.1	0.75	98	<0.85	<2.1	< 0.77
10/9/2023	17	<0.52		3.0	92	<0.82		16
10/20/2023	16	<0.49		<0.49	93	<0.77		<0.77
10/23/2023	27	<0.47		22	100	<0.74		81
11/2/2023	38	<0.49		10	180	<0.78		48
11/6/2023	51	<0.47		15	99	1.7		31
11/14/2023	34	<0.47	<1.9	1.6	150	<0.75	<1.9	7.2
11/20/2023	32	<0.49		<0.49	150	2.2		2.2
12/1/2023	27	<0.48	<1.7	<0.48	150	<0.75	<1.7	<0.75
12/5/2023	22	0.62		3.1	120	6.1		19
12/14/2023	29	<0.50		1.3	280	<0.79		13
12/18/2023	29	<0.48		<0.48	190	1.5		1.5
12/27/2023	21	<0.50		4.3	130	1.4		27
Surface Water Criteria = 8 ppt					Surface Water Criteria = 95 ppt			

⁽²⁾ Estimated Surface Water Concentration = $[(V_{untreated} * \text{Influent Concentration}) + (V_{treated} * \text{Effluent Concentration})] / V_{stream}$

BOLD = Surface water concentration greater than surface water criteria

ppt = parts per trillion or nanograms per liter

Figure A.1

Ditch B Downstream Surface Water Concentrations: PFOA

(Compare to Figure 6 in Progress Report #9)

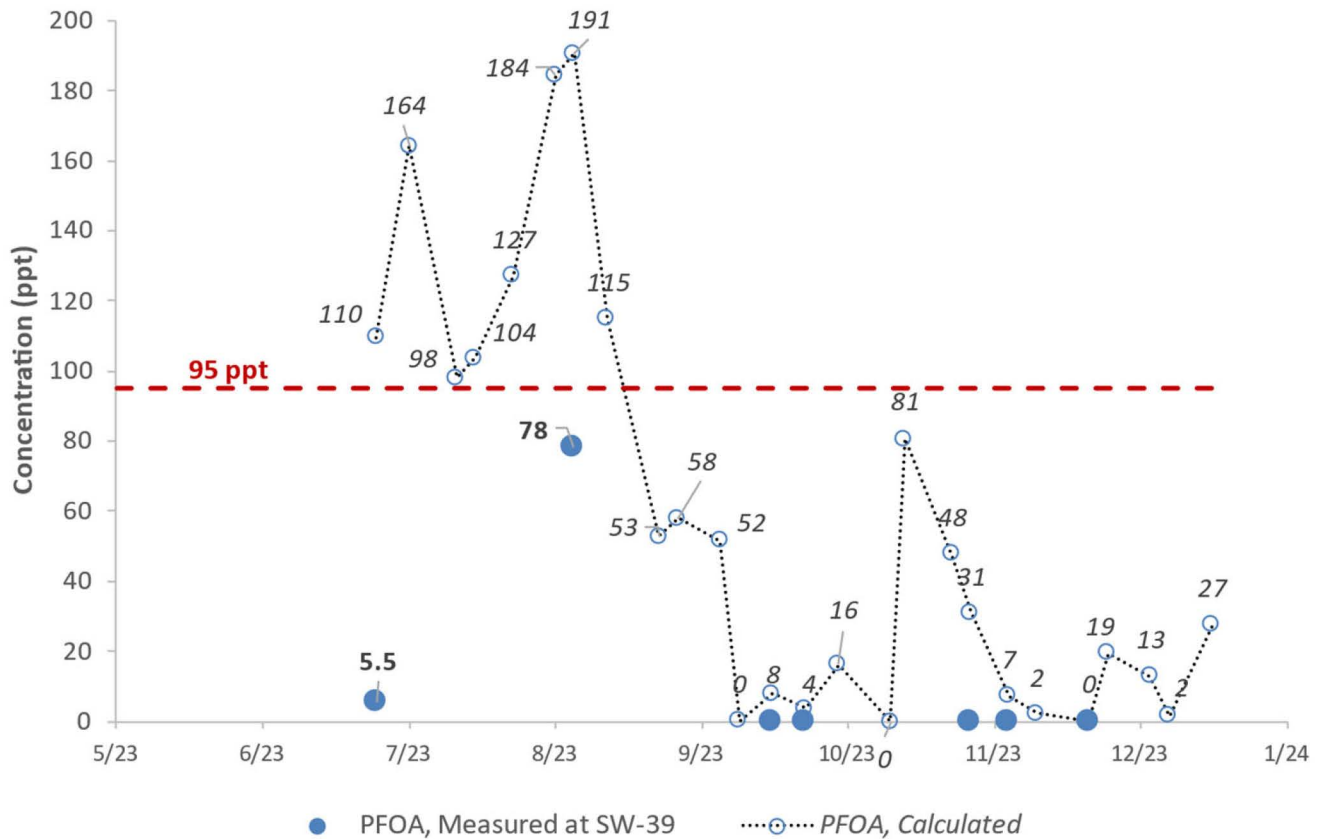


Figure A.2

Ditch B Downstream Surface Water Concentrations: PFOS

(Compare to Figure 6 in Progress Report #9)

