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WISCONSIN DEPT. OF NATURAL RESOURCES

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.

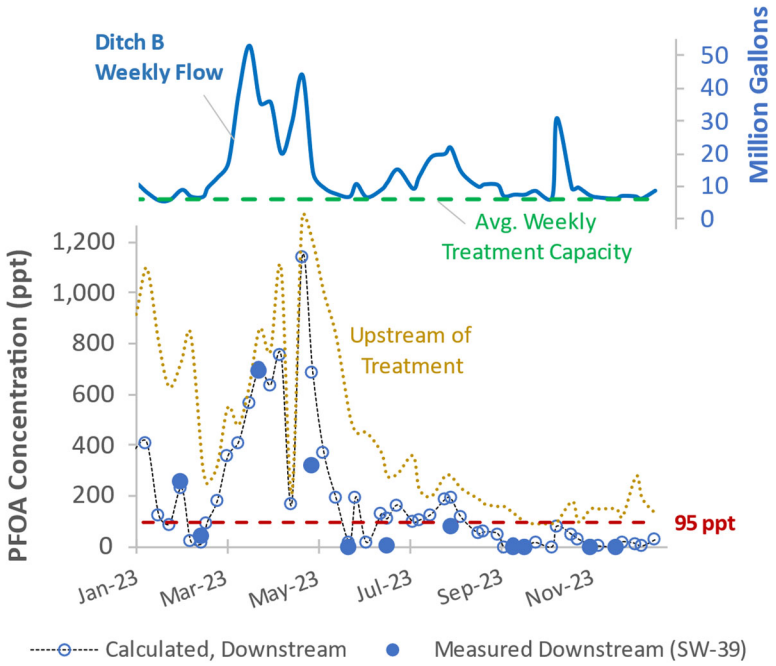
Routine system maintenance that occurred during this reporting period included removal of accumulated sediment, replacement of spent bag filters and replacement of spent GAC. The spent bag filters were collected in drums and disposed by End Point Solutions, and the spent GAC was reactivated by Tetrasolv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

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)			PFOS Concentrations (ppt)				PFOA Concentration (ppt)			
	Source	JCI/Tyco Table 5	JCI/Tyco Table 5	DNR Calculated[1]	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]
Week Start Date	Week End Date	Estimated Stream Flow (V_{stream})	Treated Discharge ($V_{treated}$)	Estimated Untreated Flow ($V_{untreated}$)	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
Sunday, July 2, 2023	Saturday, July 8, 2023	11,106,100	6,884,100	4,222,000	7/3/2023	**50**	<0.47	< 1.8	**19**	**280**	5.1	5.5	**110**
Sunday, July 9, 2023	Saturday, July 15, 2023	15,137,700	6,570,800	8,566,900	7/10/2023	**40**	<0.55		**23**	**290**	<0.86		**164**
Sunday, July 16, 2023	Saturday, July 22, 2023	9,215,500	6,706,500	2,509,000	7/20/2023	**58**	<0.46		**16**	**360**	<0.72		**98**
Sunday, July 23, 2023	Saturday, July 29, 2023	12,844,300	7,051,100	5,793,200	7/24/2023	**34**	<0.47		**15**	**230**	<0.74		< 0.5
Sunday, July 30, 2023	Saturday, August 5, 2023	18,951,800	6,901,600	12,050,200	8/1/2023	**30**	<0.53		**19**	**200**	<0.83		**127**
Sunday, August 6, 2023	Saturday, August 12, 2023	19,911,100	6,793,600	13,117,500	8/10/2023	**43**	<0.51		**28**	**280**	<0.80		**184**
Sunday, August 13, 2023	Saturday, August 19, 2023	21,776,400	6,999,200	14,777,200	8/14/2023	**54**	<0.45	**15**	**37**	**280**	1.9	78	**191**
Sunday, August 20, 2023	Saturday, August 26, 2023	14,244,700	7,130,000	7,114,700	8/21/2023	**41**	<0.47		**20**	**230**	<0.73		**115**
Sunday, August 27, 2023	Saturday, September 2,	9,882,300	7,136,200	2,746,100	9/1/2023	**28**	<0.47		7.8	**190**	<0.75		53
Sunday, September 3, 2023	Saturday, September 9,	10,535,100	6,938,100	3,597,000	9/5/2023	**25**	<0.52		**8.5**	**170**	<0.82		58
Sunday, September 10, 2023	Saturday, September 16, 2023	10,360,100	7,020,300	3,339,800	9/14/2023	**25**	<0.47		**8.1**	**160**	<0.74		52
Sunday, September 17, 2023	Saturday, September 23, 2023	6,928,300	6,924,000	4,300	9/18/2023	**26**	<0.47		0.016	**160**	<0.75		0.10
Sunday, September 24, 2023	Saturday, September 30, 2023	7,394,600	6,942,800	451,800	9/25/2023	**23**	<0.46	<1.9	1.4	**130**	<0.73	<1.9	8
Sunday, October 1, 2023	Saturday, October 7, 2023	7,377,600	7,099,200	278,400	10/2/2023	**20**	<0.54	<2.1	0.75	**98**	<0.85	<2.1	< 0.77
Sunday, October 8, 2023	Saturday, October 14, 2023	8,546,900	7,035,600	1,511,300	10/9/2023	**17**	<0.52		3.0	92	<0.82		16
Sunday, October 15, 2023	Saturday, October 21, 2023	6,616,400	6,616,400	0	10/20/2023	**16**	<0.49		<0.49	93	<0.77		<0.77
Sunday, October 22, 2023	Saturday, October 28, 2023	30,938,000	5,967,000	24,971,000	10/23/2023	**27**	<0.47		**22**	**100**	<0.74		81
Sunday, October 29, 2023	Saturday, November 4, 2023	9,260,500	6,802,000	2,458,500	11/2/2023	**38**	<0.49		**10**	**180**	<0.78		48
Sunday, November 5, 2023	Saturday, November 11, 2023	9,624,700	6,729,600	2,895,100	11/6/2023	**51**	<0.47		**15**	**99**	1.7		31
Sunday, November 12, 2023	Saturday, November 18, 2023	7,124,700	6,782,800	341,900	11/14/2023	**34**	<0.47	<1.9	1.6	**150**	<0.75	<1.9	7.2
Sunday, November 19, 2023	Saturday, November 25, 2023	6,523,100	6,523,100	0	11/20/2023	**32**	<0.49		<0.49	**150**	2.2		2.2
Sunday, November 26, 2023	Saturday, December 2, 2023	6,185,700	6,185,700	0	12/1/2023	**27**	<0.48	<1.7	<0.48	**150**	<0.75	<1.7	<0.75
Sunday, December 3, 2023	Saturday, December 9, 2023	6,988,000	6,171,600	816,400	12/5/2023	**22**	0.62		3.1	**120**	6.1		19
Sunday, December 10, 2023	Saturday, December 16, 2023	6,848,200	6,533,200	315,000	12/14/2023	**29**	<0.50		1.3	**280**	<0.79		13
Sunday, December 17, 2023	Saturday, December 23, 2023	6,157,000	6,157,000	0	12/18/2023	**29**	<0.48		<0.48	**190**	1.5		1.5
Sunday, December 24, 2023	Saturday, December 30, 2023	8,607,700	6,861,200	1,746,500	12/27/2023	**21**	<0.50		4.3	**130**	1.4		27
	Total (gallons)	289,086,500	175,462,700	113,623,800		**Surface Water Critera = 8 ppt**				**Surface Water Critera = 95 ppt**			
	Total (million gallons)	**289**	**175**	**114**									

Notes:

[1] $V_{untreated} = V_{stream} - V_{treated}$

[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 critera

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)

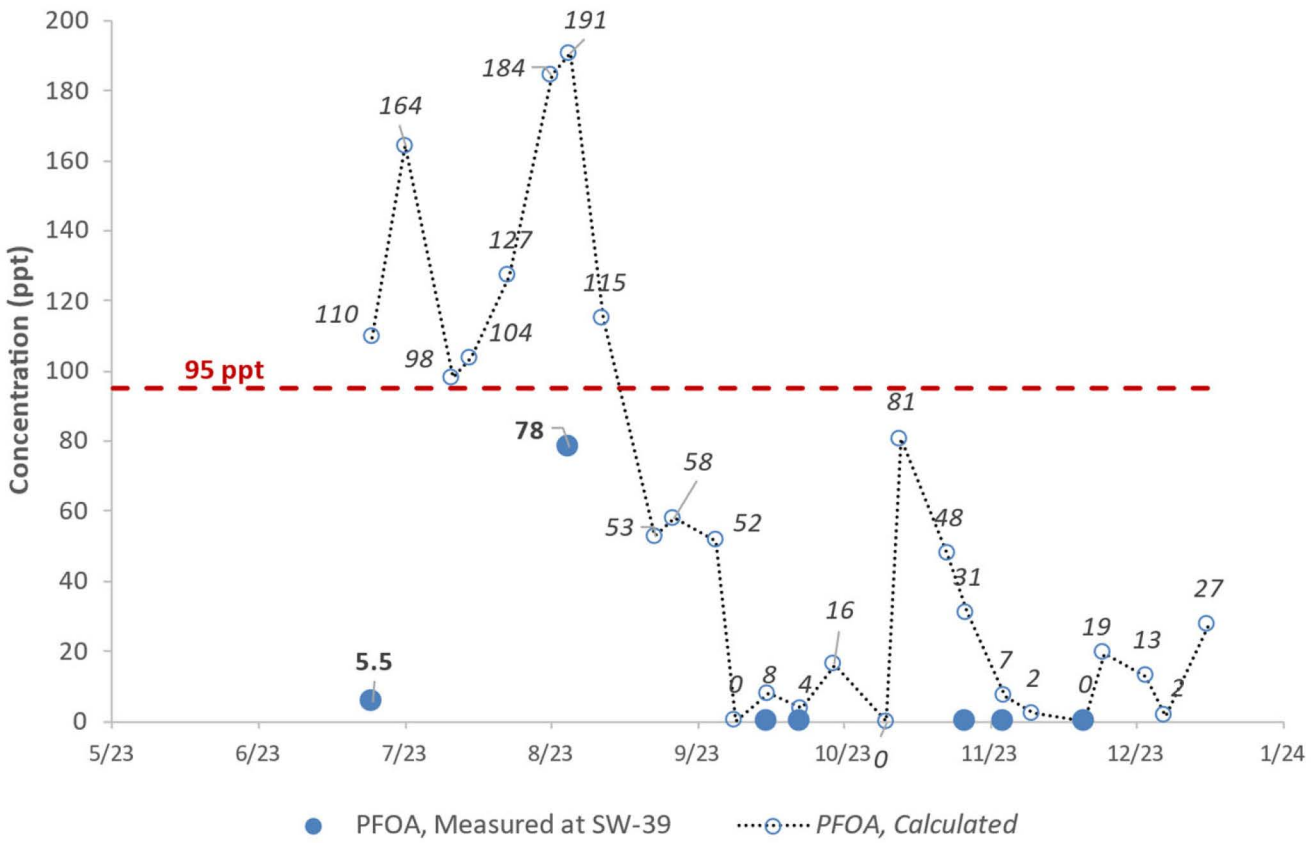


Figure A.2

Ditch B Downstream Surface Water Concentrations: **PFOS**

(Compare to Figure 6 in Progress Report #9)