



January 11, 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: Response to Semi-Annual Operation, Maintenance, and Optimization Progress Report #8
Ditch B Interim Action Treatment System (Jan. 1, 2023 – June 30, 2023)
JCI/Tyco FTC PFAS, 2700 Industrial Parkway South, Marinette, WI
BRRTS #02-38-580694

Dear Ms. Nelson:

On Nov. 2, 2023, the Wisconsin Department of Natural Resources (DNR) received the *Semi-Annual Operation, Maintenance, and Optimization Progress Report #8* (O&M Progress Report #8) for the Ditch B interim remedial action 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 #8 finds that the Ditch B treatment system removes per- and polyfluoroalkyl substances (PFAS) from the water it captures and treats. However, because the streamflow in the ditch frequently exceeds the capacity of the system, a portion of the water often goes untreated allowing PFAS at concentrations that exceed current surface water standards to migrate downstream towards the Bay of Green Bay. JCI/Tyco plans to include additional downstream monitoring in future Progress Reports and must report on the cause and significance of PFAS exceedances detected in surface water downstream of the treatment system (Wis. Admin. Code § NR 724.17(3m)(f)). JCI/Tyco may need to consider other remedial actions or modifications to the current interim actions to meet surface water criteria in Ditch B.¹

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 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 Lake Michigan. In Oct. 2019, JCI/Tyco began an interim remedial action to treat surface water in Ditch B after testing

¹ The DNR acknowledges that JCI/Tyco began operating another interim remedial action – the Groundwater Extraction and Treatment System (GETS) – in Nov. 2022, with a goal of reducing the concentration of PFAS in the surface water in Ditch B such that operation of the Ditch B treatment system is no longer needed. Currently, the PFAS concentrations in Ditch B remain above the surface water standards downstream of the GETS, and so continued operation of the Ditch B system is recommended.

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 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 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 #8

System Operation and Performance

JCI/Tyco's O&M Progress Report #8 covered the period from Jan. 1 to June 30, 2023. During the reporting period, the system operated continuously and treated approximately 158 million gallons of surface water from Ditch B. However, JCI/Tyco calculated the total flow volume in the ditch to be around 434 million gallons during this reporting period, which means that some 276 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 2,300 ppt for PFOA and up to 130 ppt for PFOS and the treated water exiting the system had concentrations less than 84 for PFOA and less than 2.0 for PFOS.

JCI/Tyco calculated that the Ditch B treatment system removed 1.05 pounds of PFOA and 0.08 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 9.8 pounds of PFOA and 0.76 pounds of PFOS have been removed from the approximately 933 million gallons of water treated by the Ditch B system.

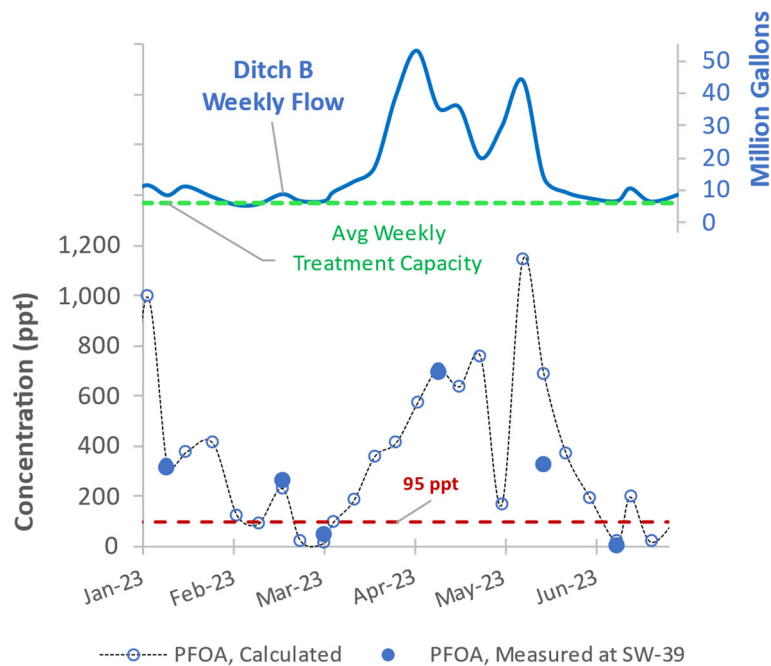
Routine system maintenance that occurred during this reporting period included removal of accumulated sediment, replacement of spent bag filters and replacement of spent GAC. The spent bag filters were collected in drums and disposed by End Point Solutions, and the spent GAC was reactivated by Tetrasolv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

Surface Water Long-Term Monitoring

JCI/Tyco collects monthly samples of surface water in Ditch B at surface water sampling point SW-39, which is located immediately downstream of the treatment system. The concentration of PFOA and PFOS were below the Wis. Admin. Code § NR 102.04 surface water standards of 95 ppt for PFOA and 8 ppt for PFOS in the samples collected in March and June of 2023, but exceeded these standards in the samples collected in January, February, April, and May 2023. During these months the downstream surface water concentrations ranged from 18 to 40 ppt for PFOS and 260 to 700 ppt for PFOA. JCI/Tyco attributed the elevated concentrations to high flow volumes in Ditch B, which caused some surface water to bypass the system and go untreated.

In prior review letters, the DNR recommended that JCI/Tyco use data that is collected weekly to monitor system operations to calculate/estimate the downstream concentrations of PFAS in the surface water in Ditch B. This was recommended to ensure that the downstream concentrations of PFAS in Ditch B during times of high streamflow were included in the evaluation of the effectiveness of the Ditch B treatment system. The DNR completed the recommended evaluation using the data JCI/Tyco submitted in O&M Progress Report #8 (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. During the periods of high streamflow where some of the water goes untreated, the downstream concentrations of PFOA (and PFOS) often exceed their respective Wis. Admin. Code § NR 102.04 surface water standards².



In its prior review of O&M Progress Report #7, the DNR requested that JCI/Tyco add surface water sampling point SW-15 (or similar location) to the monthly monitoring of the Ditch B treatment system to track the concentrations of PFAS in the surface water closer to where Ditch B enters the Bay of Green Bay. Data from surface water in this area was not included in O&M Progress Report #8, but JCI/Tyco submitted an update to the

² In Table 6, the formatting footnote refers to these as “proposed” standards. Please update the footnotes to remove the word “proposed”.

O&M Plan on July 20, 2023, and has stated that results from monthly sampling of surface water sample point SW-L03 will be included in future reports, starting in O&M Progress Report #9.

Next Steps

While the Ditch B treatment system is shown to be effective at removing PFAS from the water it captures and treats, the data collected during this reporting period shows that PFAS with concentrations exceeding the Wis. Admin. Code § NR 102.04 surface water standards frequently occur downstream of the treatment system during times of high streamflow.

JCI/Tyco should begin reporting, as planned, on results from monthly testing for PFAS at downstream surface water sampling point SW-L03 in O&M Progress Report #9. 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 and figures. This weekly estimate provides a more complete picture of concentrations of PFAS in surface water throughout the reporting period.

Because the PFAS concentrations in Ditch B remain above the surface water standards upstream of the treatment system, continued operation of the Ditch B system is recommended to help further reduce the amount of PFAS in the water. If concentrations of PFAS remain elevated above surface water standards downstream of the interim actions then JCI/Tyco must evaluate the cause and significance (Wis. Admin. Code § NR 724.17(3m)(f)). JCI/Tyco may need to consider other remedial actions or modifications to the current interim actions to meet surface water criteria in Ditch B.

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 about this letter, please contact me, the DNR Project Manager, at (608) 622-8606 or Alyssa.Sellwood@wisconsin.gov.

Sincerely,



Alyssa Sellwood, PE
Water Resources Engineer
Remediation & Redevelopment Program

Attachments Table A.1 – Mass Balance Approach to Estimated 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 #8

		Ditch B Flow Volume (gallons)		
		JCI/Tyco Table 5	JCI/Tyco Table 5	DNR Calculated ⁽¹⁾
Source		Estimated Stream Flow (V _{stream})	Treated Discharge (V _{treated})	Estimated Untreated Flow (V _{untreated})
Week Start Date	Week End Date			
Sunday, January 1, 2023	Saturday, January 7, 2023	11,644,400	6,658,800	4,985,600
Sunday, January 8, 2023	Saturday, January 14, 2023	8,513,100	7,126,400	1,386,700
Sunday, January 15, 2023	Saturday, January 21, 2023	11,297,400	6,713,300	4,584,100
Sunday, January 22, 2023	Saturday, January 28, 2023	7,990,000	5,416,400	2,573,600
Sunday, January 29, 2023	Saturday, February 4, 2023	5,528,500	4,928,600	599,900
Sunday, February 5, 2023	Saturday, February 11, 2023	5,782,200	5,020,400	761,800
Sunday, February 12, 2023	Saturday, February 18, 2023	8,880,000	6,135,800	2,744,200
Sunday, February 19, 2023	Saturday, February 25, 2023	6,755,600	6,597,500	158,100
Sunday, February 26, 2023	Saturday, March 4, 2023	6,749,200	6,455,700	293,500
Sunday, March 5, 2023	Saturday, March 11, 2023	9,502,400	5,947,300	3,555,100
Sunday, March 12, 2023	Saturday, March 18, 2023	12,729,100	5,519,700	7,209,400
Sunday, March 19, 2023	Saturday, March 25, 2023	17,246,200	6,063,900	11,182,300
Sunday, March 26, 2023	Saturday, April 1, 2023	39,197,900	5,796,300	33,401,600
Sunday, April 2, 2023	Saturday, April 8, 2023	53,182,800	5,281,200	47,901,600
Sunday, April 9, 2023	Saturday, April 15, 2023	35,589,100	6,499,500	29,089,600
Sunday, April 16, 2023	Saturday, April 22, 2023	35,698,100	6,276,800	29,421,300
Sunday, April 23, 2023	Saturday, April 29, 2023	20,034,200	6,525,600	13,508,600
Sunday, April 30, 2023	Saturday, May 6, 2023	29,660,500	6,579,500	23,081,000
Sunday, May 7, 2023	Saturday, May 13, 2023	44,041,200	5,357,200	38,684,000
Sunday, May 14, 2023	Saturday, May 20, 2023	13,950,200	6,080,500	7,869,700
Sunday, May 21, 2023	Saturday, May 27, 2023	9,426,500	5,979,400	3,447,100
Sunday, May 28, 2023	Saturday, June 3, 2023	7,572,400	5,840,300	1,732,100
Sunday, June 4, 2023	Saturday, June 10, 2023	6,777,000	6,532,300	244,700
Sunday, June 11, 2023	Saturday, June 17, 2023	10,673,200	6,127,800	4,545,400
Sunday, June 18, 2023	Saturday, June 24, 2023	6,581,700	6,348,500	233,200
Sunday, June 25, 2023	Friday, June 30, 2023	9,008,400	5,865,700	3,142,700
Total (gallons)		434,011,300	157,674,400	276,336,900
Total (million gallons)		434	158	276

Sample Date	PFOS Concentrations (ppt)				PFOA Concentration (ppt)			
	JCI/Tyco Table 4	JCI/Tyco Table 4	JCI/Tyco Table 7	DNR Calculated ⁽²⁾	JCI/Tyco Table 4	JCI/Tyco Table 4	JCI/Tyco Table 7	DNR Calculated ⁽²⁾
	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
1/3/2023	120	0.81		51	2,300	< 0.51		994
1/10/2023	110	< 0.72	19	18	1,800	< 0.46	310	321
1/16/2023	68	< 0.76		28	920	< 0.48		373
1/25/2023	67	< 0.78		< 0.78	1,100	< 0.5		< 0.5
2/2/2023	60	< 0.5		7	810	< 0.78		123
2/9/2023	51	< 0.47		7	630	1.1		88
2/17/2023	50	< 0.48	18	15	730	< 0.76	260	231
2/23/2023	35	< 0.48		1	840	< 0.75		21
3/3/2023	34	< 0.45	4.7	1	320	< 0.71	45	14
3/6/2023	38	< 0.48		14	250	6.8		94.8
3/13/2023	28	< 0.46		16	320	< 0.73		181
3/20/2023	43	< 0.46		< 0.46	550	13		358
3/27/2023	30	< 0.48		26	480	2.7		411
4/3/2023	41	< 0.49		< 0.49	630	< 0.77		< 0.77
4/10/2023	53	< 0.49	38	43	860	1.2	690	703
4/17/2023	52	< 0.48		< 0.48	770	2.9		636
4/24/2023	90	< 0.48		61	1,100	< 0.75		755
5/1/2023	26	< 0.48		20	210	10		166
5/8/2023	81	< 0.48		71	1,300	2.2		1142
5/15/2023	76	1.7	40	43	1,200	70	320	684
5/22/2023	78	1.2		29	1,000	39		369
5/30/2023	130	1.1		31	830	24		191
6/8/2023	63	1.8	<1.9	2	520	68	<1.9	19
6/12/2023	62	< 0.48		27	450	2.3		197
6/19/2023	56	< 0.48		2	450	2.6		17
6/29/2023	58	1.2		20	370	58		130
Surface Water Criteria = 8 ppt					Surface Water Criteria = 95 ppt			

Notes:
⁽¹⁾ V_{untreated} = V_{stream} - V_{treated}

⁽²⁾ Estimated Surface Water Concentration = [(V_{untreated} * Influent Concentration) + (V_{treated} * 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 #8)

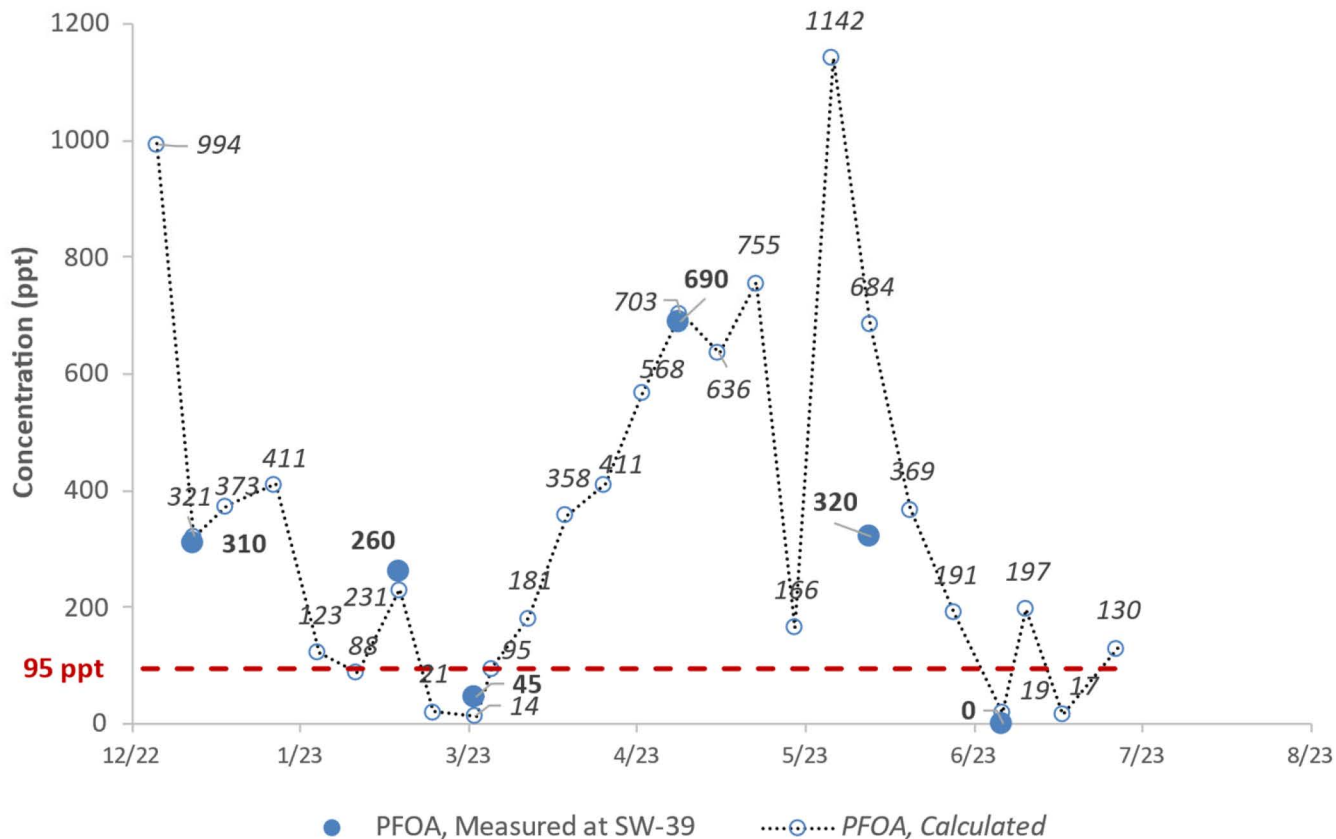


Figure A.2

Ditch B Downstream Surface Water Concentrations: PFOS

(Compare to Figure 6 in Progress Report #8)

