



NEW Water Pretreatment Program and Phosphorus Pollution Prevention

WWOA
Lake Michigan District

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Bill Oldenburg,
Laboratory & Research Manager

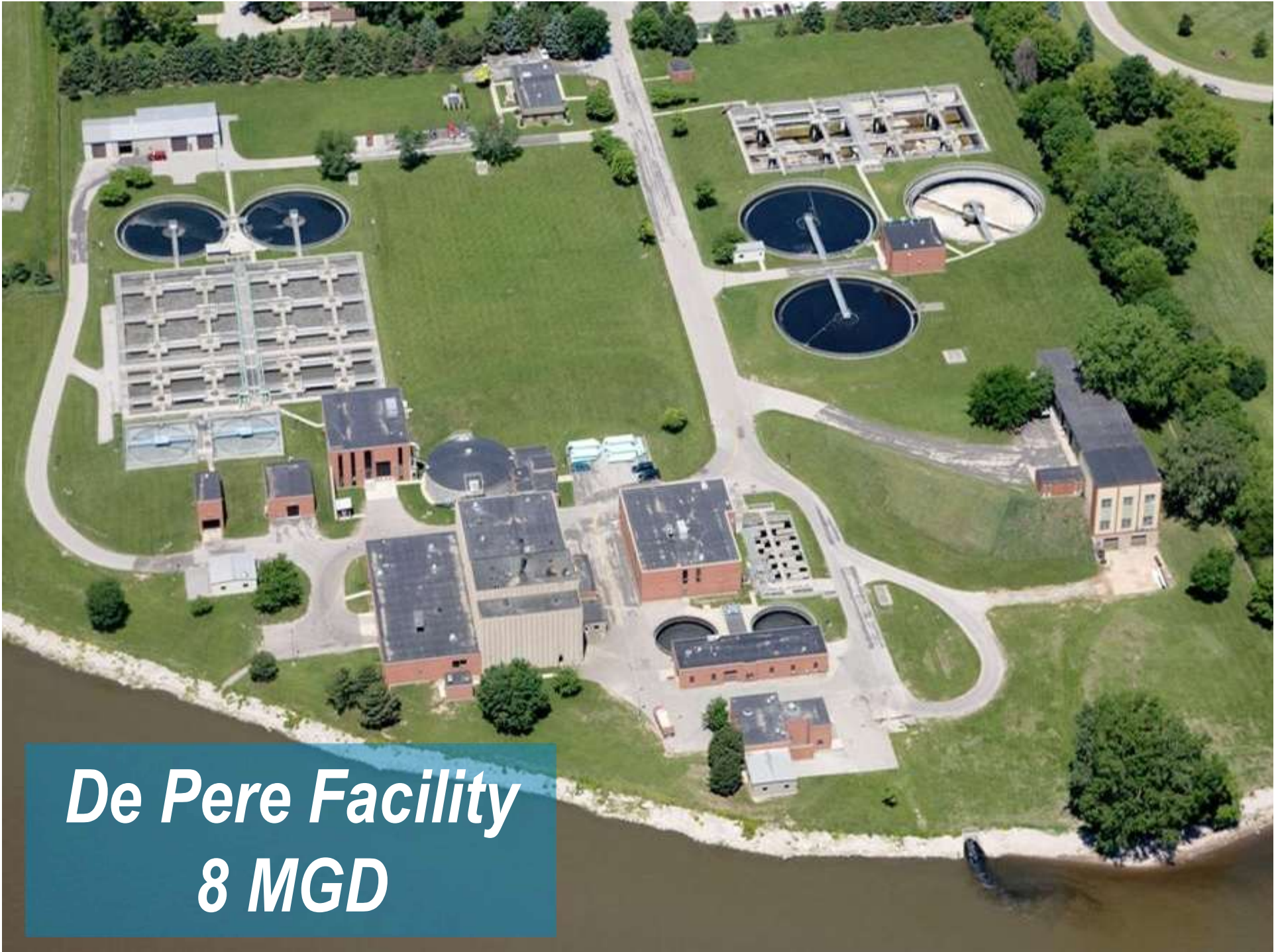


*Protecting our most valuable
resource, water.*

NEW Water
The brand of the Green Bay
Metropolitan Sewerage District 

*30 million
gallons per day*





De Pere Facility
8 MGD

Who or What is NEW Water?



- Brand of the Green Bay Metropolitan Sewerage District (GBMSD)
- Two treatment facilities serving NE Wisconsin 24/7/365
- Approximately 100 employees



WPDES Permit Limit Changes

- Current WPDES permit limit – 1.0 mg/L TP
- MOU next permit term 0.6 mg/L TP
- Following 3 permit terms 0.5 mg/L TP
- Ultimate goal 0.1 mg/L TP



Trident of Phosphorus

1. Adaptive Management
2. Treatment facility operational improvement
3. Indirect dischargers – Pretreatment Program



Phosphorus Species

Particulate reactive

Particulate nonreactive

Dissolved reactive

Dissolved nonreactive



Analytical Tests

- Total phosphorus
- Total phosphorus, filtered
- Soluble orthophosphate
- Soluble orthophosphate, filtered





Calculations

- **Particulate, reactive** = ortho P – dissolved ortho P
- **Particulate, nonreactive** = total P – dissolved total P – (ortho P – dissolved ortho P)
- **Soluble, reactive** = dissolved ortho P
- **Soluble, nonreactive** = dissolved total P – dissolved ortho P



Location	Date	Flow (MGD)	Particulate Reactive (mg/L)	Particulate Nonreactive (mg/L)	Soluble Reactive (mg/L)	Soluble Nonreactive (mg/L)	Soluble Nonreactive (lbs)	Total lbs	
Bay Towel	7/18-19/2016	0.12492	0.159	0.641	0.823	1.077	1.12	2.81	7
Bay Towel	7/19-20/2016	0.12492	0.032	0.468	0.754	1.446	1.51	2.81	
Bay Towel	7/20-21/2016	0.13417	0	0.5	0.659	1.441	1.61	2.91	
Bay Valley Foods	7/25-26/2016	0.638759	2.402	1.098	0.588	0.512	2.73	24.51	3
Bay Valley Foods	7/26-27/2016	0.683335	2.53	5.13	0.31	0.63	3.59	49.01	
Bay Valley Foods	7/27-28/2016	0.713164	1.17	0.33	3.69	2.51	14.93	45.80	
Dean Foods	8/1-2/2016	0.0678	0.2	3.8	10.9	3.1	1.75	10.18	4
Dean Foods	8/2-3/2016	0.06421	0.9	2.1	11.3	5.7	3.05	10.71	
Dean Foods	8/3-4/2016	0.02659	0.5	3.5	10.6	4.4	0.98	4.21	
Expera	8/1-2/2016	0.850287	0	0	0.006	0.064	0.45	0.50	
Expera	8/2-3/2016	0.928518	0	-0.05	0.006	0.124	0.96	0.62	
Expera	8/3-4/2016	1.007479	0	0	0.006	0.044	0.37	0.42	
Fox River Fiber	7/25-26/2016	0.994919	0.9	5.5	2.64	3.96	32.86	107.87	1
Fox River Fiber	7/26-27/2016	1.123621	0.34	1.76	2.92	6.98	65.41	112.45	
Fox River Fiber	7/27-28/2016	0.689841	0.4	1.6	3.04	6.96	40.04	69.04	
Green Bay Nonwovens Plant #2	8/1-2/2016	0.119304	0.035	0.105	0.006	0.454	0.45	0.60	
Green Bay Nonwovens Plant #2	8/2-3/2016	0.104617	0	0.11	0.006	0.384	0.34	0.44	
Green Bay Nonwovens Plant #2	8/3-4/2016	0.106246	0.015	0.085	0.006	0.364	0.32	0.42	
JBS	7/11-12/2016	1.215378	1.9	4607.1	12.6	-0.6	-6.08	46839.62	5
JBS	7/12-13/2016	1.251701	2.24	1.06	6.98	-0.28	-2.92	104.39	
JBS	7/13-14/2016	1.21231	5.06	0.94	8.74	1.26	12.74	161.77	
Pioneer Metal Finishing, SP #1	7/18-19/2016	0.34884	6.754	0.946	0.006	7.294	21.22	43.64	2
Pioneer Metal Finishing, SP #1	7/19-20/2016	0.40016	5.024	-5.024	0.026	6.674	22.27	22.36	
Pioneer Metal Finishing, SP #1	7/20-21/2016	0.50229	1.815	1.185	0.095	9.905	41.49	54.46	
Proactive Solutions, SP #2	7/12/2016	0.0007	285	-285	3994	642	3.75	27.06	6
Proactive Solutions, SP #2	7/19/2016	0.0007	381	-173	2829	173	1.01	18.74	
Proactive Solutions, SP #2	7/26/2016	0.0007	0	70	1261	-192	-1.12	6.65	
Schreiber Foods	7/25-26/2016	0.03779	2.99	2.01	6.05	5.95	1.88	5.36	
Schreiber Foods	7/26-27/2016	0.03976	0.97	-0.97	4.84	1.06	0.35	1.96	
Schreiber Foods	7/27-28/2016	0.03177	2.931	-0.431	0.639	2.361	0.63	1.46	
MS-13A	7/18-19/2016	0.574	2.944	3.656	0.006	5.394	25.82	57.45	
MS-13A	7/19-20/2016	0.652	2.985	3.315	0.015	3.185	17.32	51.66	
MS-13A	7/20-21/2016	0.654	1.305	2.195	0.015	2.285	12.46	31.64	

Fox River Fiber

- Wet lap mill – anaerobic digestion
- Micronutrients for digester (50% H_3PO_4)
- 2015 (922 MGD)
- 2016 (843 MGD)
- 2017 (785 MGD)





Fox River Fiber *(continued)*

- 2015 total – 26,581 lbs. TP (9.24 mg/L)
- 2016 total – 28,426 lbs. TP (10.68 mg/L)
- October 25, 2016 changed to Super Phos.
- 2017 total – 16,274 lbs. TP (6.68 mg/L)

Fox River Fiber *(continued)*

- July, 2016 dissolved nonreactive P
 - 32.86 lbs./day
 - 65.41 lbs./day
 - 40.04 lbs./day

 - Average 46.10 lbs./day



Fox River Fiber *(continued)*

- Dec '16/Jan '17 dissolved nonreactive P
 - 13.09 lbs./day
 - 13.17 lbs./day
 - 10.33 lbs./day
 - 30.36 lbs./day

 - Average 16.74 lbs./day



Fox River Fiber *(continued)*

- Reduced diss. nonreact P by 10,716 lbs./yr
- Reduced total P by 17,826 lbs./yr
- H_3PO_4 is 48% dissolved nonreactive P
- Super Phos is 35% diss. nonreact P



ProActive Solutions

- Chemical blending facility
- Sanitation and cleaning chemicals
- Product line broken into acidic and caustic
- Batch discharge after pH adjustment



ProActive Solutions *(continued)*

- H_3PO_4 is used to pH adjust the caustic waste tank (500-1,100 gallons per dump, 2-3x per week)
- 4.44 lbs. of P in each gallon of H_3PO_4
- 1-50 gallons H_3PO_4 necessary to adjust a tank. Volumes recorded each event



ProActive Solutions *(continued)*

- Researched product substitution as a pollution prevention strategy
- Concerns raised regarding heat and vapor with the use of high concentration sulfuric acid



ProActive Solutions *(continued)*

- The facility already uses 40% sulfuric acid as an ingredient
- Bench scale test was employed to determine changes in temperature using the lower concentration acid



ProActive Solutions *(continued)*

- Full pH adjustment was completed with no measurable change in temperature. Tech memo was drafted and shared with the industry
- Facility agreed to make the change from phosphoric acid to sulfuric acid



ProActive Solutions *(continued)*

- Facility averaged 2.3 lbs. dissolved nonreactive P per dump (est. 400 lbs./year)
- Facility averaged 22.9 lbs. of total P per dump (est. 4,000 lbs./year)



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			Reactive (mg/L)	Nonreactive (mg/L)	Reactive (mg/L)	Nonreactive (mg/L)		
JBS	10/31-11/1/2016	1.234057	0.861	2.37	9.555	-1.283	-13.20	118.39
JBS	11/1-2/2016	1.194136	1.114	5.854	8.161	0.182	1.81	152.48
JBS	11-2-3/2016	1.16421	2.4	0.878	7.578	7.216	70.06	175.47
JBS	11/3-4/2016	1.168498	0.722	1.641	9.405	7.678	74.82	189.51
Schreiber Foods	11/7-8/2016	0.03225	7.412	7.626	4.737	2.202	0.59	5.91
Schreiber Foods	11/8-9/2016	0.04509	2.792	0.729	5.993	1.976	0.74	4.32
Schreiber Foods	11/9-10/2016	0.03112	0.529	2.399	2.865	0.131	0.03	1.54
Schreiber Foods	11/10-11/2016	0.04569	3.879	1.966	8.566	-0.85	-0.32	5.17
Schreiber Foods	11/11-12/2016	0.04209	1.295	0.506	4.288	0.522	0.18	2.32
Fox River Fiber	12/12-13/2016	0.8544	0.44	3.627	0.763	1.837	13.09	47.51
Fox River Fiber	12/13-14/2016	0.7656	0.402	2.874	0.634	2.062	13.17	38.13
Fox River Fiber	1/9-10/2017	0.552868	0.644	3.883	2.284	2.241	10.33	41.74
Fox River Fiber	1/10-11/2017	0.805524	1.838	3.01	0.023	4.519	30.36	63.08

Conclusion

- Pollution prevention strategies such as product substitution work well to reduce/eliminate P discharges
- Communication with industrial dischargers paramount




Conclusion *(continued)*

- More time is necessary to better understand phosphorus speciation and its impacts
- Phosphorus reduction is a long term campaign





 **Morning Glory Dairy**

 **GOLDEN GUERNSEY DAIRY**

Thank You!



Questions / Comments?

Contact Information:
Bill Oldenburg, *Laboratory &
Research Manager*
boldenburg@newwater.us
(920) 438-1074

For more information
please visit:
www.newwater.us

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