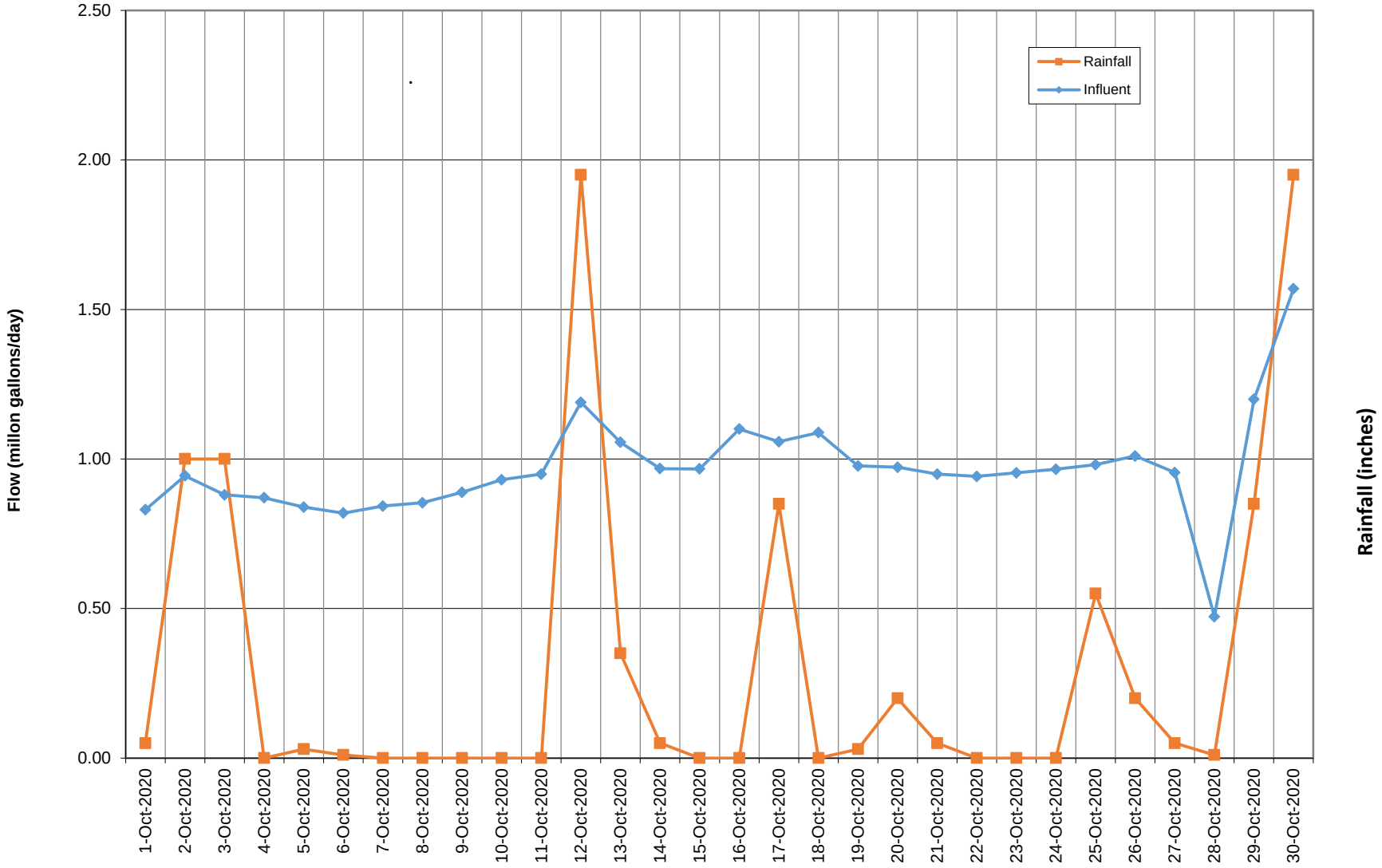
Lewes WWTP

Influent Flow Vs. Rainfall



12/3/2020

LEWES BPW WWTP Biweekly InSight Report

Date: 10/7/2020

From: Erin Horocholyn - Suez Water Technologies & Solutions
To: Dave Weed, Darrin Gordon
cc: Matt Stapleford - Suez Water Technologies & Solutions

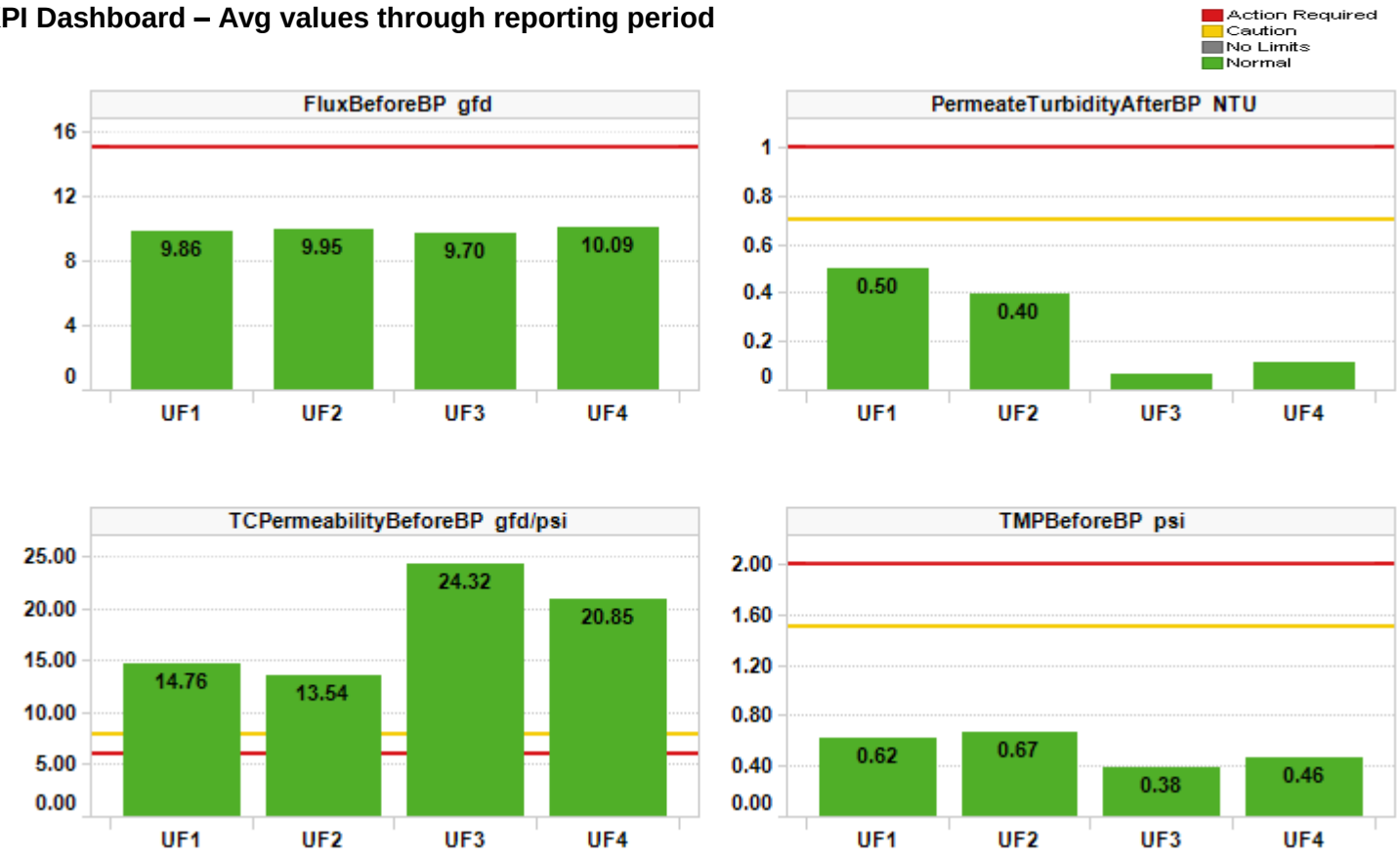
System Equipment

4 × ZW trains, each train consists of 4 - 500D cassettes, 120 modules x 370 sq. ft. per train (surface area 44,400 sq. ft. per train)
Replacement membranes installed Q1 2020 on all 4 trains

Cleaning Strategy

Recovery cleaning - 2 NaOCl @ 2000 ppm dose/1000 ppm soak per year, 1 Citric acid @ 2000 ppm per year
Maintenance cleaning - 1 NaOCl per week @ 200 ppm, 1 Citric acid per week @ 2000 ppm

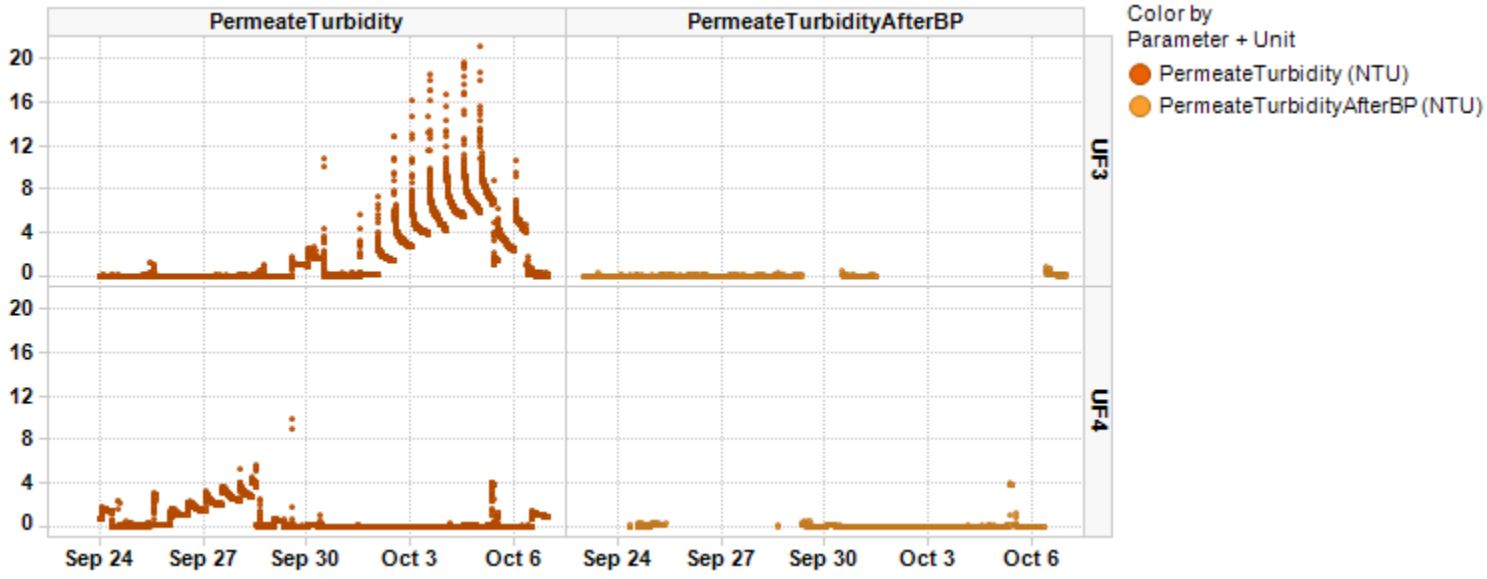
KPI Dashboard – Avg values through reporting period



Plant Summary

Overall, the plant operated well. Turbidity has decreased on UF1 and UF2 since the previous report. A recovery clean was run on UF2 and UF3 on Sept 24 and 29th respectively. RC results did not improve permeability significantly.

- Daily permeate production averaged 859 kgal, excluding days without permeate production. Max flow occurred on Oct 2 at 964 kgal with UF1, UF2, and UF4 active. Average daily permeate production by train was 221 kgal for UF1, 175 kgal for UF2, 130 kgal for UF3, and 135 kgal for UF4
- Flux ranged from 9.70 – 10.09 gfd and is mostly even across trains. Even flux between trains is beneficial for even wear across the membrane trains over time
- TC permeability BBP was good on all trains, and excellent on trains UF3 and UF4. UF1 and UF2 averaged 14.76 and 13.54 gfd/psi respectively. UF3 and UF4 averaged 24.32 and 20.85 gfd/psi respectively. For reference, TC permeability BBP is considered good above 8 gfd/psi
- Average TMP was great on all trains. UF1 and UF2 averaged 0.62 and 0.67 psi, while UF3 and UF4 averaged 0.38 and 0.46 psi. For reference, excellent TMP is below 1.0 psi
- Permeate turbidity ABP was above 0.10 NTU on UF1, UF2, and UF4, averaging 0.50, 0.40, and 0.11 NTU respectively. Last report, UF1 and UF2 had turbidities above the High limit of 0.70 NTU; this report both train's turbidities have dropped to prior levels. UF3 averaged 0.07 NTU. For reference, excellent turbidity is less than 0.1 NTU, and good turbidity less than approximately 0.3 NTU
- Comparing the tags PermeateTurbidity (PT) and PermeateTurbidityAfterBP (PTABP), there are some unusual PT trends apparent on UF3 and UF4. PTABP samples the raw data tag PT after each backpulse, and therefore can miss data present in PT if it occurs outside the data trigger to bring it into PTABP. In this case, both periods of spiking started when the train entered Standby and resolved when the train re-entered Production. The trends have resolved as of Oct 6 for UF1, and Sept 28 for UF2



- Maintenance clean (MC) design specifies 1 hypochlorite/chlorine MC and 1 citric acid MC per week, per train. Design pH for hypochlorite MCs is maximum 10.5, and for citric acid MCs the ideal range is 2.5 – 3.5
    - UF1 had 2 citric and 4 chlorine MCs over the past 2 weeks
    - UF2 had 1 citric and 4 chlorine MCs over the past 2 weeks
    - UF3 and UF4 had 1 citric and 3 chlorine MCs over the past 2 weeks

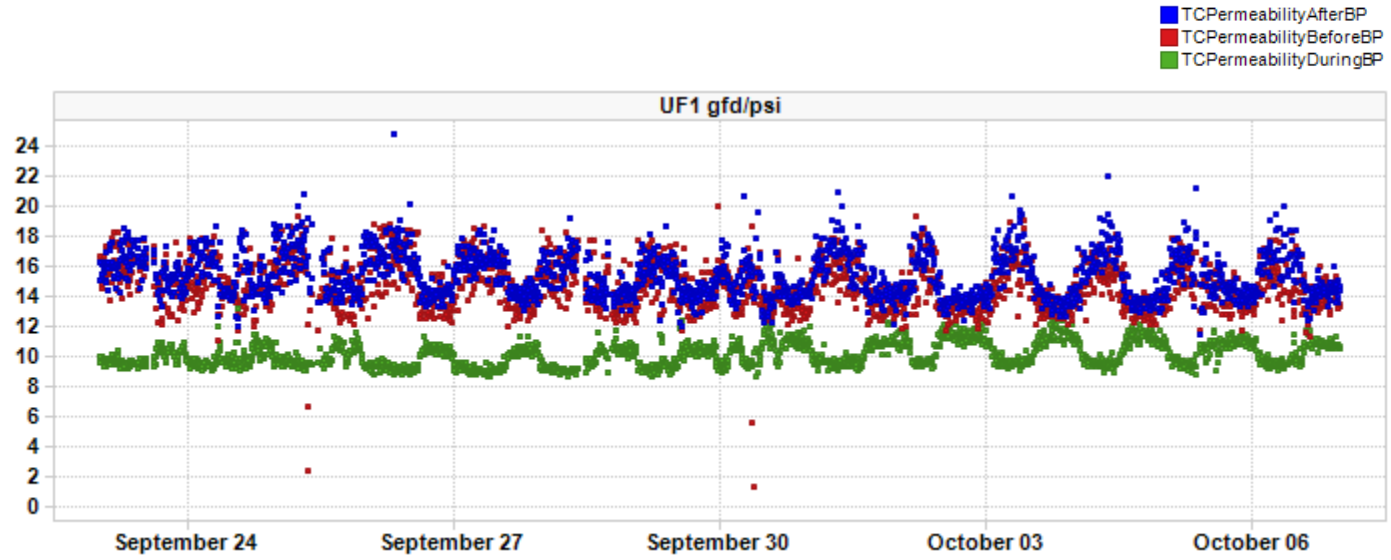
- A recovery clean (RC) was run on UF2 on Sept 24, and on UF3 on Sept 29. UF2 and UF3 first ran chlorine and soaked for 19 hours, followed by citric with a 3-hour soak. Details are summarized in the table below. Both RCs saw little or no permeability increase. Design pH for chlorine RCs is maximum 10.5, and for citric acid RCs the ideal range is 2.5 – 3.5. During an RC it is good practice to measure pH throughout the clean to see if there is a changing trend as the chemical is consumed by foulants. If the pH strays outside these ranges, more chemical can be added to maintain the soak pH and target cleaning concentration

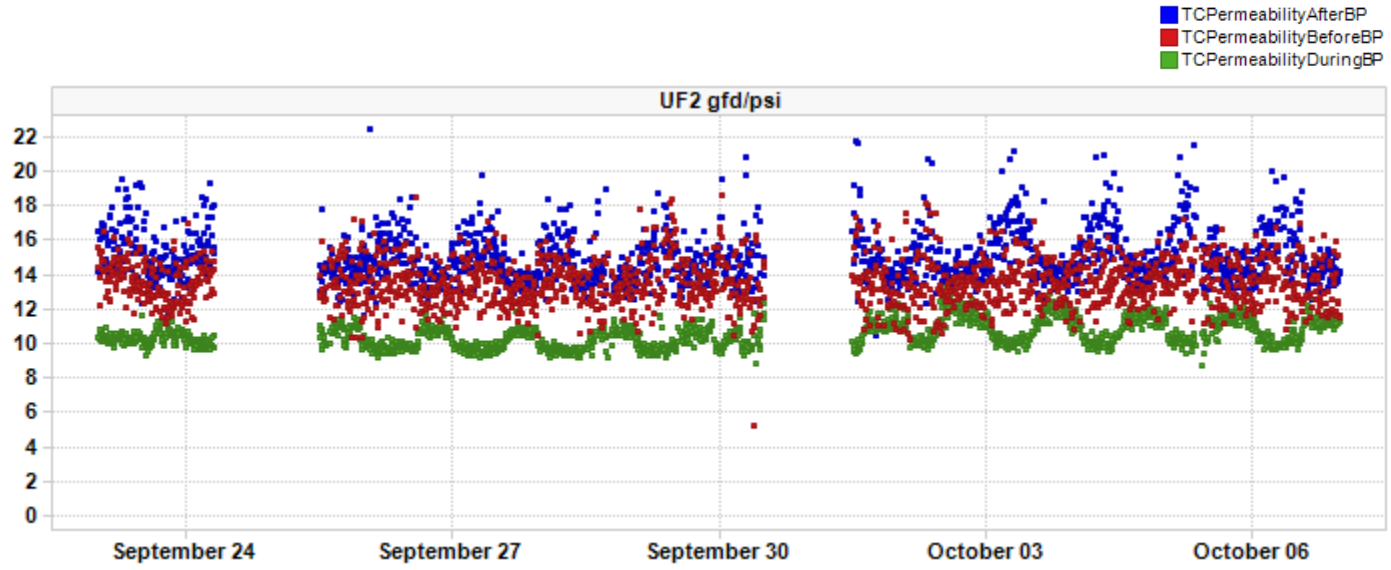
TCP = temperature corrected permeability before backpulse

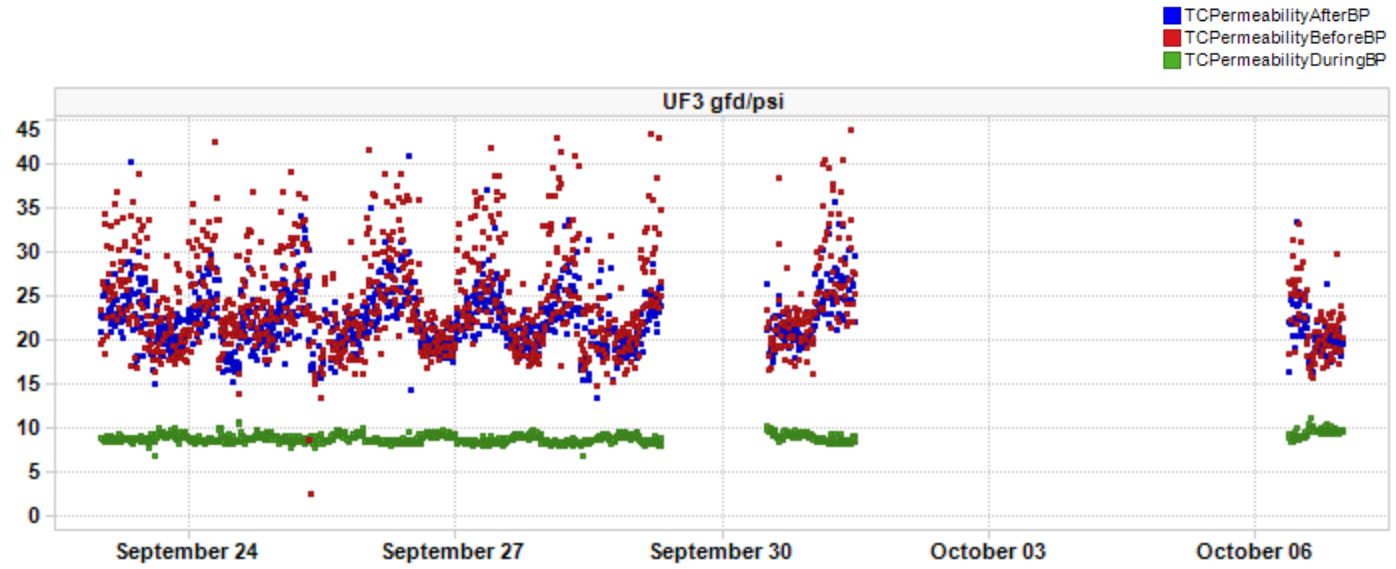
Train	Date	Pre-RC TCP (gfd/psi)	Post-RC TCP (gfd/psi)	TCP Change (gfd/psi)
UF2	Sept 24	13.64	13.61	~ 0
UF3	Sept 29	24.47	24.75	+ 0.27

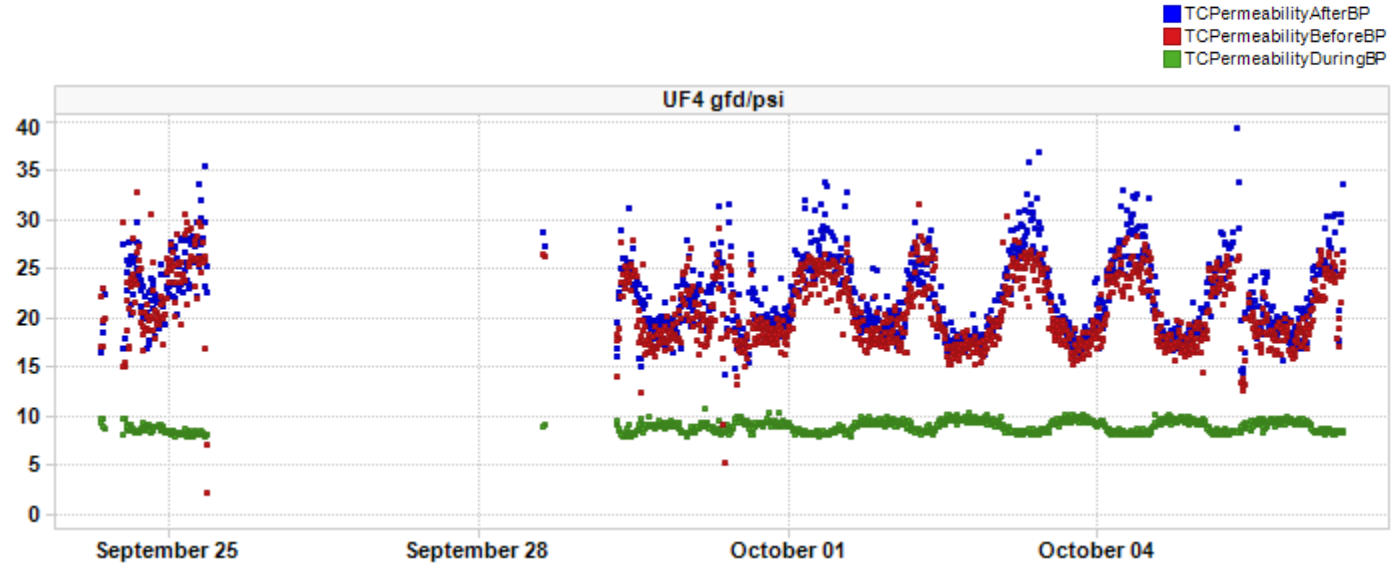
Acronyms:
TC = temperature corrected, BBP = before backpulse, ABP = after backpulse, RC = recovery clean, MC = maintenance clean, TMP = trans membrane pressure

TC Permeability Trends By Train

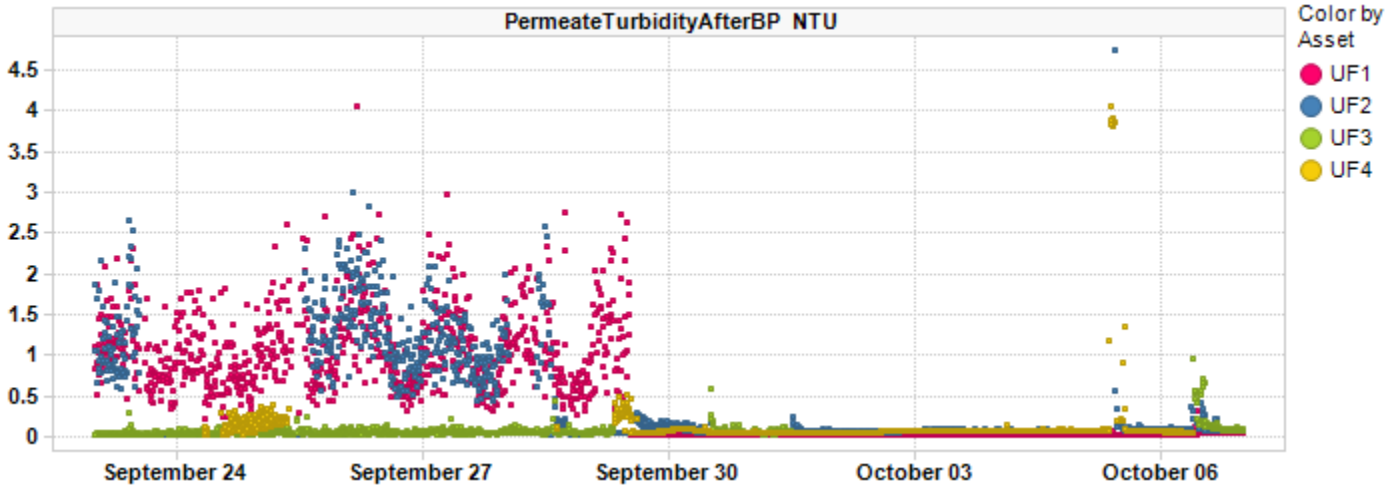




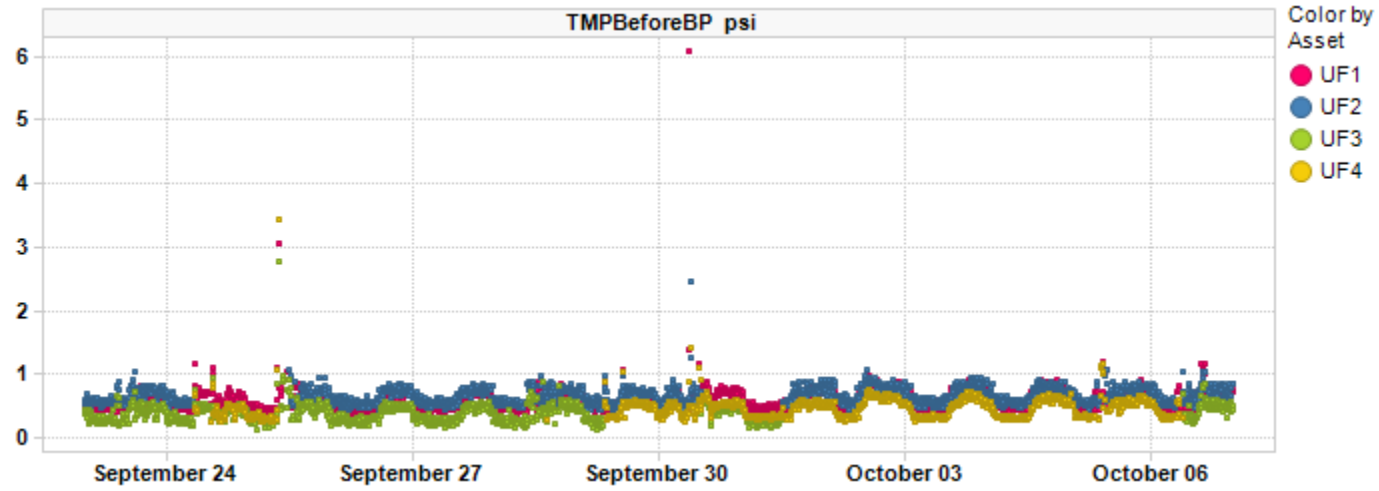




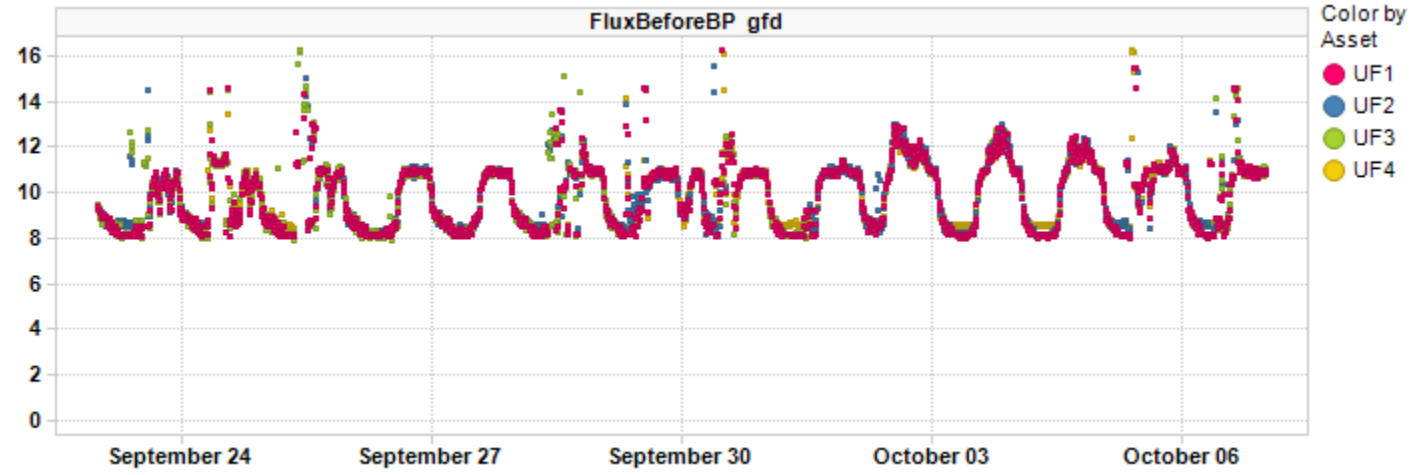
Permeate Turbidity Trend



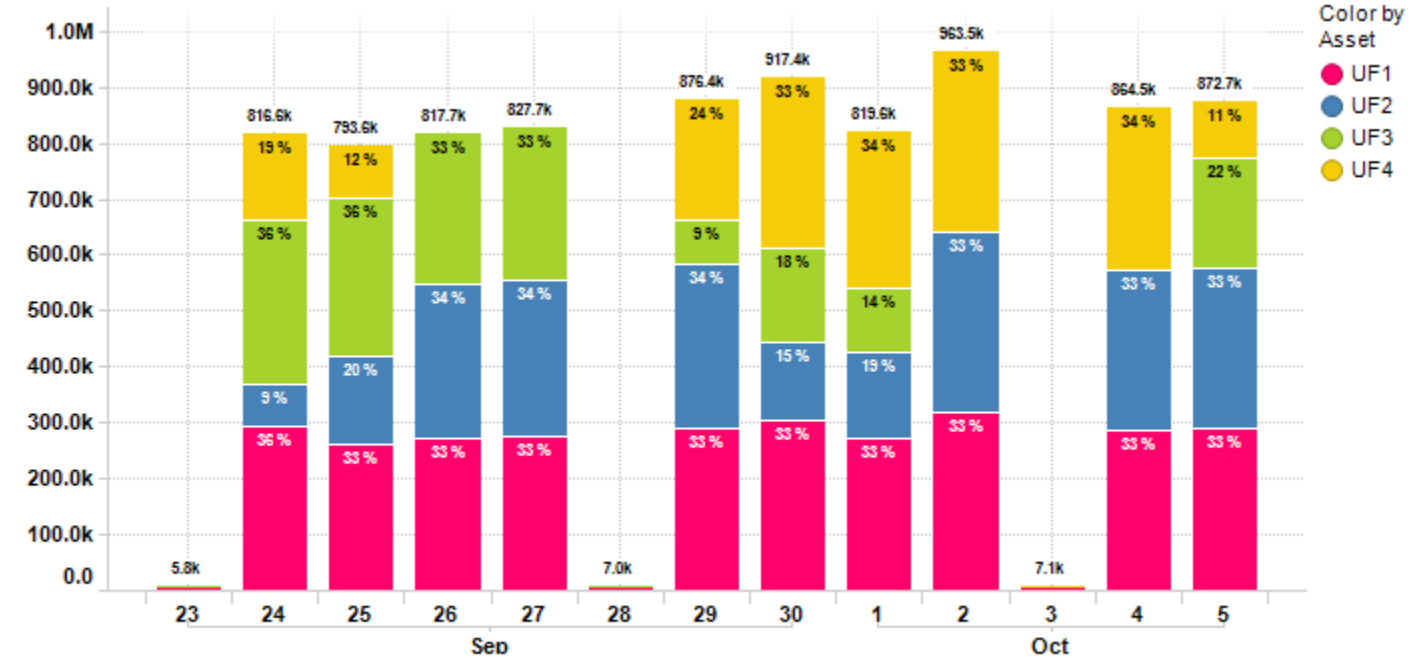
Before BPTMP Trend



Before BP Flux Trend



Daily Permeate Flow



Average Daily permeate flow from 9/23/2020 to 10/6/2020 is 660.7k gal with a maximum daily flow of 963.5k gal.

Asset Summary

KPI Parameters	Value/Change	UF1	UF2	UF3	UF4
FluxBeforeBP gfd	Value	9.86	9.95	9.70	10.09
	Change	-0.57 %	0.59 %	-2.06 %	0.05 %
FluxDuringBP gfd	Value	18.85	18.67	18.54	18.85
	Change	-0.04 %	0.32 %	0.03 %	-0.09 %
PermeateTurbidityAfterBP NTU	Value	0.50	0.40	0.07	0.11
	Change	-70.21 %	-99.12 %	0.29 %	-57.03 %
TCPermeabilityBeforeBP gfd/psi	Value	14.76	13.54	24.32	20.85
	Change	4.03 %	4.15 %	2.63 %	-10.52 %
TMPBeforeBP psi	Value	0.62	0.67	0.38	0.46
	Change	-1.59 %	-1.46 %	-1.58 %	10.51 %
TotalPermeateFlowDaily gal	Value	220.93k	175.22k	129.53k	135.06k
	Change	5.18 %	-32.30 %	-83.39 %	72.33 %

Plant Summary

KPI Parameters	Value/Change	UF Plant
TotalPermeateFlowDaily gal	Value	746.77k
	Change	-8.29 %

Contract Expiry Date : **(Empty)**

For InSight technical assistance please email insight.src@suez.com or please call technical support at 1 866 271 5425 or 905 469 7723 and follow the prompts, if you require after hours assistance please contact the 24/7 Emergency number provided in your plant documentation. This email is a summary of issues identified during a manual review of InSight data from the time period above. This review is an analysis of data that is logged by InSight and identifies key plant performance issues determined from this data. This data review was not focused on minor data issues but on identifying possible existing and/or upcoming critical operational issues.

This review was prepared by SUEZ Water Technologies & Solutions solely to assist water treatment plant owners and/or operators in analyzing and optimizing plant performance and is not intended to be used or relied upon for regulatory compliance or any other purpose. The content of this review is based in whole or in part on operation data obtained from the plant using InSight software. SUEZ Water Technologies & Solutions makes no representations or warranties as to the accuracy of the plant data utilized in the preparation of this review. SUEZ Water Technologies & Solutions accepts no liability for consequences or actions taken in whole or in part by any person on the basis of this review or its contents

LEWES BPW WWTP Biweekly InSight Report

Date: 10/21/2020

From: Erin Horocholyn - Suez Water Technologies & Solutions
To: Dave Weed, Darrin Gordon
cc: Matt Stapleford - Suez Water Technologies & Solutions

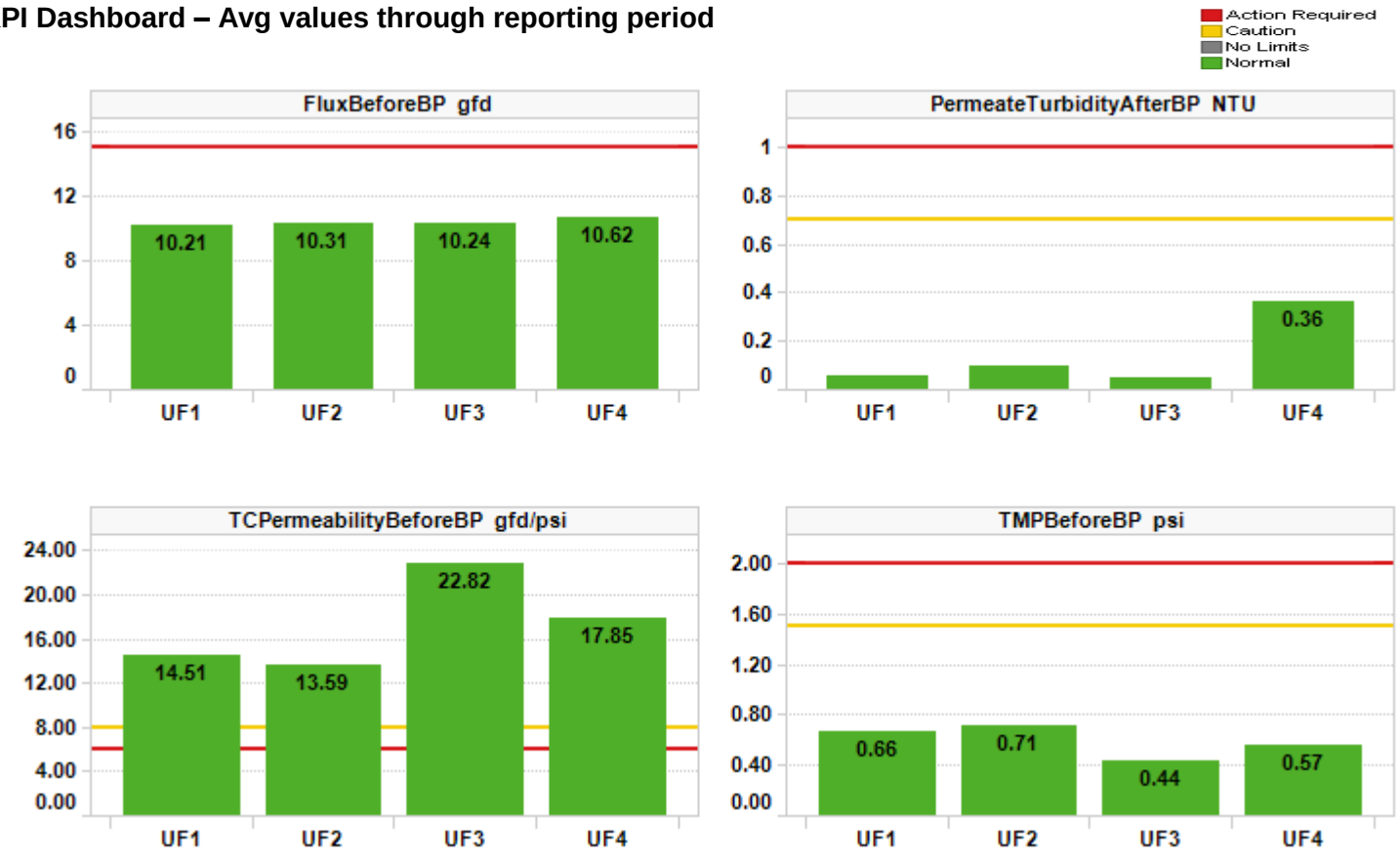
System Equipment

4 × ZW trains, each train consists of 4 - 500D cassettes, 120 modules x 370 sq. ft. per train (surface area 44,400 sq. ft. per train)
Replacement membranes installed Q1 2020 on all 4 trains

Cleaning Strategy

Recovery cleaning - 2 NaOCl @ 2000 ppm dose/1000 ppm soak per year, 1 Citric acid @ 2000 ppm per year
Maintenance cleaning - 1 NaOCl per week @ 200 ppm, 1 Citric acid per week @ 2000 ppm

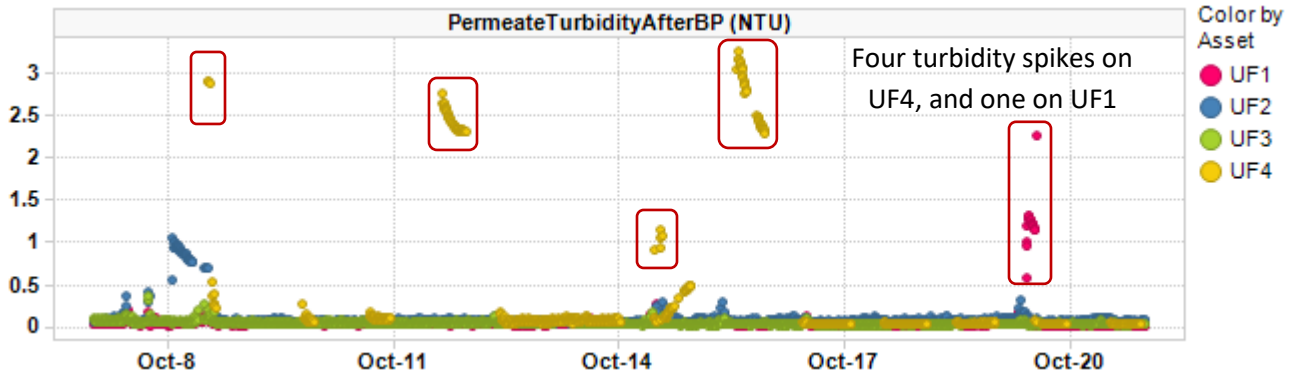
KPI Dashboard – Avg values through reporting period



Plant Summary

Overall, the plant operated well. Turbidity has decreased on UF1, UF2, and UF3 since the previous report. Turbidity has spiked four times on UF4, contributing to its higher report average.

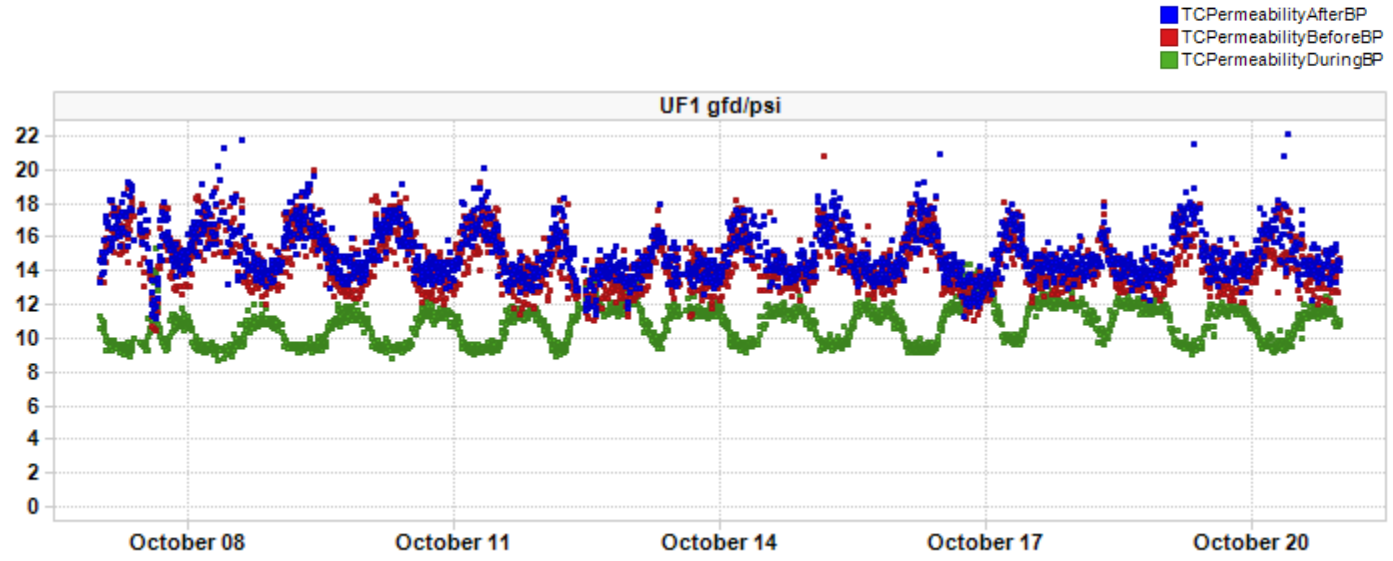
- Daily permeate production averaged 1.01 MGD, excluding days without permeate production. Max flow occurred on Oct 2 at 1.2 MGD. Average daily permeate production by train was 223 kgal for UF1, 226 kgal for UF2, 225 kgal for UF3, and 85 kgal for UF4
- Flux averages ranged from 10.21 – 10.62 gfd and is even across trains. Even flux between trains is beneficial for even wear across the membrane trains over time. Flux did increase to max flux three times in this reporting period, on Oct 7, 12, and 17. During these times, TMP rose and permeabilities were temporarily suppressed. All KPI values returned to regular trends once flow and flux decreased
- TC permeability BBP was good on all trains, and excellent on trains UF3 and UF4. UF1 and UF2 averaged 14.51 and 13.59 gfd/psi respectively. UF3 and UF4 averaged 22.82 and 17.85 gfd/psi respectively. For reference, TC permeability BBP is considered good above 8 gfd/psi
- Average TMP was great on all trains. UF1 and UF2 averaged 0.66 and 0.71 psi, while UF3 and UF4 averaged 0.44 and 0.57 psi. For reference, excellent TMP is below 1.0 psi
- Permeate turbidity ABP was below 0.10 NTU on all trains except UF4. UF1 averaged 0.06 NTU, UF2 averaged 0.09 NTU, and UF3 averaged 0.05 NTU. UF4 averaged high at 0.36 NTU. As seen in the plot below, UF4 had four major turbidity spikes in this reporting period, on Oct 8, 11, 14, and 15. The peak values were 2.9, 2.8, 1.1, and 3.2 NTU respectively. UF1 spiked on Oct 19, peaking at 2.3 NTU. For reference, excellent turbidity is less than 0.1 NTU, and good turbidity less than approximately 0.3 NTU

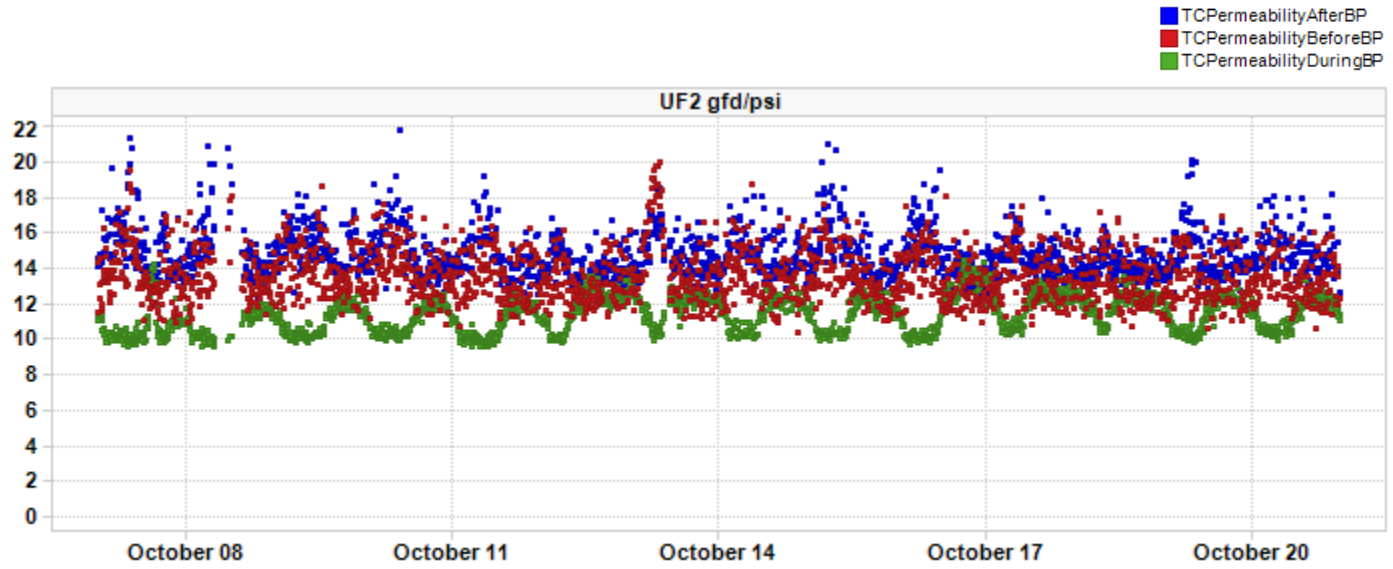


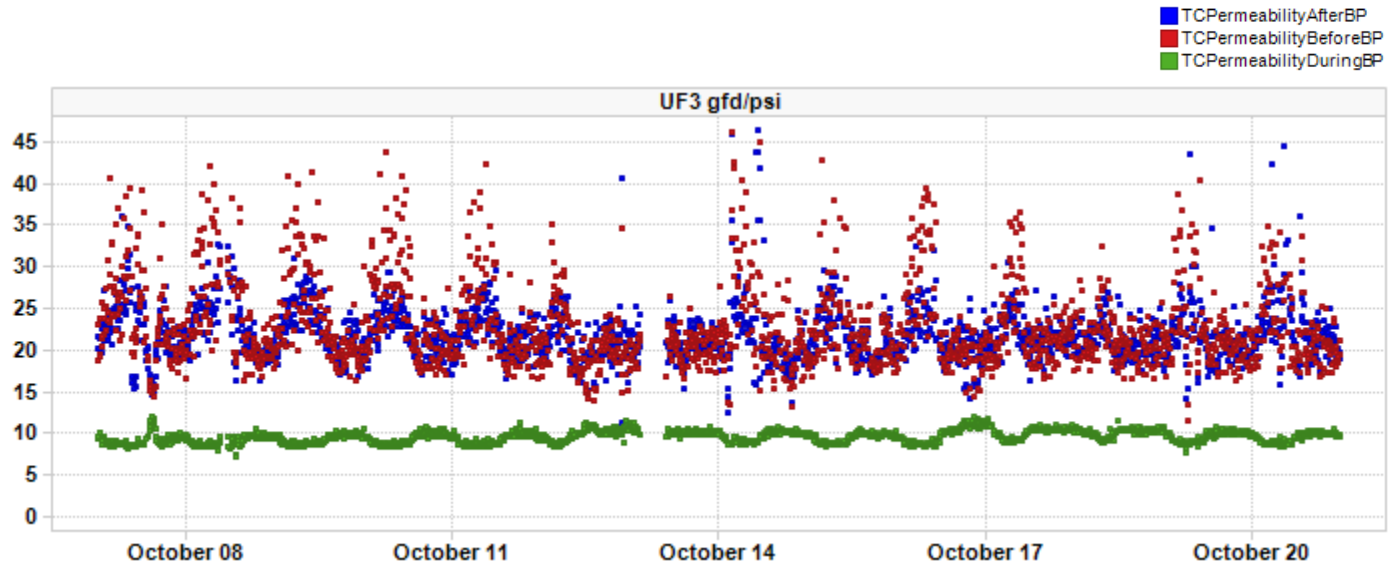
- Maintenance clean (MC) design specifies 1 hypo/chlorine MC and 1 citric acid MC per week, per train
  - UF1, UF2, and UF3 had 2 citric and 2 chlorine MCs over the past 2 weeks, meeting design
  - UF4 had 1 citric and 3 chlorine MCs over the past 2 weeks

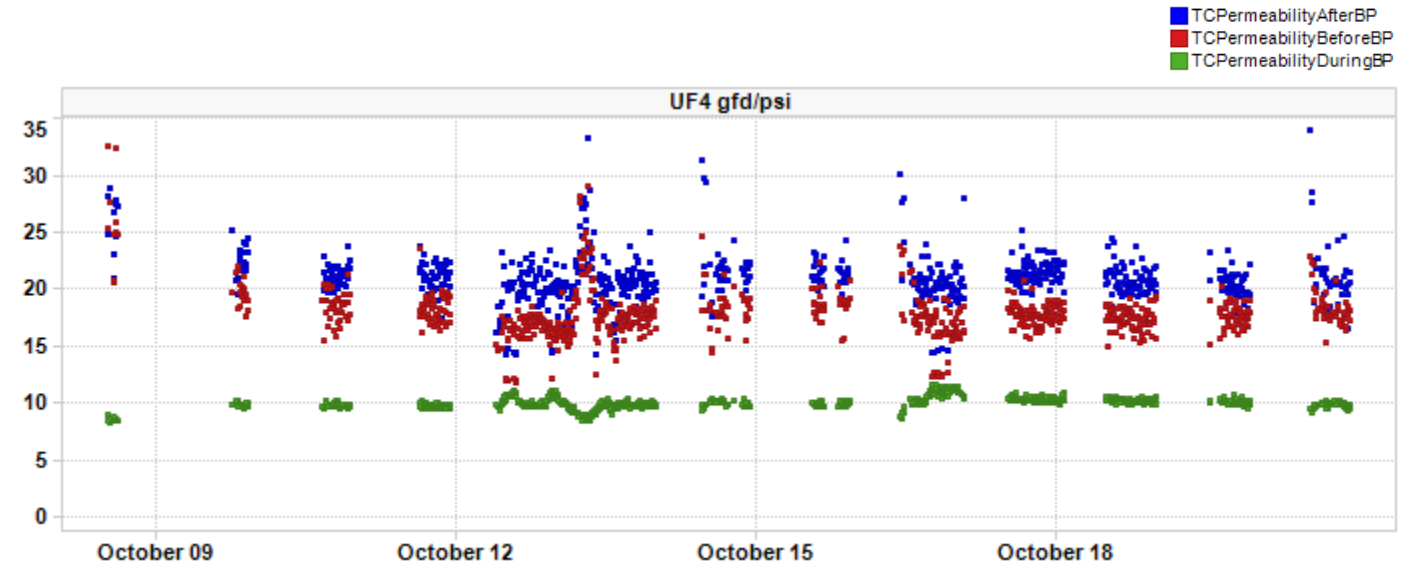
Acronyms:
TC = temperature corrected, BBP = before backpulse, ABP = after backpulse, RC = recovery clean, MC = maintenance clean, TMP = trans membrane pressure

TC Permeability Trends By Train

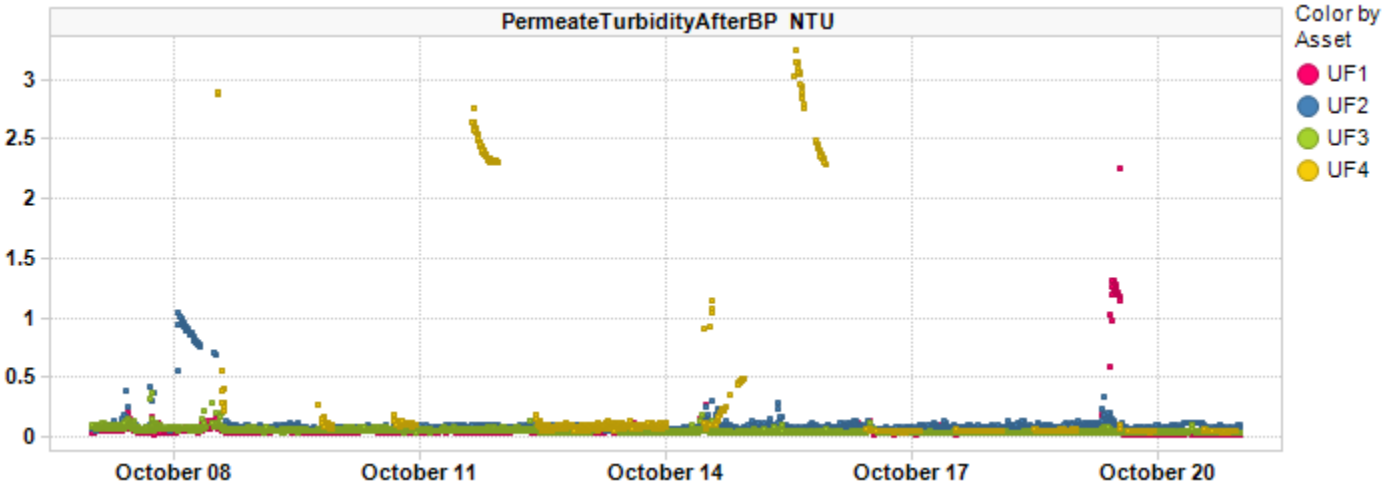




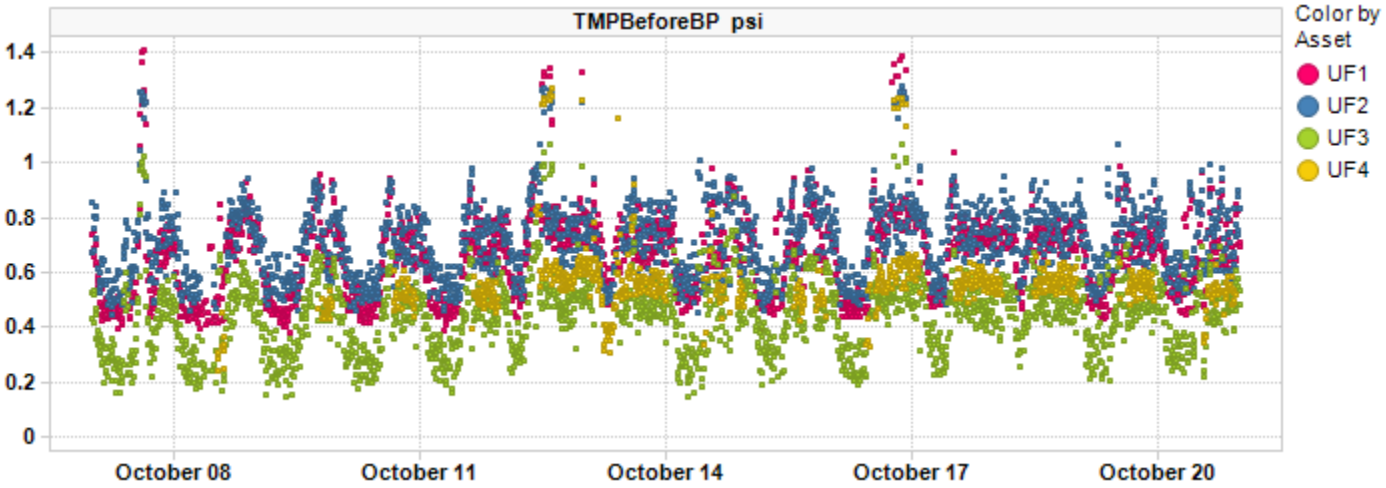




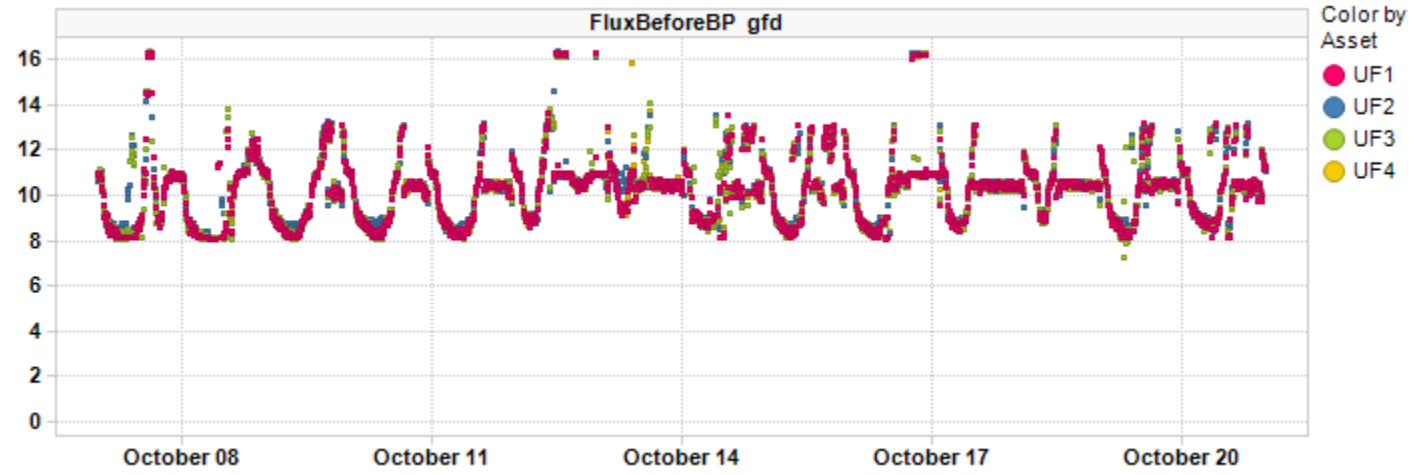
Permeate Turbidity Trend



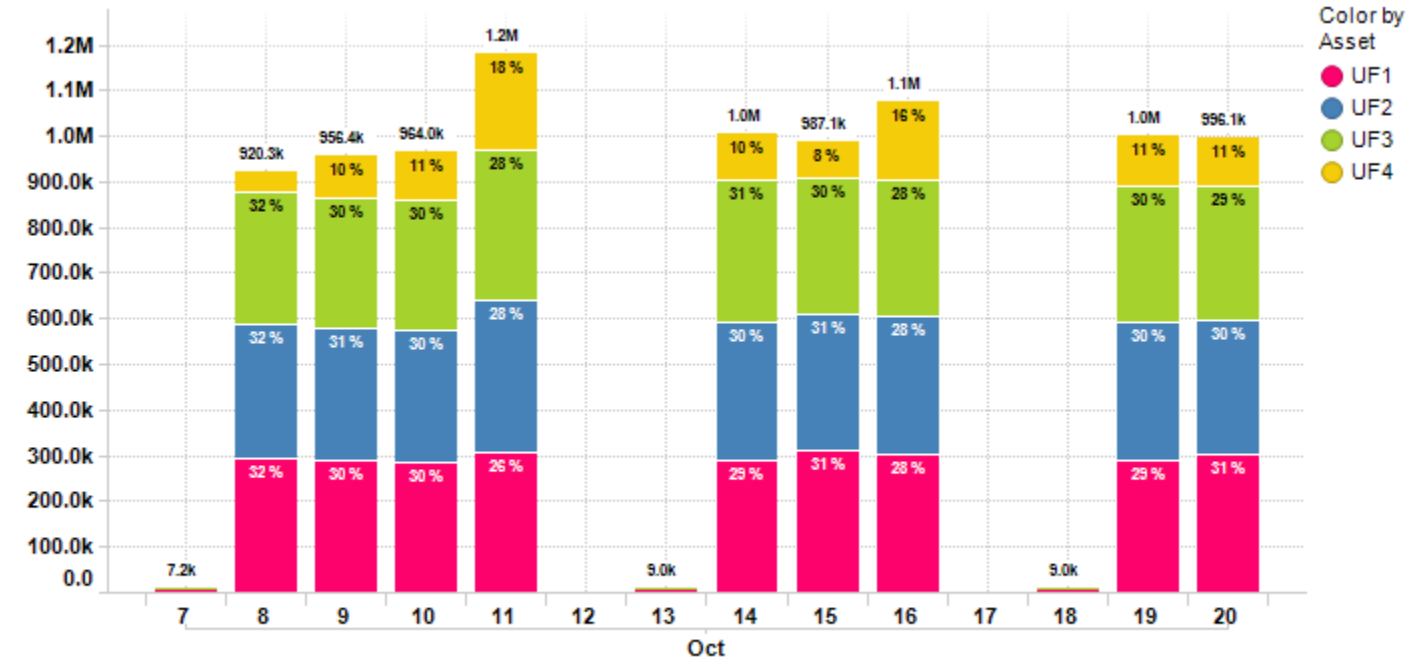
Before BPTMP Trend



Before BP Flux Trend



Daily Permeate Flow



Average Daily permeate flow from 10/7/2020 to 10/20/2020 is 759.3k gal with a maximum daily flow of 1.2M gal.

Asset Summary

KPI Parameters	Value/Change	UF1	UF2	UF3	UF4
FluxBeforeBP gfd	Value	10.21	10.31	10.24	10.62
	Change	3.40 %	3.47 %	5.27 %	4.99 %
FluxDuringBP gfd	Value	18.85	18.71	18.52	18.85
	Change	-0.04 %	0.23 %	-0.11 %	-0.02 %
PermeateTurbidityAfterBP NTU	Value	0.06	0.09	0.05	0.36
	Change	-762.25 %	-318.20 %	-30.72 %	68.98 %
TCPermeabilityBeforeBP gfd/psi	Value	14.51	13.59	22.82	17.85
	Change	-1.69 %	0.36 %	-6.61 %	-16.81 %
TMPBeforeBP psi	Value	0.66	0.71	0.44	0.57
	Change	7.08 %	6.06 %	12.93 %	18.24 %
TotalPermeateFlowDaily gal	Value	223.17k	226.17k	225.06k	84.89k
	Change	-0.74 %	18.50 %	37.14 %	-47.73 %

Plant Summary

KPI Parameters	Value/Change	UF Plant
TotalPermeateFlowDaily gal	Value	851.92k
	Change	10.33 %

Contract Expiry Date : **(Empty)**
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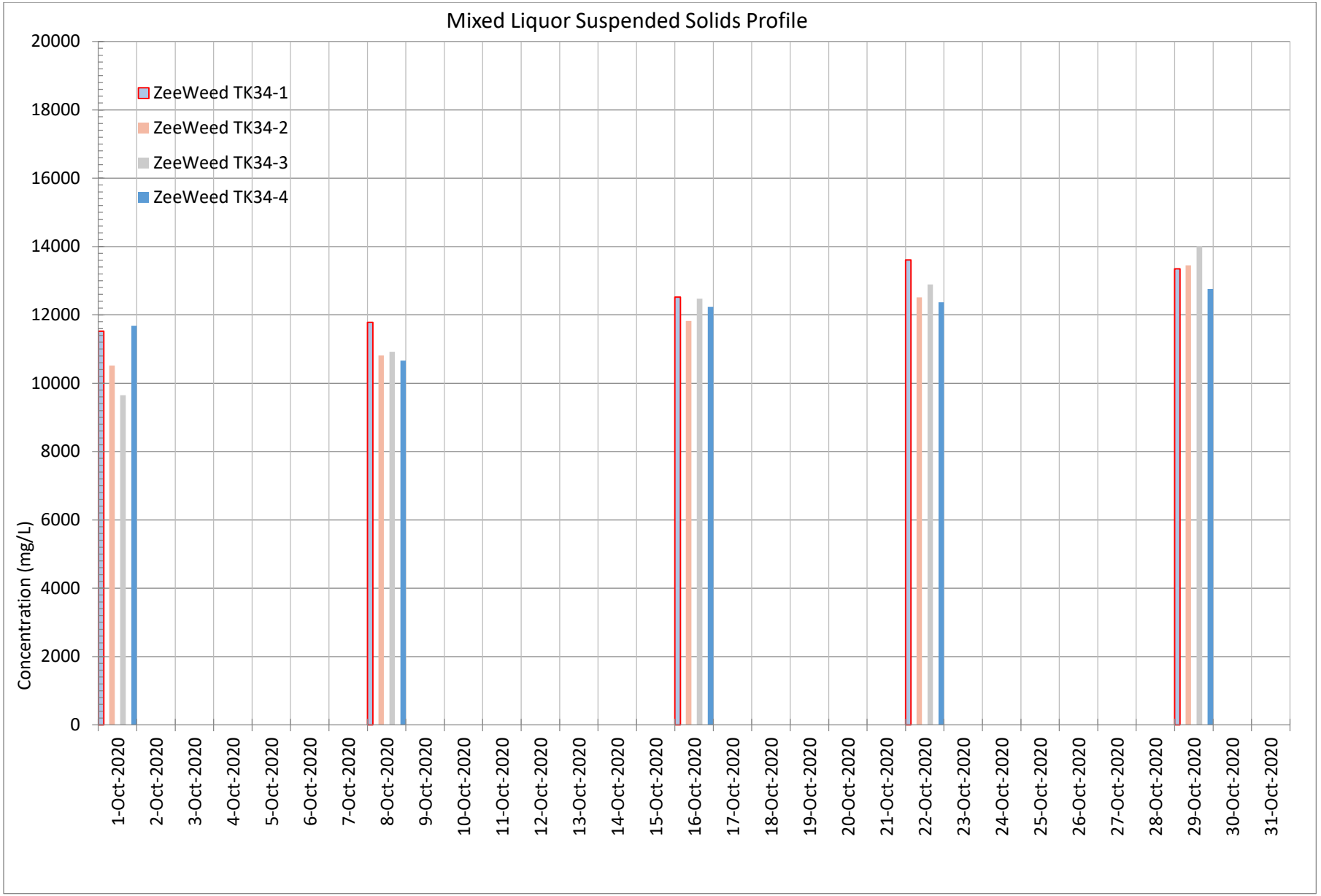
Lewes WWTP



12/3/2020

NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM (NPDES)

DISCHARGE MONITORING REPORT (DMR) ** DRAFT COPY **

PERMITTEE NAME/ADDRESS (include Facility Name/Location if different):

NAME: Howard Seymour Water Reclamation Plant
ADDRESS: 116 American Legion Road, Lewes, DE 19958 US
FACILITY: Howard Seymour Water Reclamation Plant
LOCATION: 116 American Legion Road, Lewes, DE 19958 US

PERMIT NUMBER: DE0021512
DISCHARGE NUMBER: 001
MONITORING PERIOD: FROM 2020 10 01 TO 2020 10 31

REPORT DESIGNATOR: A
DATA ENTRY COMPLETE: 11/23/2020
REPORT SUBMITTED BY: jmarion@tuiwater.com
STATUS OF SUBMISSION: Submitted for Signature

#	PARAMETER		NDI	QUANTITY OR LOADING			QUALITY OR CONCENTRATION				NO. EX.	FREQUENCY OF ANALYSIS	SAMPLE TYPE
				AVERAGE	MAXIMUM	UNITS	MINIMUM	AVERAGE	MAXIMUM	UNITS			
1/1	Flow	SAMPLE MEASUREMENT		0.9757	1.457	Mil Gal/Day				--	0	99/99	RCOTOT
	Gross Effluent (50050)	PERMIT REQUIREMENT	-	No Limit | Monitoring Reqd	No Limit | Monitoring Reqd	Mil Gal/Day	No Monitoring Required	No Monitoring Required	No Monitoring Required	--	--	99/99	RCOTOT
1/2	Dissolved oxygen (DO)	SAMPLE MEASUREMENT				--	3.02		4.76	mg/l	0	99/99	Imersion
	Gross Effluent (00300)	PERMIT REQUIREMENT	-	No Monitoring Required	No Monitoring Required	--	No Limit | Monitoring Reqd	No Monitoring Required	No Limit | Monitoring Reqd	mg/l	--	99/99	Imersion
1/3	pH	SAMPLE MEASUREMENT				--	7.2		7.6	Std pH Units	0	01/01	Grab
	Gross Effluent (00400)	PERMIT REQUIREMENT	-	No Monitoring Required	No Monitoring Required	--	6	No Monitoring Required	9	Std pH Units	--	01/01	Grab
1/4	Enterococcus	SAMPLE MEASUREMENT				--		<1	<1	CFU/100 ML	0	01/07	Grab
	Gross Effluent (31639)	PERMIT REQUIREMENT	-	No Monitoring Required	No Monitoring Required	--	No Monitoring Required	10	104	CFU/100 ML	--	01/07	Grab
1/5	BOD5	SAMPLE MEASUREMENT		<2.47	<21.94	lbs/Day		<2.4	<2.4	mg/l	0	01/07	Composite 24
	Gross Effluent (00310)	PERMIT REQUIREMENT	-	188	288	lbs/Day	No Monitoring Required	15	23	mg/l	--	01/07	Composite 24
1/6	BOD5	SAMPLE MEASUREMENT				--		201	252	mg/l	0	01/07	Composite 24
	Raw Sewage (00310)	PERMIT REQUIREMENT	-	No Monitoring Required	No Monitoring Required	--	No Monitoring Required	No Limit | Monitoring Reqd	No Limit | Monitoring Reqd	mg/l	--	01/30	Composite 24
1/7	TSS	SAMPLE MEASUREMENT		<0.75	<8	lbs/Day		<0.75	<1	mg/l	0	01/07	Composite 24
	Gross Effluent (00530)	PERMIT REQUIREMENT	-	188	288	lbs/Day	No Monitoring Required	15	23	mg/l	--	01/07	Composite 24

COMMENTS AND EXPLANATION OF ANY VIOLATIONS (Reference all attachments here)

NAME/TITLE PRINCIPAL EXECUTIVE OFFICER

TYPED OR PRINTED

I CERTIFY UNDER PENALTY OF LAW THAT THIS DOCUMENT AND ALL ATTACHMENTS WERE PREPARED UNDER MY DIRECTION OR SUPERVISION IN ACCORDANCE WITH A SYSTEM DESIGNED TO ASSURE THAT QUALIFIED PERSONNEL PROPERLY GATHER AND EVALUATE THE INFORMATION SUBMITTED, BASED ON MY INQUIRY OF THE PERSON OR PERSONS WHO MANAGE THE SYSTEM, OR THOSE PERSONS DIRECTLY RESPONSIBLE FOR GATHERING THE INFORMATION, THE INFORMATION SUBMITTED IS, TO THE BEST OF MY KNOWLEDGE AND BELIEF, TRUE, ACCURATE, AND COMPLETE. I AM AWARE THAT THERE ARE SIGNIFICANT PENALTIES FOR SUBMITTING FALSE INFORMATION, INCLUDING THE POSSIBILITY OF FINE AND IMPRISONMENT FOR KNOWING VIOLATIONS.

[ATTACH DIGITAL SIGNATURE RECEIPT FROM CROMERR]

SIGNATURE OF PRINCIPAL EXECUTIVE OFFICER OR AUTHORIZED AGENT

TELEPHONE

DATE: YEAR MO DAY

NDI (No Data Indicator) Reasons: 8 - No Sample (Other); 9 - No Sample (Monitoring Not Required this Monitoring Period); B - Not Detected; C - No Sample (No Discharge)

NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM (NPDES)

DISCHARGE MONITORING REPORT (DMR) ** DRAFT COPY **

PERMITTEE NAME/ADDRESS (include Facility Name/Location if different):

NAME	Howard Seymour Water Reclamation Plant
ADDRESS	116 American Legion Road, Lewes, DE 19958 US
FACILITY	Howard Seymour Water Reclamation Plant
LOCATION	116 American Legion Road, Lewes, DE 19958 US

PERMIT NUMBER	DE0021512
DISCHARGE NUMBER	001
REPORT DESIGNATOR	A
DATA ENTRY COMPLETE	11/23/2020
REPORT SUBMITTED BY	jmarion@tuiwater.com
STATUS OF SUBMISSION	Submitted for Signature

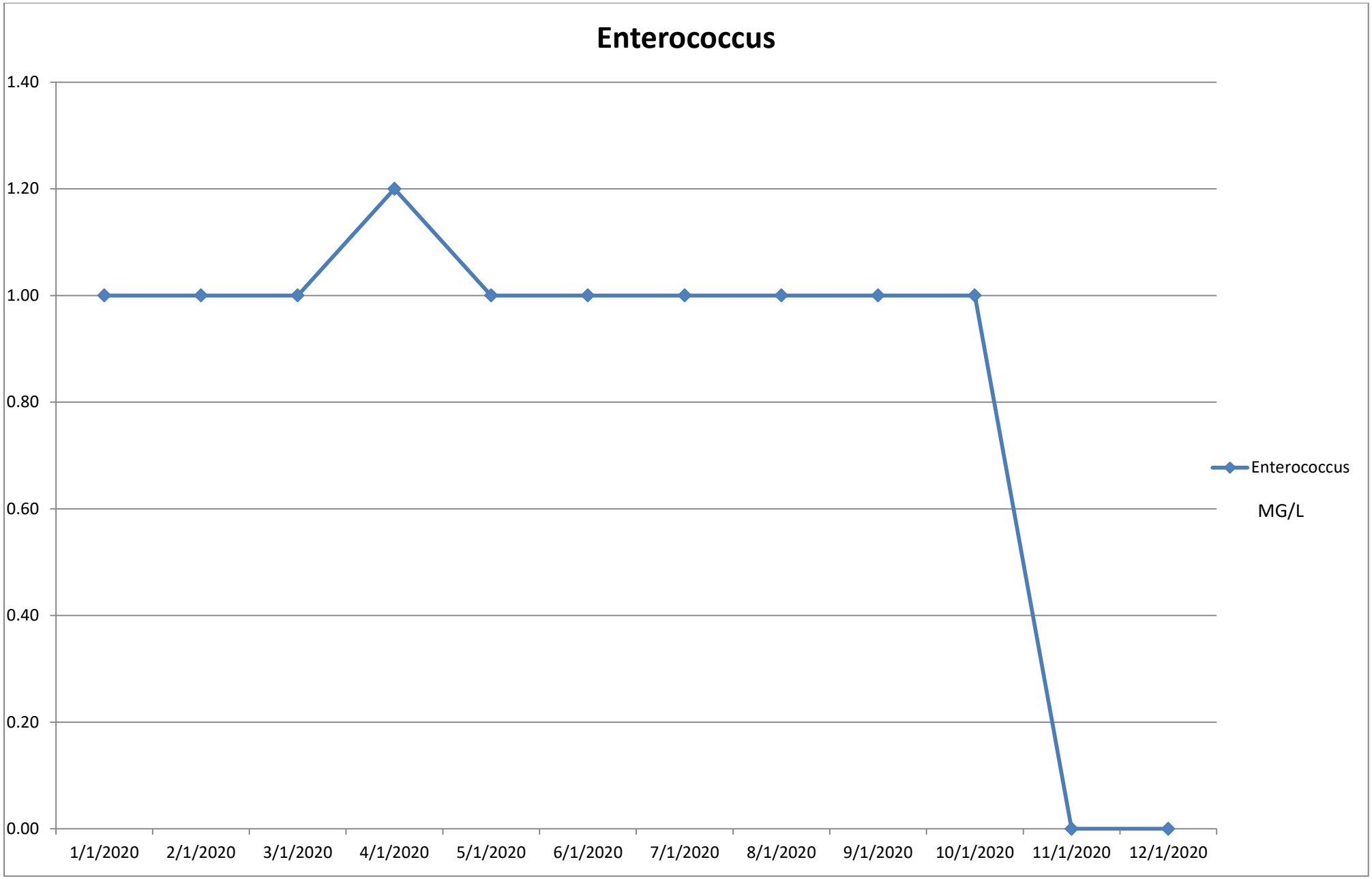
MONITORING PERIOD FROM 2020 10 01 TO 2020 10 31

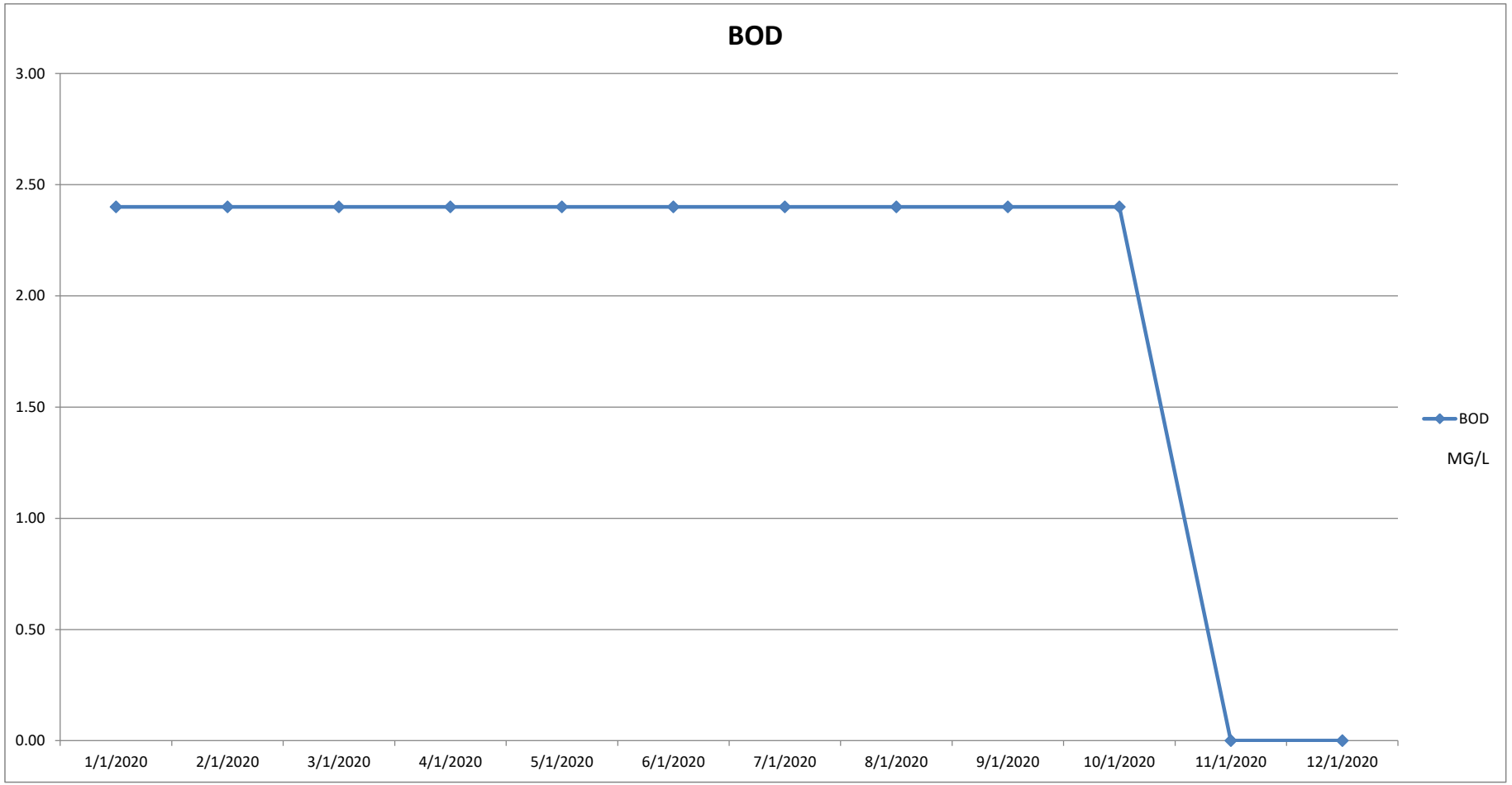
#	PARAMETER		NDI	QUANTITY OR LOADING			QUALITY OR CONCENTRATION				NO. EX.	FREQUENCY OF ANALYSIS	SAMPLE TYPE
				AVERAGE	MAXIMUM	UNITS	MINIMUM	AVERAGE	MAXIMUM	UNITS			
2/1	TSS	SAMPLE MEASUREMENT				--		55740.26	693554.4	mg/l	0	01/07	Composite 24
	Raw Sewage (00530)	PERMIT REQUIREMENT	-	No Monitoring Required	No Monitoring Required	-	No Monitoring Required	No Limit | Monitoring Reqd	No Limit | Monitoring Reqd	mg/l	-	01/30	Composite 24
2/2	Total Nitrogen	SAMPLE MEASUREMENT		21.89	24.59	lbs/Day		2.69	2.69	mg/l	0	01/07	Composite 24
	Gross Effluent (00600)	PERMIT REQUIREMENT	-	100	No Limit | Monitoring Reqd	lbs/Day	No Monitoring Required	8	No Limit | Monitoring Reqd	mg/l	-	01/30	Composite 24
2/3	Phosphorus, Total	SAMPLE MEASUREMENT		3.25	3.66	lbs/Day		0.4	0.4	mg/l	0	01/30	Composite 24
	Gross Effluent (00665)	PERMIT REQUIREMENT	-	25	No Limit | Monitoring Reqd	lbs/Day	No Monitoring Required	2	No Limit | Monitoring Reqd	mg/l	-	01/30	Composite 24

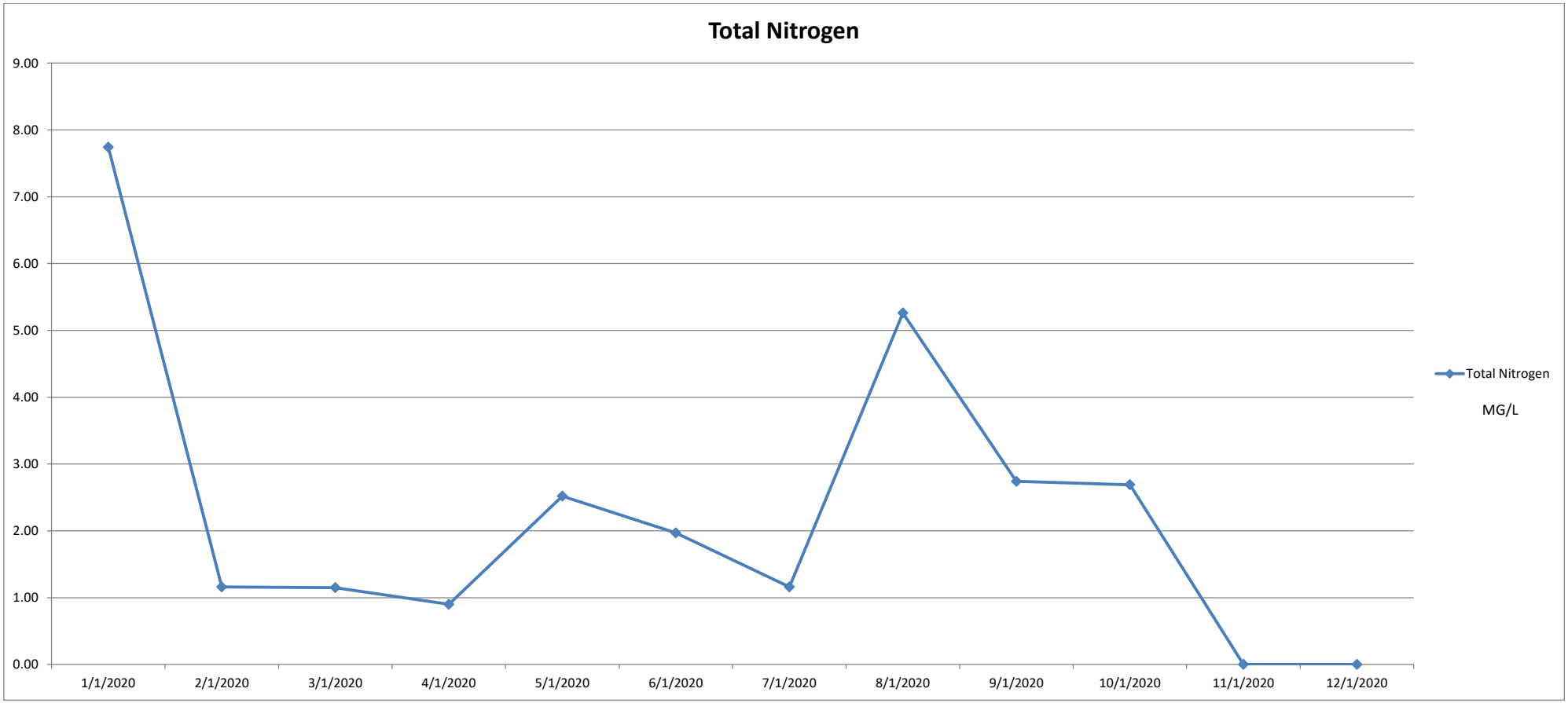
COMMENTS AND EXPLANATION OF ANY VIOLATIONS (Reference all attachments here)

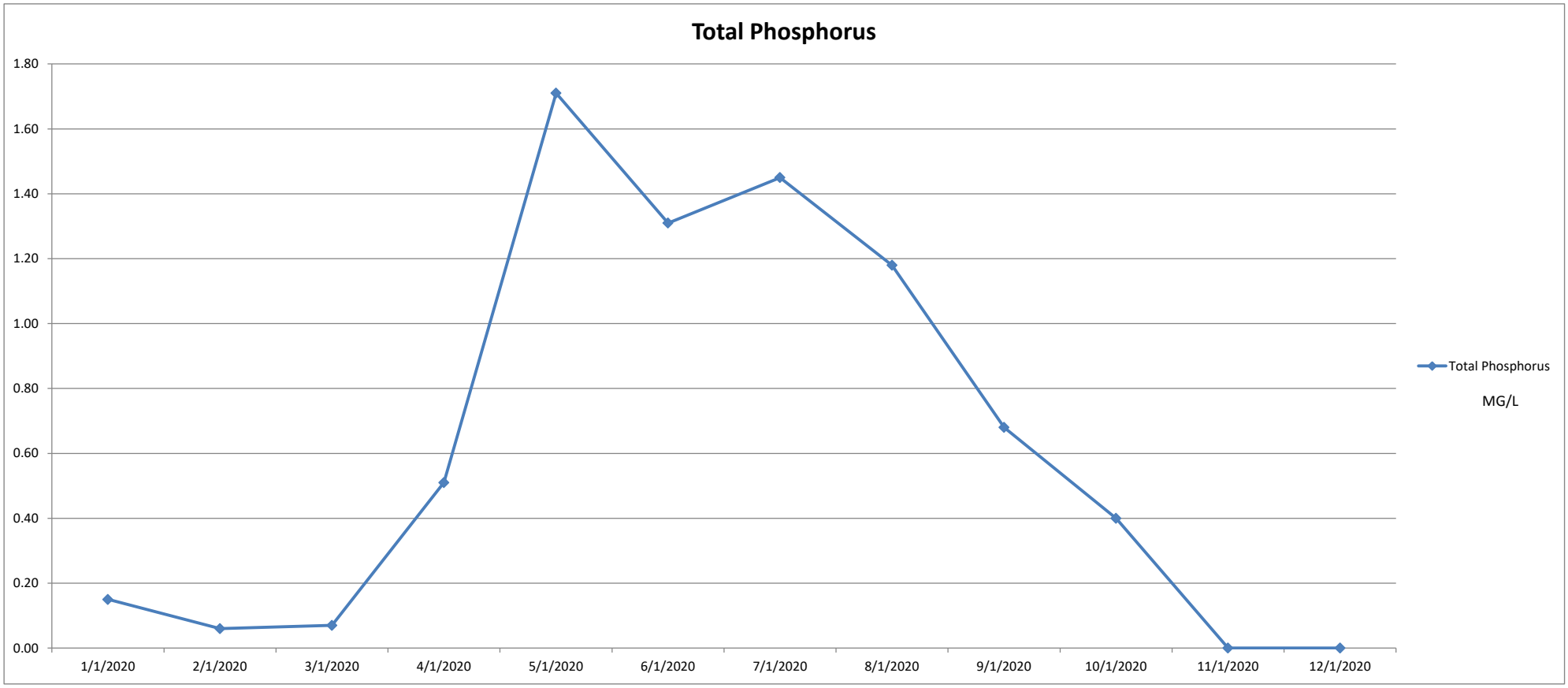
NAME/TITLE PRINCIPAL EXECUTIVE OFFICER		*[ATTACH DIGITAL SIGNATURE RECEIPT FROM CROMERR]*	TELEPHONE	DATE		
	I CERTIFY UNDER PENALTY OF LAW THAT THIS DOCUMENT AND ALL ATTACHMENTS WERE PREPARED UNDER MY DIRECTION OR SUPERVISION IN ACCORDANCE WITH A SYSTEM DESIGNED TO ASSURE THAT QUALIFIED PERSONNEL PROPERLY GATHER AND EVALUATE THE INFORMATION SUBMITTED. BASED ON MY INQUIRY OF THE PERSON OR PERSONS WHO MANAGE THE SYSTEM, OR THOSE PERSONS DIRECTLY RESPONSIBLE FOR GATHERING THE INFORMATION, THE INFORMATION SUBMITTED IS, TO THE BEST OF MY KNOWLEDGE AND BELIEF, TRUE, ACCURATE, AND COMPLETE. I AM AWARE THAT THERE ARE SIGNIFICANT PENALTIES FOR SUBMITTING FALSE INFORMATION, INCLUDING THE POSSIBILITY OF FINE AND IMPRISONMENT FOR KNOWING VIOLATIONS.				YEAR	MO	DAY
TYPED OR PRINTED		SIGNATURE OF PRINCIPAL EXECUTIVE OFFICER OR AUTHORIZED AGENT				

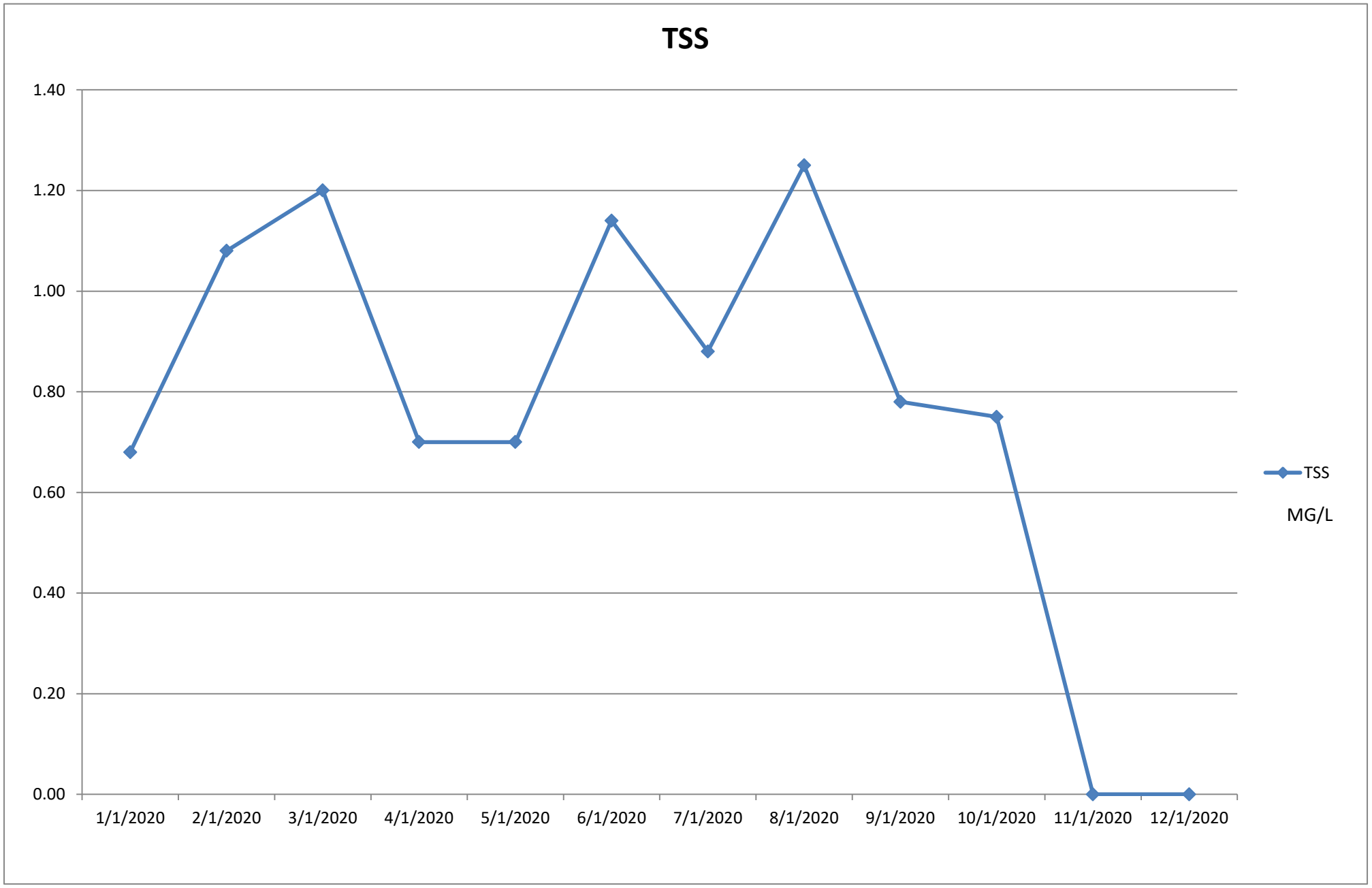
NDI (No Data Indicator) Reasons: 8 - No Sample (Other); 9 - No Sample (Monitoring Not Required this Monitoring Period); B - Not Detected; C - No Sample (No Discharge)


Enterococcus
1.40
1.20
1.00
0.80
0.60
0.40
0.20
0.00
1/1/2020
2/1/2020
3/1/2020
4/1/2020
5/1/2020
6/1/2020
7/1/2020
8/1/2020
9/1/2020
10/1/2020
11/1/2020
12/1/2020
Enterococcus
MG/L


BOD
3.00
2.50
2.00
1.50
1.00
0.50
0.00
1/1/2020
2/1/2020
3/1/2020
4/1/2020
5/1/2020
6/1/2020
7/1/2020
8/1/2020
9/1/2020
10/1/2020
11/1/2020
12/1/2020
BOD
MG/L


Total Nitrogen
9.00
8.00
7.00
6.00
5.00
4.00
3.00
2.00
1.00
0.00
1/1/2020
2/1/2020
3/1/2020
4/1/2020
5/1/2020
6/1/2020
7/1/2020
8/1/2020
9/1/2020
10/1/2020
11/1/2020
12/1/2020
Total Nitrogen
MG/L


Total Phosphorus
1.80
1.60
1.40
1.20
1.00
0.80
0.60
0.40
0.20
0.00
1/1/2020
2/1/2020
3/1/2020
4/1/2020
5/1/2020
6/1/2020
7/1/2020
8/1/2020
9/1/2020
10/1/2020
11/1/2020
12/1/2020
Total Phosphorus
MG/L


TSS
1.40
1.20
1.00
0.80
0.60
0.40
0.20
0.00
1/1/2020
2/1/2020
3/1/2020
4/1/2020
5/1/2020
6/1/2020
7/1/2020
8/1/2020
9/1/2020
10/1/2020
11/1/2020
12/1/2020
TSS
MG/L