



City of
Coeur d'Alene
IDAHO

Coeur d 'Alene Advanced Wastewater Treatment Facility

2018 Ultra-Low Phosphorus Removal Report





Tertiary Treatment Building

Began treating all plant flows in June 2018 utilizing membrane filtration.

Treatment Requirements

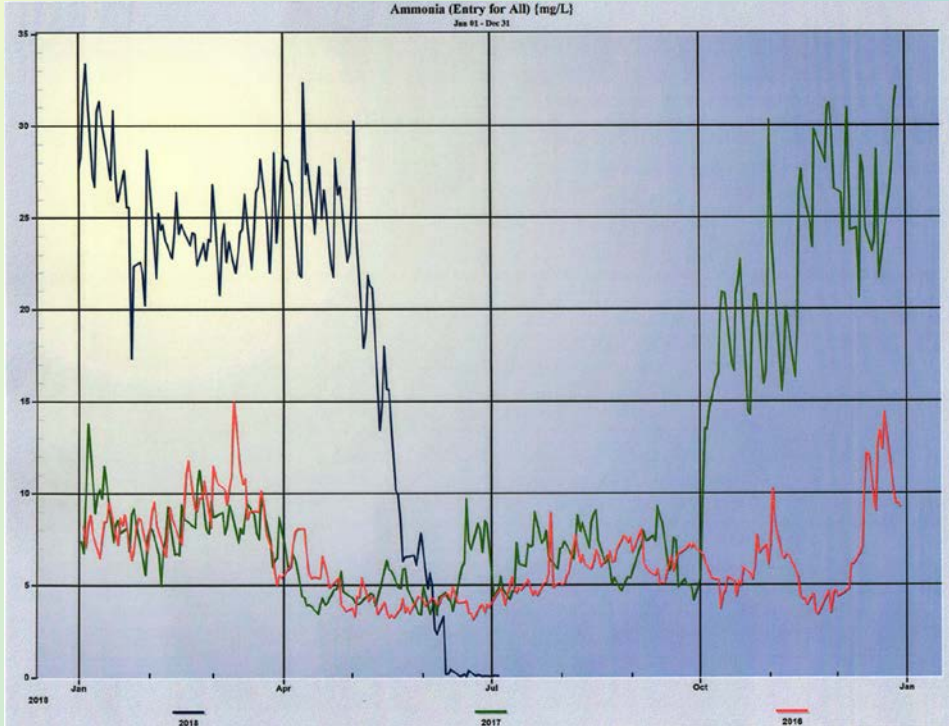
Table 1: Final Effluent Limits and Monitoring Requirements for Outfall 001

Parameter	Units	Effluent limits			Monitoring Requirements		
		Average Monthly Limit	Average Weekly Limit	Max. Daily Limit	Location	Frequency	Sample Type
Total Residual Chlorine October – June	µg/L	150	—	390	Effluent	1/day	Grab
	lb/day	7.5	—	20			Calculation ²
Total Residual Chlorine ⁷ July – September	µg/L	39	—	102	Effluent	3/day	Grab
	lb/day	2.0	—	5.1			Calculation ²
Total Ammonia as N ¹ March – June	mg/L	Report	—	Report	Effluent	3/week	24-Hr. Comp.
	lb/day	649	—	1547			Calculation ²
Total Ammonia as N ¹ July – September	mg/L	6.59	—	15.7	Effluent	3/week	24-Hr. Comp.
	lb/day	330	—	786			Calculation ²
Total Ammonia as N ¹ October	mg/L	Report	—	Report	Effluent		24-Hr. Comp.
	lb/day	Report	—	Report			
Total Ammonia as N ¹ March – October	lb/day	Seasonal Average Limit: 272 lb/day ² . See I.B.10.			Effluent		
Total Ammonia as N November – February	mg/L	Report	—	Report	Effluent		
Total Phosphorus as P ¹ February – October	µg/L	Report	Report	—	Effluent		
	lb/day	Report	Report	—			
	lb/day	Seasonal Average Limit: 3.17 lb/day ² . See I.B.10.					
Total Phosphorus as P November – January	µg/L	Report	Report	—	Effluent		

9.59 mg/L @ 3.4 mgd
5.43 mg/L @ 6.0 mgd
4.29 mg/L @ 7.6 mgd

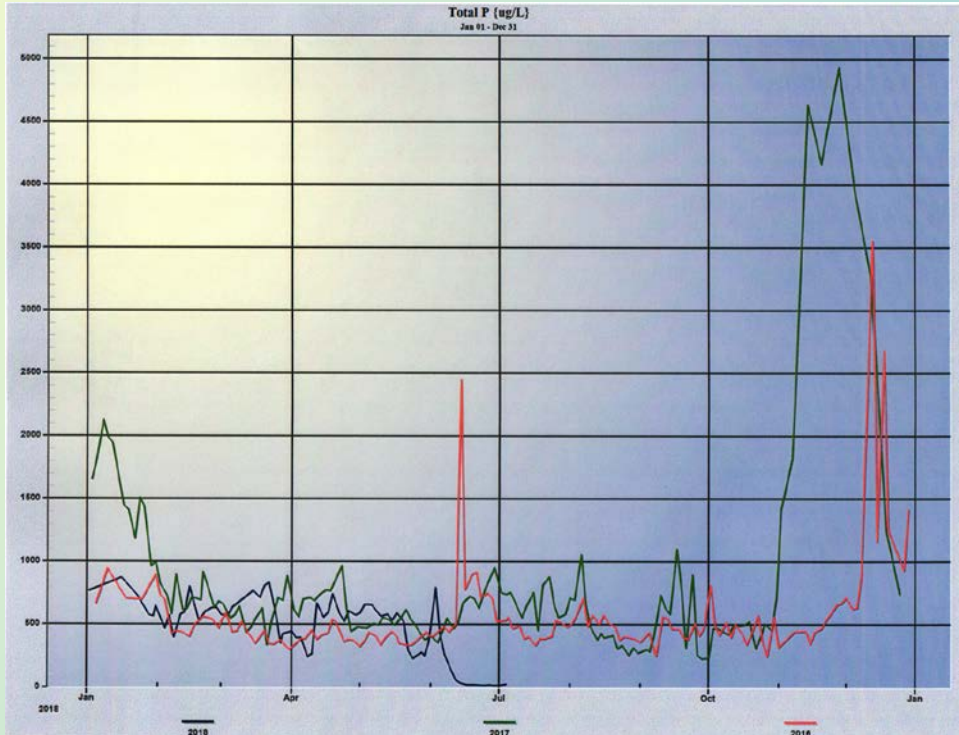
0.112 mg/L @ 3.4 mgd
0.063 mg/L @ 6.0 mgd
0.050 mg/L @ 7.6 mgd

Effluent Ammonia 2016, 2017, 2018



	2016	2017	2018
Date			
Jan	7.99	8.65	26.84
Feb	8.95	8.06	24.07
Mar	9.28	8.22	24.43
Apr	5.87	4.85	25.94
May	3.96	4.75	15.27
Jun	4.05	5.78	1.32
Jul	5.06	6.27	0.09
Aug	6.53	6.81	
Sep	6.37	6.70	
Oct	5.66	17.12	
Nov	5.46	24.44	
Dec	8.97	26.34	
Average	6.51	10.67	16.85

Effluent Total Phosphorous 2016, 2017, 2018



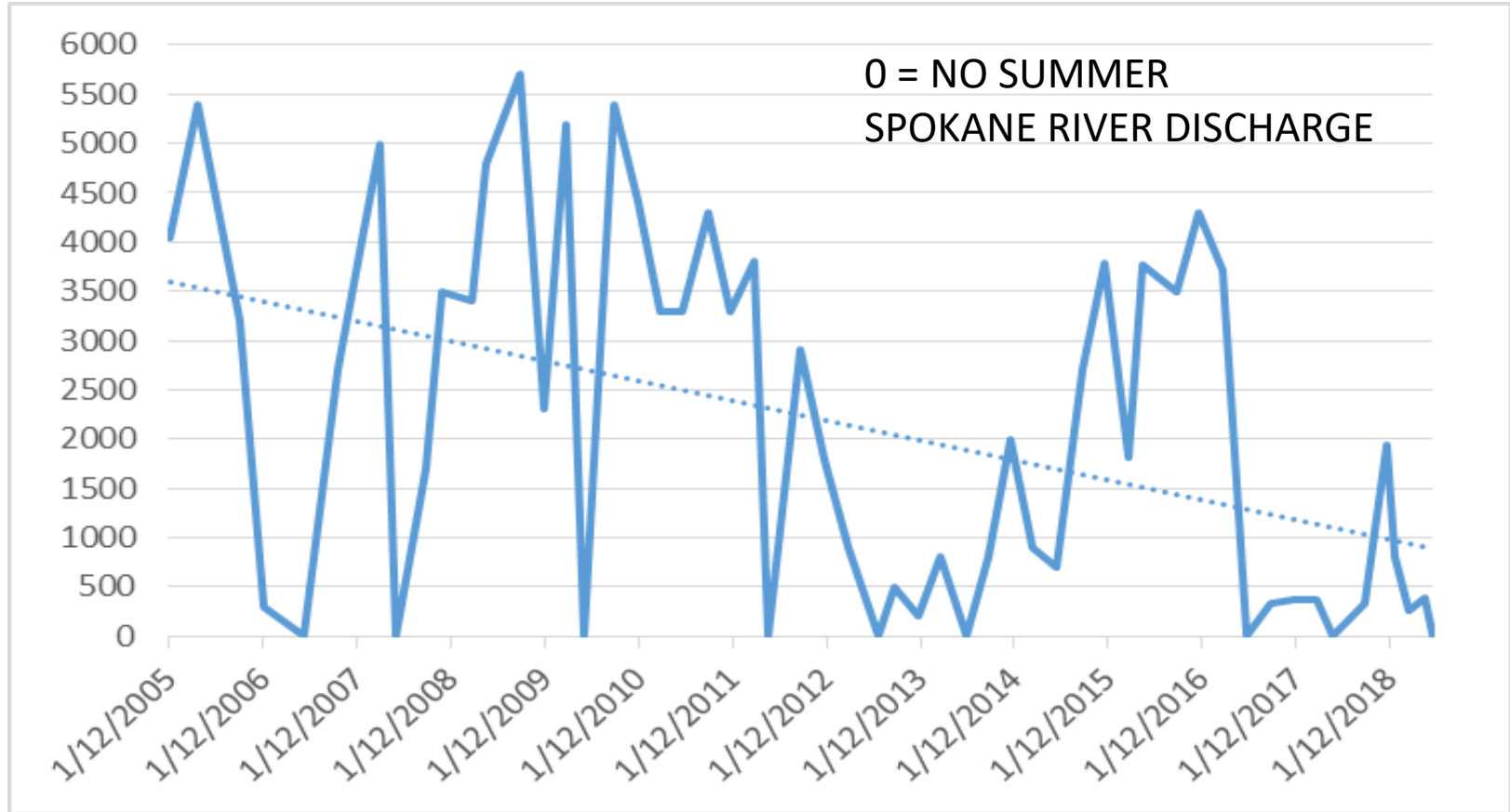
	2016	2017	2018
Date			
Jan	784	1,542	713
Feb	524	729	581
Mar	417	590	629
Apr	416	687	509
May	384	503	482
Jun	772	624	152
Jul	454	678	20
Aug	500	480	
Sep	434	546	
Oct	467	460	
Nov	481	3,398	
Dec	1,497	2,305	
Average	594.17	1045.17	440.86

HAYDEN AREA REGIONAL SEWER BOARD



PHOSPHOROUS REMOVAL UPDATE JULY 2018

HARSB EFFLUENT TOTAL PHOSPHOROUS UG/L 2005 TO PRESENT WITH NO SUMMER DISCHARGE



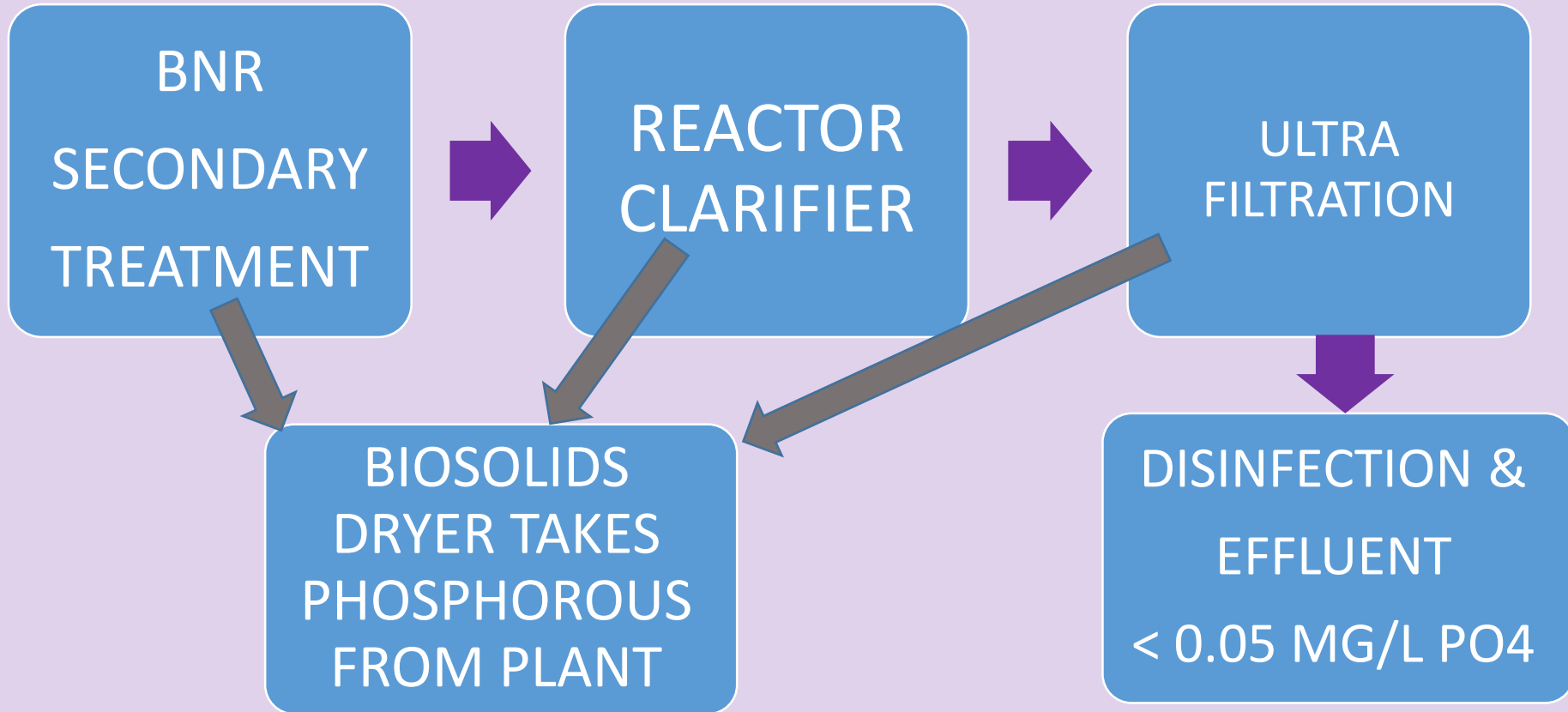
HARSB D.O. TMDL COMPLIANCE SCHEDULE

- November 30, 2019, pilot testing completed for the selected technology to achieve effluent compliance.
- November 30, 2021, the design is completed and bids awarded to begin construction.
- November 30, 2022, new treatment system construction is completed.
- November 30, 2024, the new treatment system meets final effluent limitations.

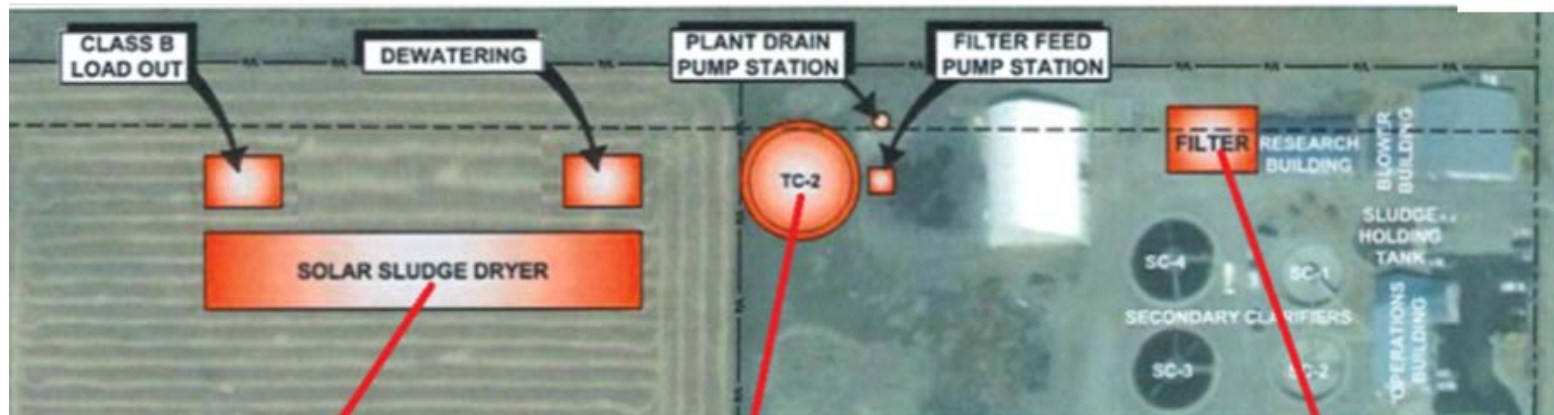
BIOLOGICAL NUTRIENT REMOVAL SECONDARY TREATMENT



HARSB TERTIARY TREATMENT PLAN



TERTIARY TREATMENT AND BIOSOLIDS



SOLAR DRYER



**REACTOR
CLARIFIER**

PRESSURE FILTRATION SYSTEM

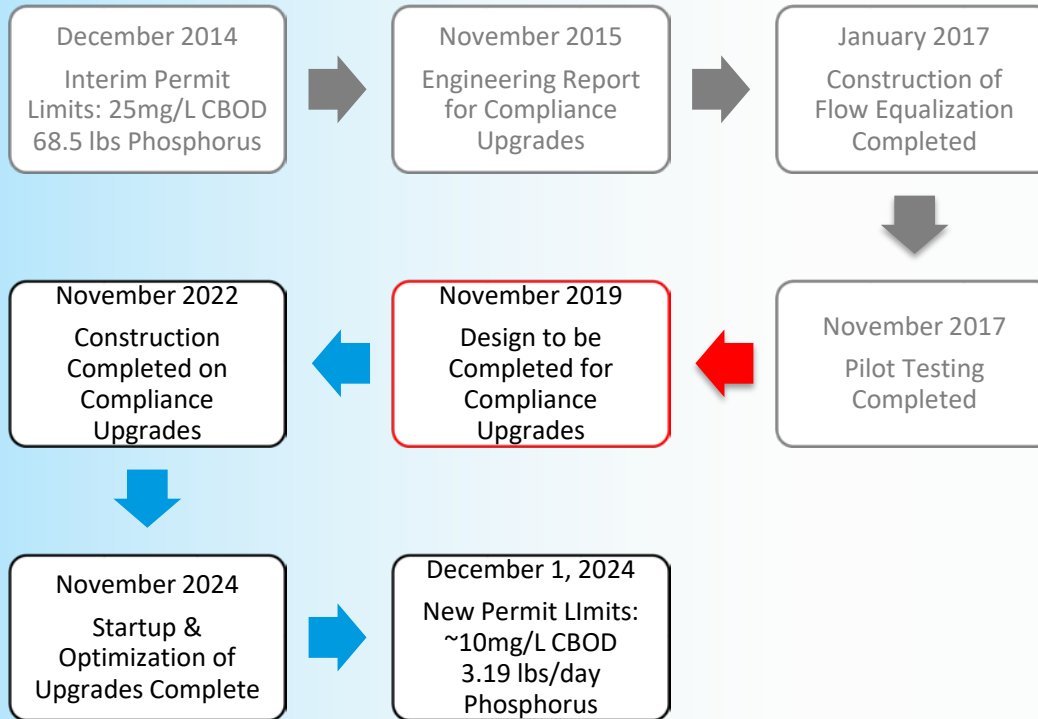


**ULTRA
FILTRATION
MEMBRANES**

City of Post Falls DO TMDL Update

Presented to Post Falls City Council
John Beacham, Utilities Manager
July 17, 2018

City of Post Falls Compliance Schedule Progress



2016 Pilot Project Goals

1. Prove that technology works
2. Allow competitive pricing
3. Allow efficient design
4. Provide training opportunity



2016 Pilot Project Goals

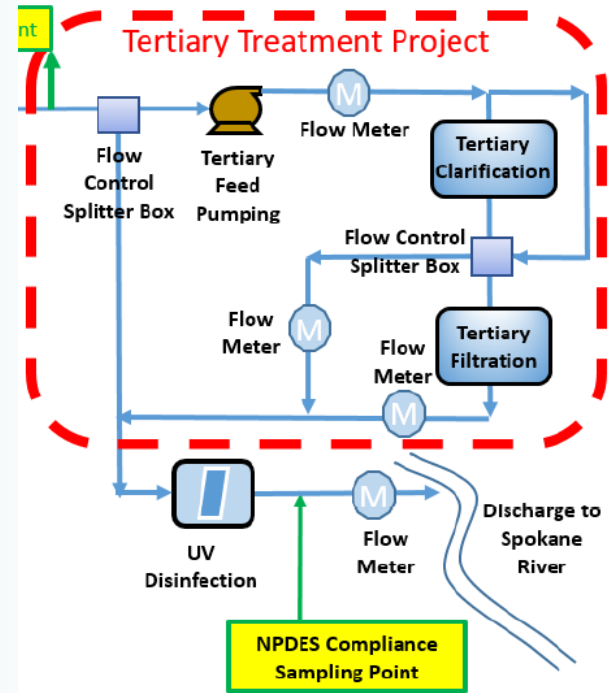
1. Prove that technology works
 - All piloted membranes performed sufficiently
2. Allow competitive pricing
 - Proceeding with “Universal Rack”
3. Allow efficient design
 - Provided proof of concept for high-rate clarification step prior to membranes
4. Provide training opportunity
 - Staff gained hands on membrane and HRC operating and troubleshooting experience

Tertiary Design

- HRC ahead of membranes
 - Protect the filters
 - Provide operational savings
- HRC - primary removal mechanism
 - Operate membranes at needed throughput
 - Meet wasteload allocation

Other project elements:

- Improve biological phosphorus removal
- Upgrade UV
- Capacity



2017 Treatment Summary

- Average Influent Phosphorus – 6.8 mg/L
- Average Effluent Phosphorus – 0.52 mg/L
- Average Removal: 92%

- Effluent Load: 11.8 lbs/day
- 2024 Limit: 3.19 lbs/day

Questions?





Liberty Lake Sewer & Water District

- The Liberty Lake Sewer and Water District collects and treats the sanitary wastewater from approximately 4,400 Equivalent Residential Units (ERUs) as well as commercial and light industrial dischargers.
- 2017 average discharge is 0.77 MGD.



Past WRF Upgrades - Phase II

- Construction for Phase II is substantially complete as of November 17, 2017.
- This upgrade includes advanced tertiary treatment through chemical addition and membrane filtration. Final Completion is extended due to the lab/operations building remodel.











Aluminum
Sulfate (48%)



MEMBRANE BACKPULSE

CAUTION
HOT SURFACE
DO NOT TOUCH

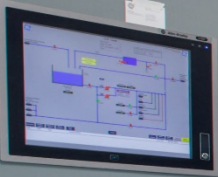








CONTROL PANEL LCP-MF
120VAC/1PH/60HZ



GE Power & Water
Water & Process Technologies

EXIT











Impact to Rates

- The cost of the Phase II upgrade was \$22.7M; paid in part with District resources and a 20-year \$15.9M SRF loan.
- The District's customers will see a 385% increase in sewer rates as a result of the Phase I and II upgrades. Operation costs between the Phase I and Phase II upgrades have doubled from \$500,000 to over \$1.0M annually.
- The most challenging aspect of these upgrades is our small customer base of 4,346.
 - \$31.30 of the 2018 monthly sewer rate of \$54.90 is for annual debt service of \$1,644,979 (total debt service is \$23,270,009 through 2038).
 - That leaves only \$23.60 toward operation and maintenance costs. Even with the rate increases, the District expects the sewer utility to operate at a deficit through 2020 (2018 deficit is \$647,277).



Phosphorus Improvements

- Permit No. WA-0045144 exp. date June 30, 2016
 - Beginning March 1, 2018 the Permittee must have installed and operational the full phosphorus removal process train including chemical addition
 - Seasonal TP Effluent Limitation: 0.612 mg/L
 - March 1, 2021 seasonal TP effluent limitation: 50 mg/l

Preliminary results

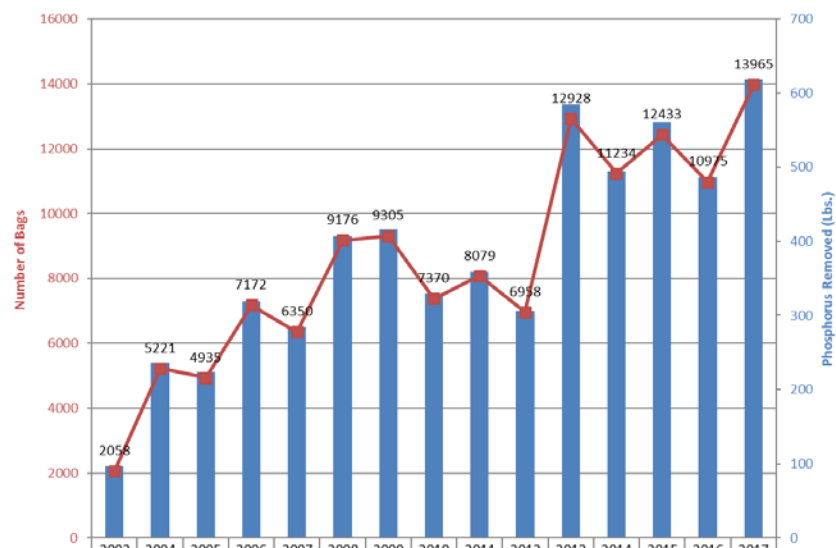
	Phosphorus (mg/L)	Turbidity (NTU)
Before membrane filtration	0.40	2.0
Membrane filtration only	0.34	0.3
Membrane filtration and alum	0.031 (as low as 0.014)	0.15



Phosphorus Removal Indirect



Liberty Lake Beach and Leaf Cleanup
2003-2017



	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
Phosphorus Removed (lbs)	97	236	224	319	284	407	416	330	359	306	585	494	560	486	618
# Bags	2058	5221	4935	7172	6350	9176	9305	7370	8079	6958	12928	11234	12433	10975	13965

Kaiser Trentwood Status

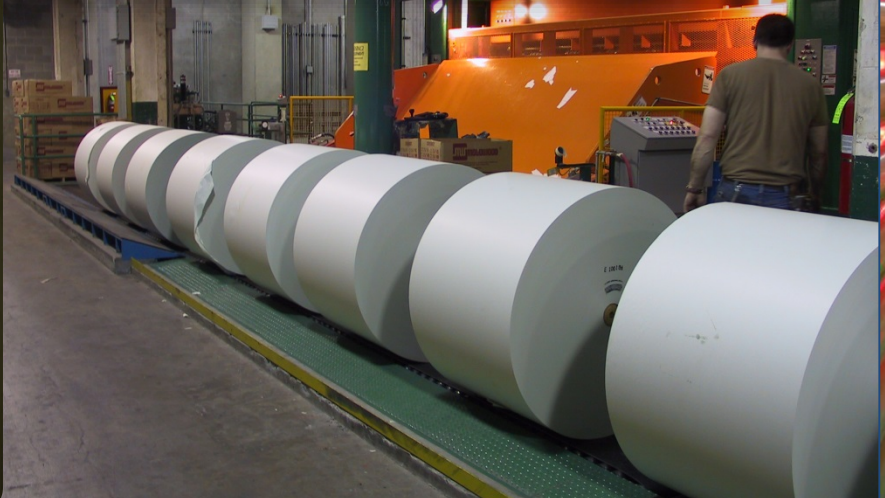
Kaiser Aluminum Season Average Performance Comparison (Pounds/Day)				
Parameter	2015 Season	2016 Season	2017 Season	WQBEL
Total Phosphorous	1.11	0.94	0.96	3.21
Carbonaceous Biological Oxygen Demand	192	206	194	463
Ammonia	1.5	1.7	2.1	9.0

Kaiser Trentwood Status

- Engineering Report for Selected Technology
 - Approved by Ecology on April 12, 2018
 - Addition of chemical precipitation of phosphorous to the sewage treatment plant
- Design Engineering in Progress
 - Jacobs Engineering
- Construction and Start-up
 - Completion by December 31, 2018



INLAND EMPIRE
PAPER COMPANY
Papermakers since 1911.

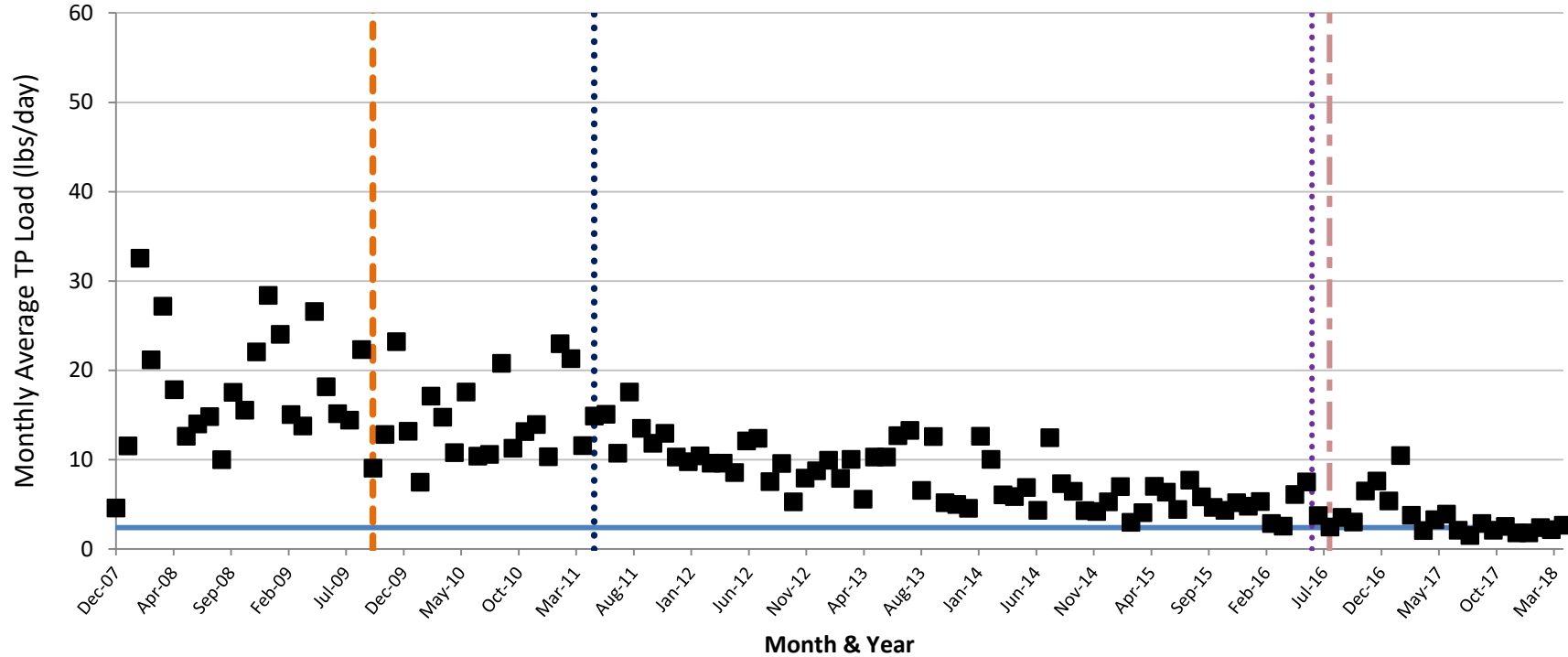


No Silver Bullet

- Mill Process Changes
- WWTS Improvement & Optimization
- Advanced/Tertiary Treatment
- Regulatory Implementation Tools

Nutrient Results: TP

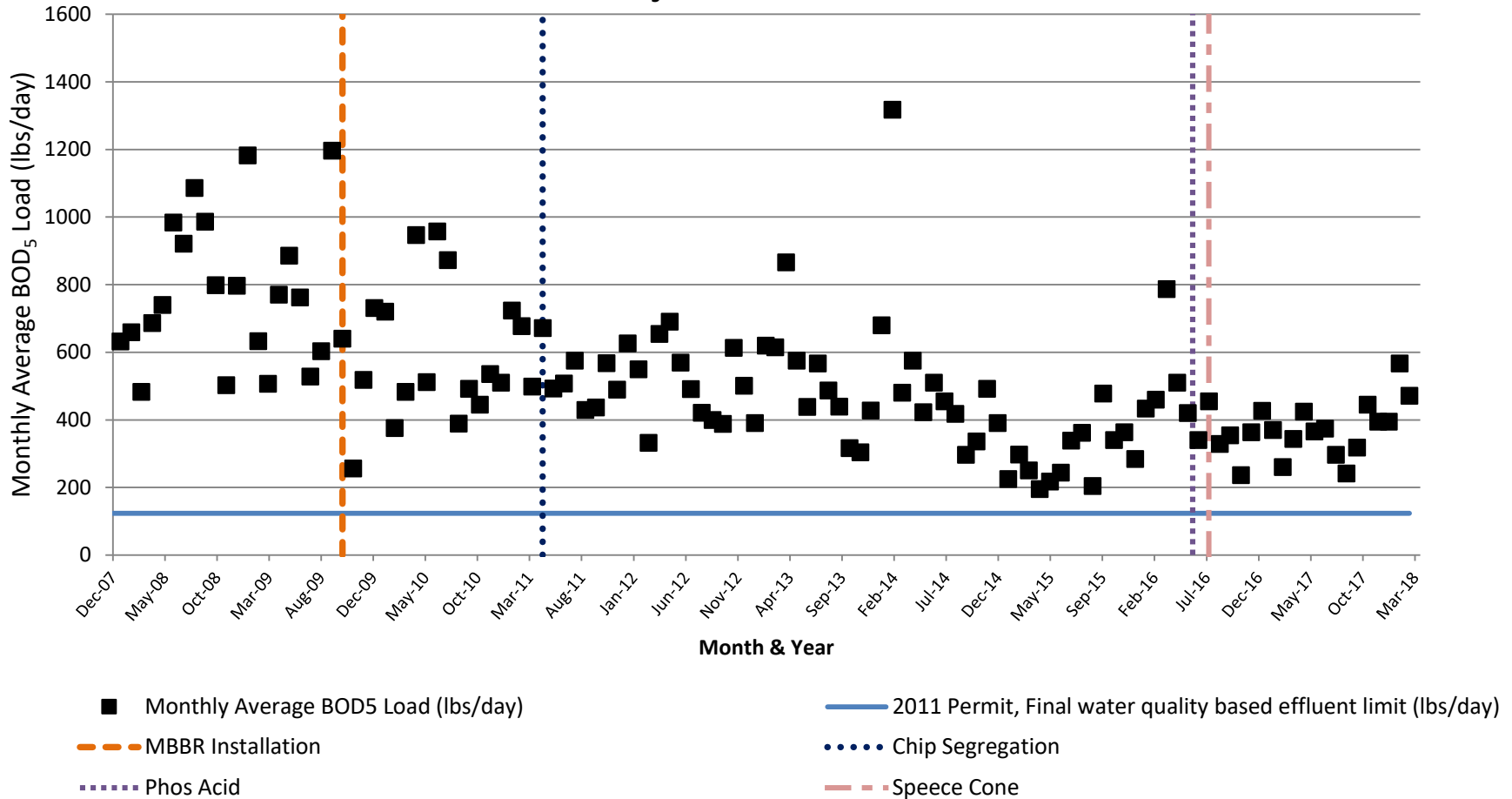
IEP Total Phosphorus Effluent Data 2008-2018



- Monthly Average TP Load (lbs/day)
- 2011 Permit, Final water quality based effluent limit
- - - MBBR's Installed
- Chip Segregation
- Phos Acid
- - - Speece Cone

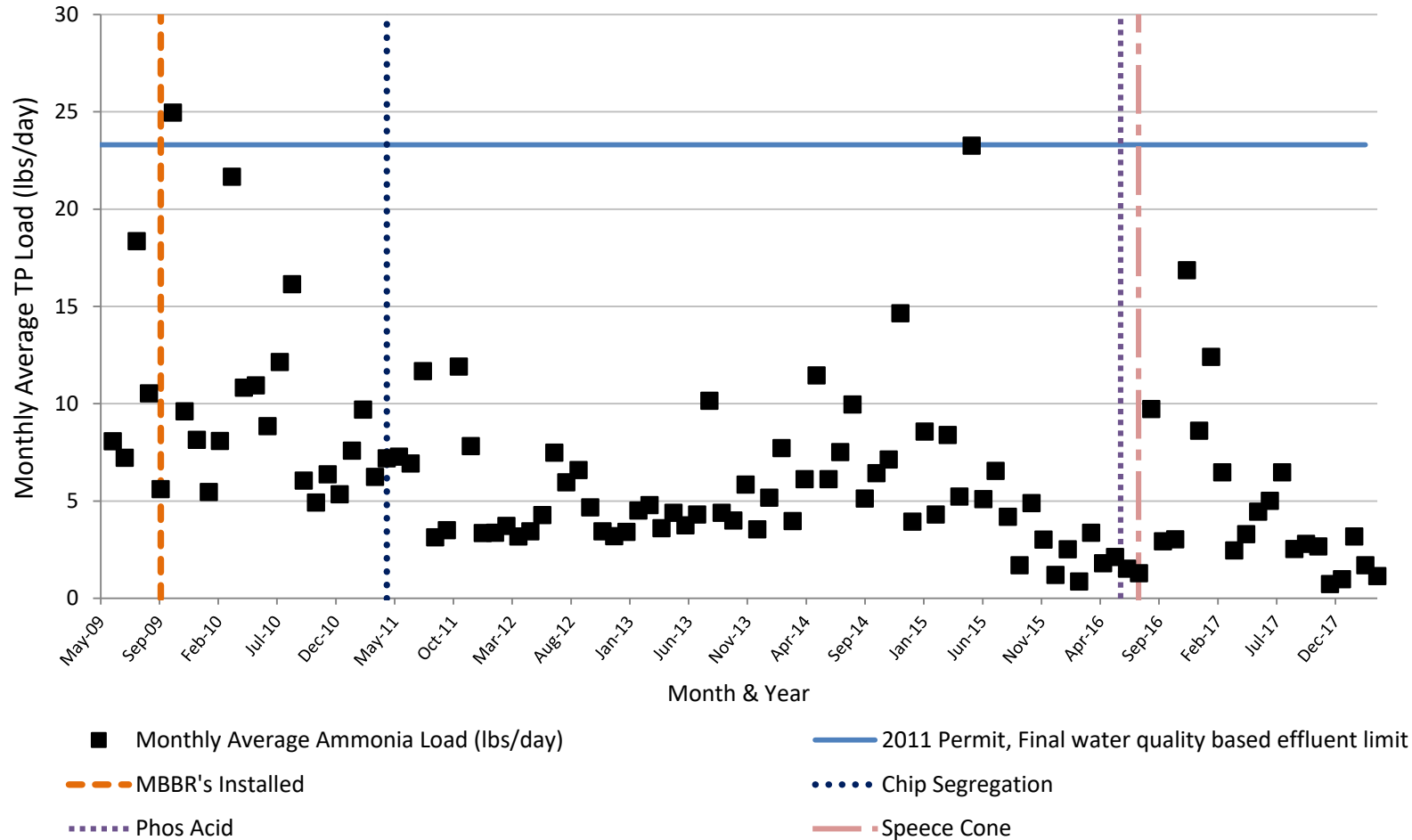
Nutrient Results: $CBO D_5$

IEP BOD_5 Effluent Data 2008-2018



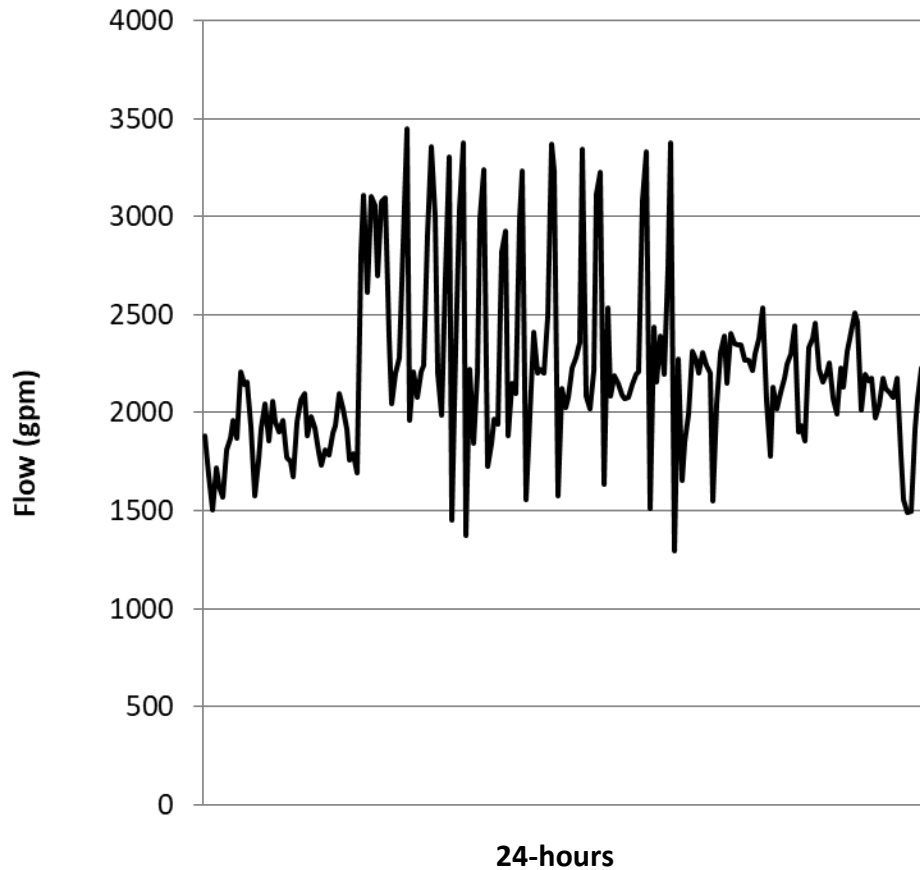
Nutrient Results: Ammonia

IEP Total Ammonia Effluent Data 2009-2018



Equalization Tanks (2018)

Non-Equalized Flow



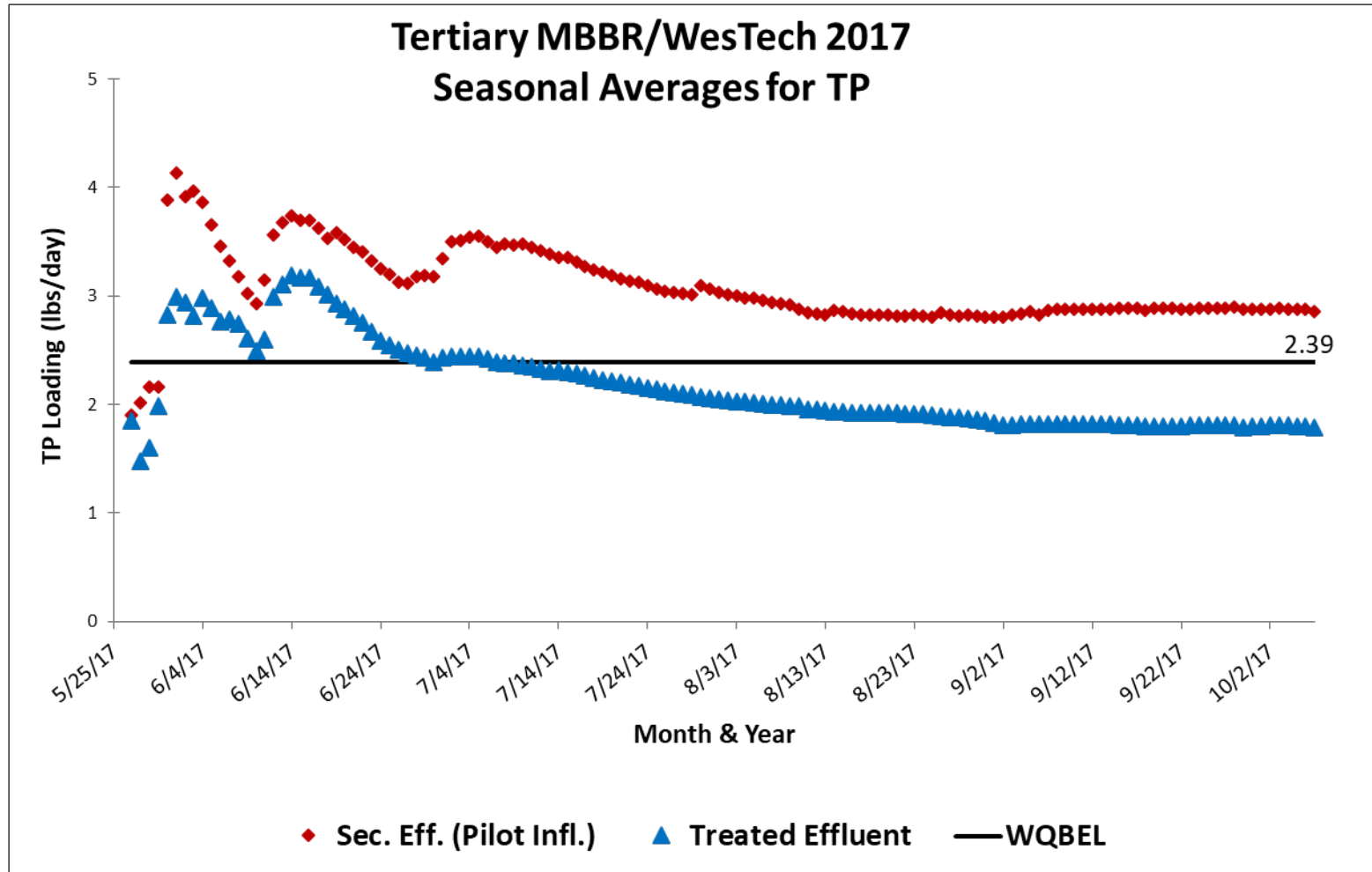
Advanced Treatment Technologies

Pilot tested 22 advanced treatment technologies:

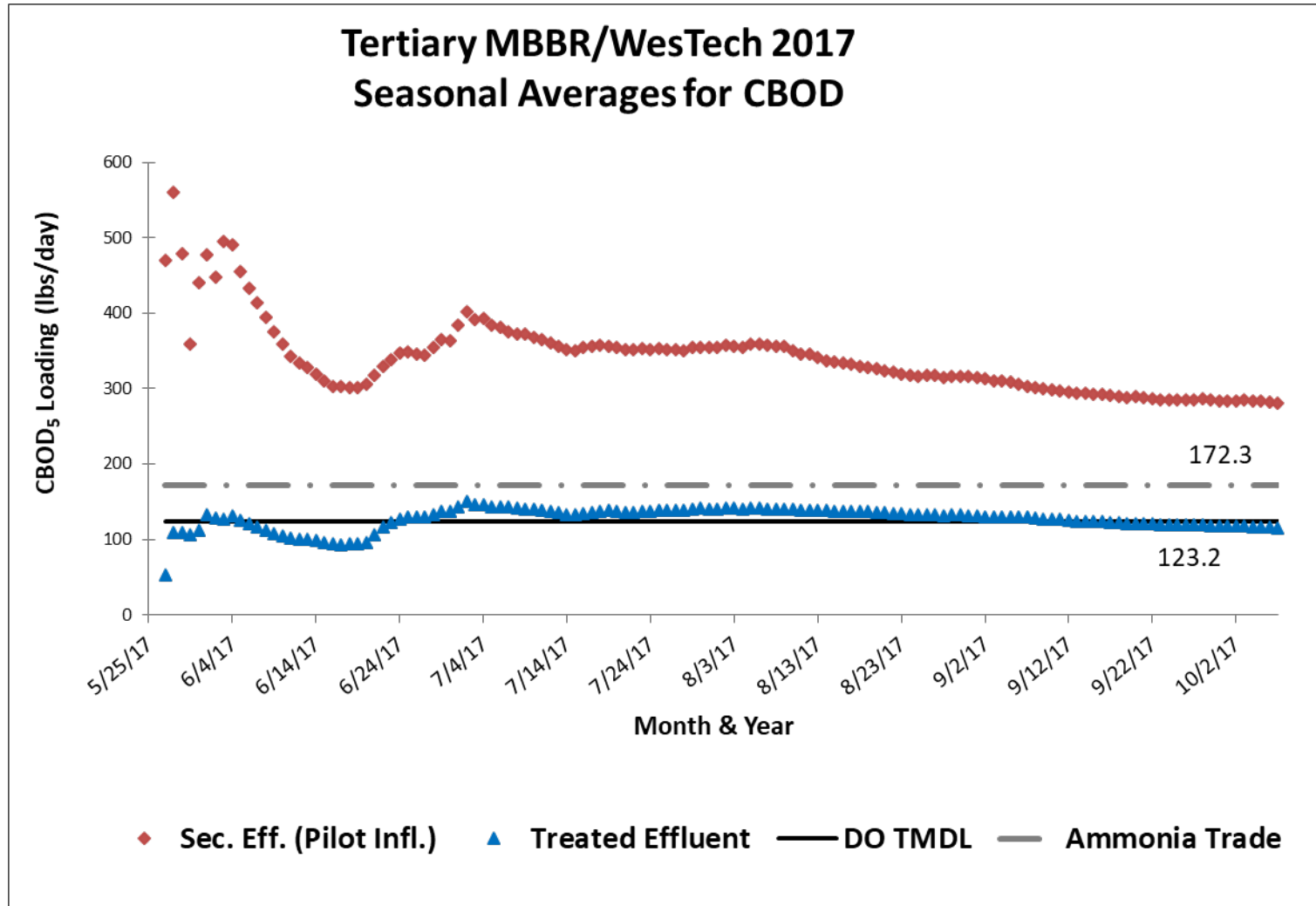
- Blue Waters Sand Filter
- Zenon Membrane
- Trident Multi-Media Filter
- Trident HS Multi-Media Filter
- Parkson Sand Filter
- Actiflo Ballasted Sand
- Co-Mag Ballasted Magnetite
- Contrafast/Trident HS
- Co-Mag/Trident HS
- EnPurion Electrochemical Coag
- Molycorp Cerium Chloride
- AlgEvolve/Clearas
- Pall Membrane
- Westec Toray Altavista
- Koch Puron Membrane
- PCI/Membrane Specialist
- Ovivo Microdyn-Nadir
- Kubota MBR
- New Logic VSEP
- Westech Toray Membrane Only
- Abtech Smart Sponge

— Westech Toray Membrane with Tertiary MBBR

Tertiary Treatment Technologies



Tertiary Treatment Technologies



IEP's "Pre-TMDL" WWTS

Primary Clarifier



Orbal Activated Sludge

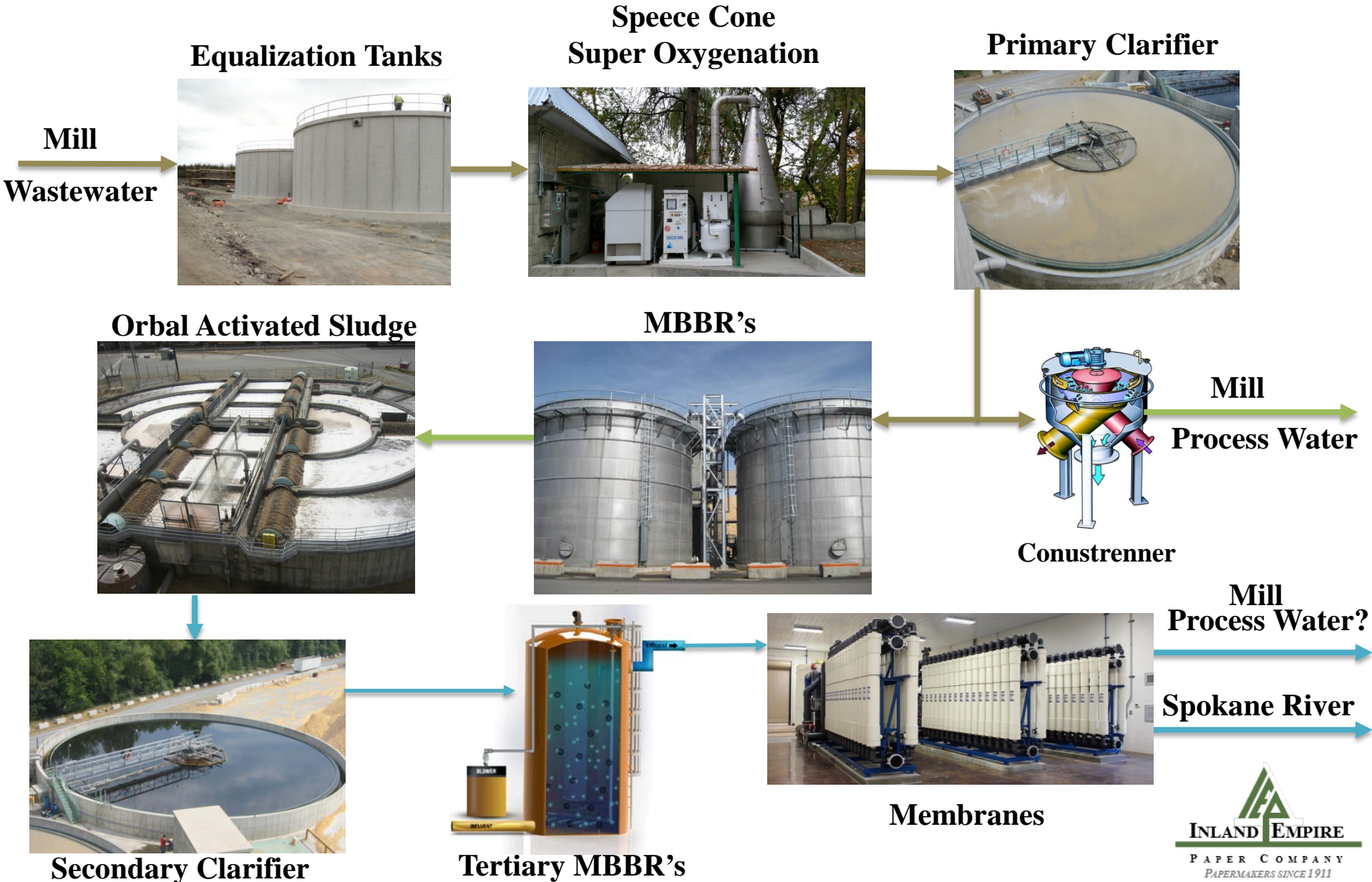


Secondary Clarifier

Mill
→
Wastewater

←
Spokane
River

IEP's "New, Improved & Near Future" WWTS



Regulatory Implementation Tools

- Extended Seasonal Treatment (Feb. - Oct.)
- Intake Credit for Groundwater NCCW
- Bubble Permit w/Kaiser
- Static Pollutant Equivalency:
 - Trading Ammonia for CBOD



Spokane County Regional Water Reclamation Facility



**Spokane River and Lake Spokane DO TMDL
Annual Meeting, July 17, 2018**

Ben Brattebo, P.E.

SPOKANE COUNTY ENVIRONMENTAL SERVICES

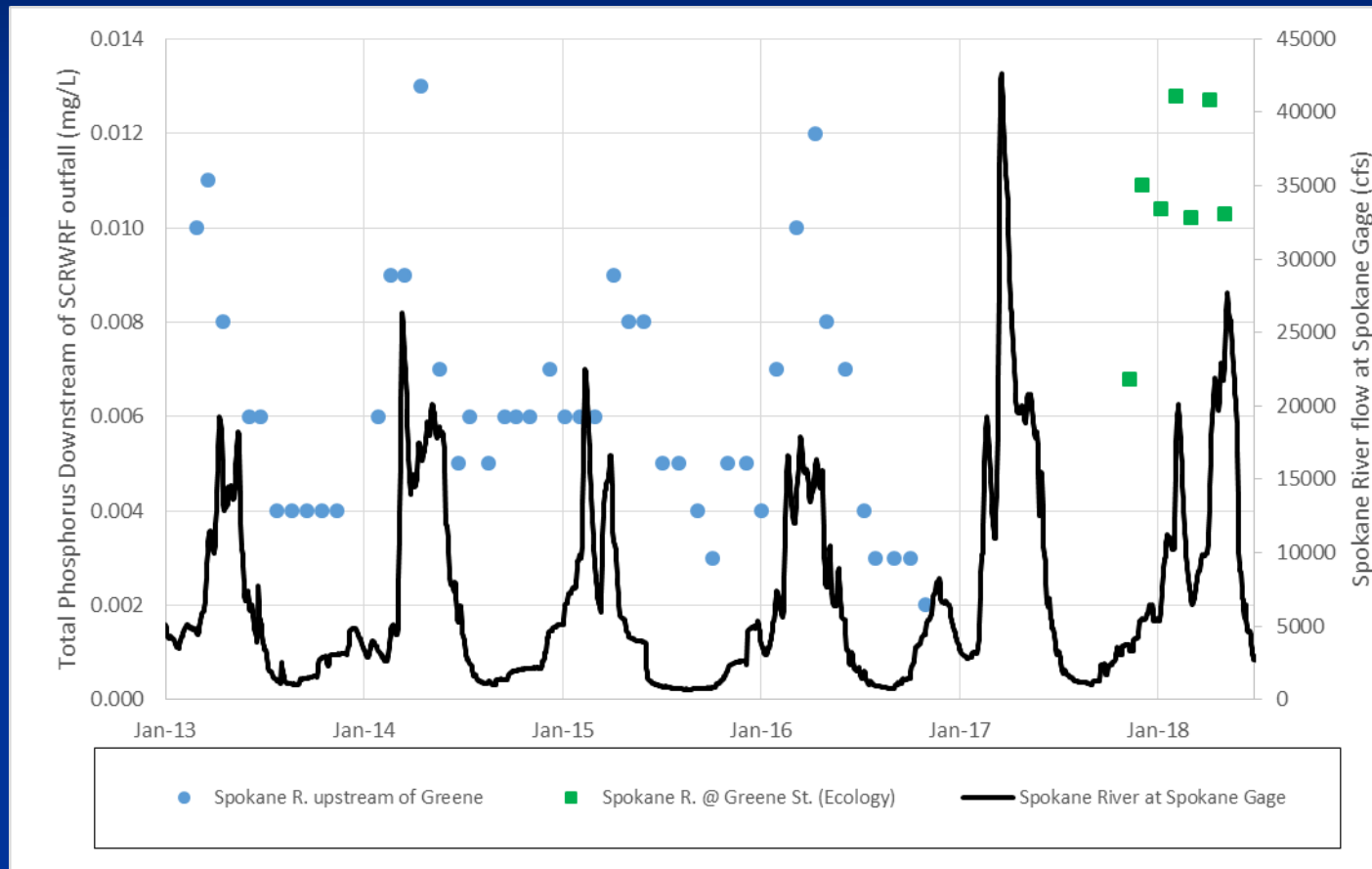


Spokane County Regional Water Reclamation Facility

Since start up in 2011, in compliance with
NPDES Permit limits for:

- Total phosphorus
- Ammonia
- CBOD

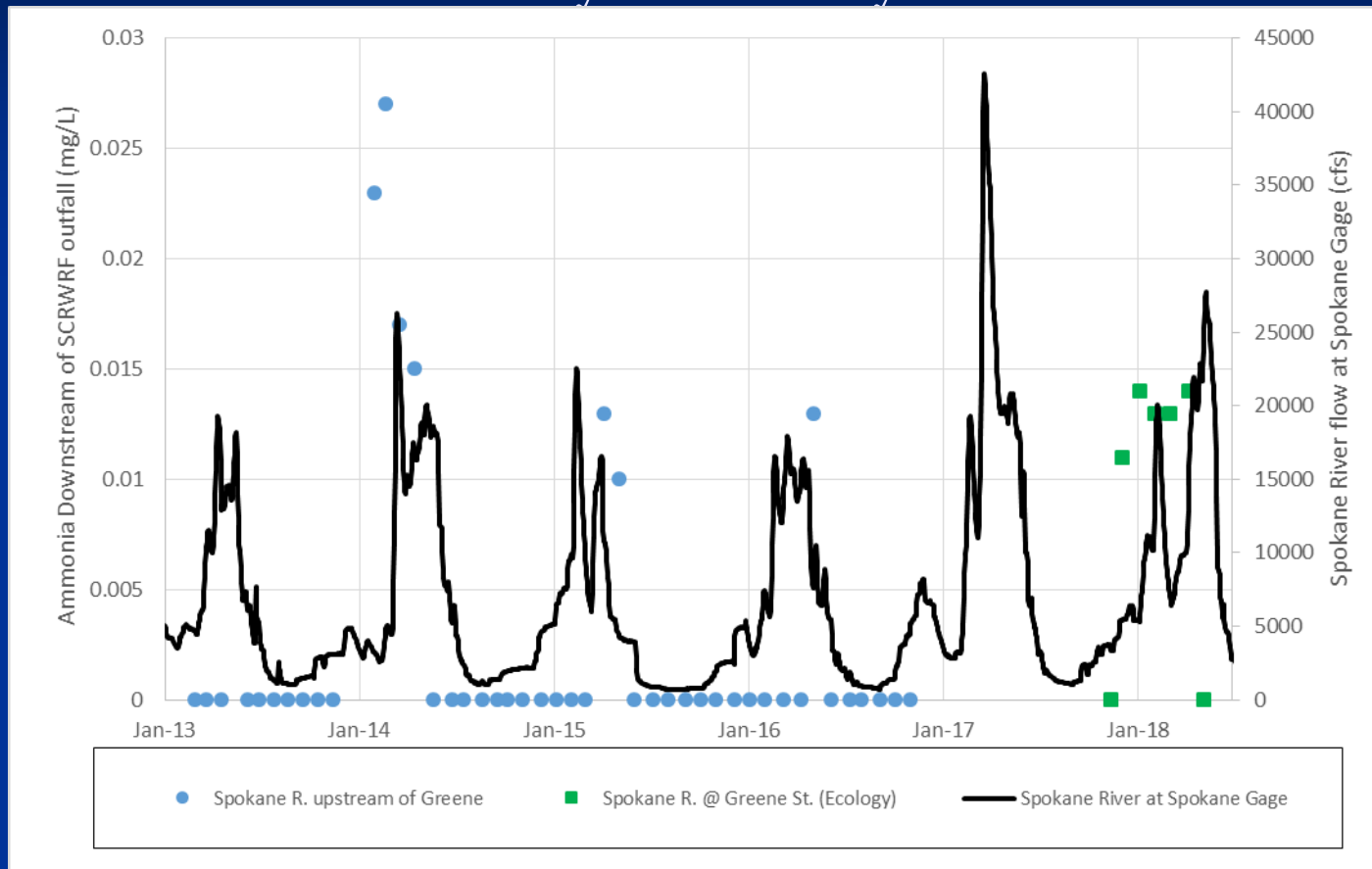
Spokane River Total Phosphorus, near Greene St February 2013 - May 2018



- Plot of Spokane County and Ecology data. Ecology data are preliminary
- Elevated TP concentrations during high river flow

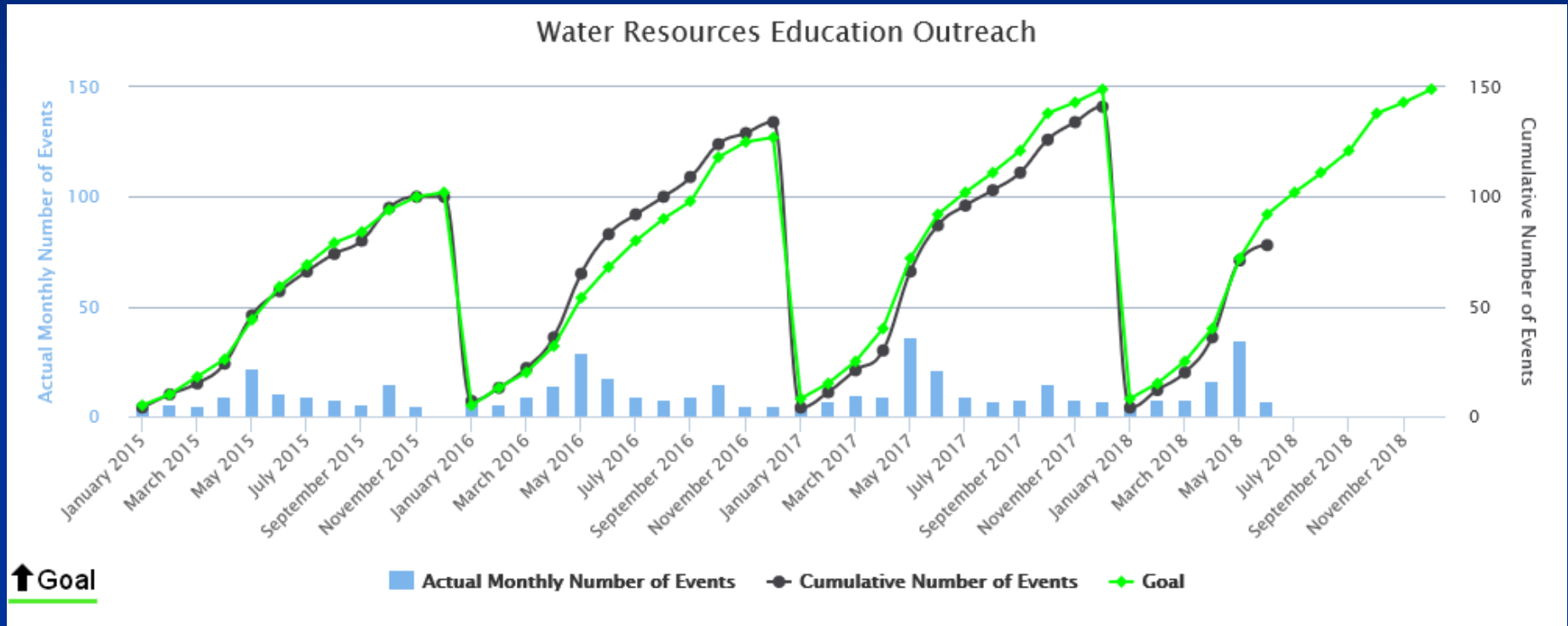
Spokane River Ammonia, near Greene St

February 2013 - May 2018



- Plot of Spokane County and Ecology data. Ecology data are preliminary
- Values not detected are plotted as zero
- Highest concentrations during elevated river flow

Spokane County Water Resources Public Education Events





SPOKANE COUNTY ENVIRONMENTAL SERVICES

City of Spokane 2018 Annual DO-TMDL Meeting Presentation

July 17th, 2018

- Next Level Treatment (NLT)
- CSO Reduction Program
- Stormwater Management



Construction Progress: Chemical Storage Facility



Primary Clarifier #5 and Pump Station



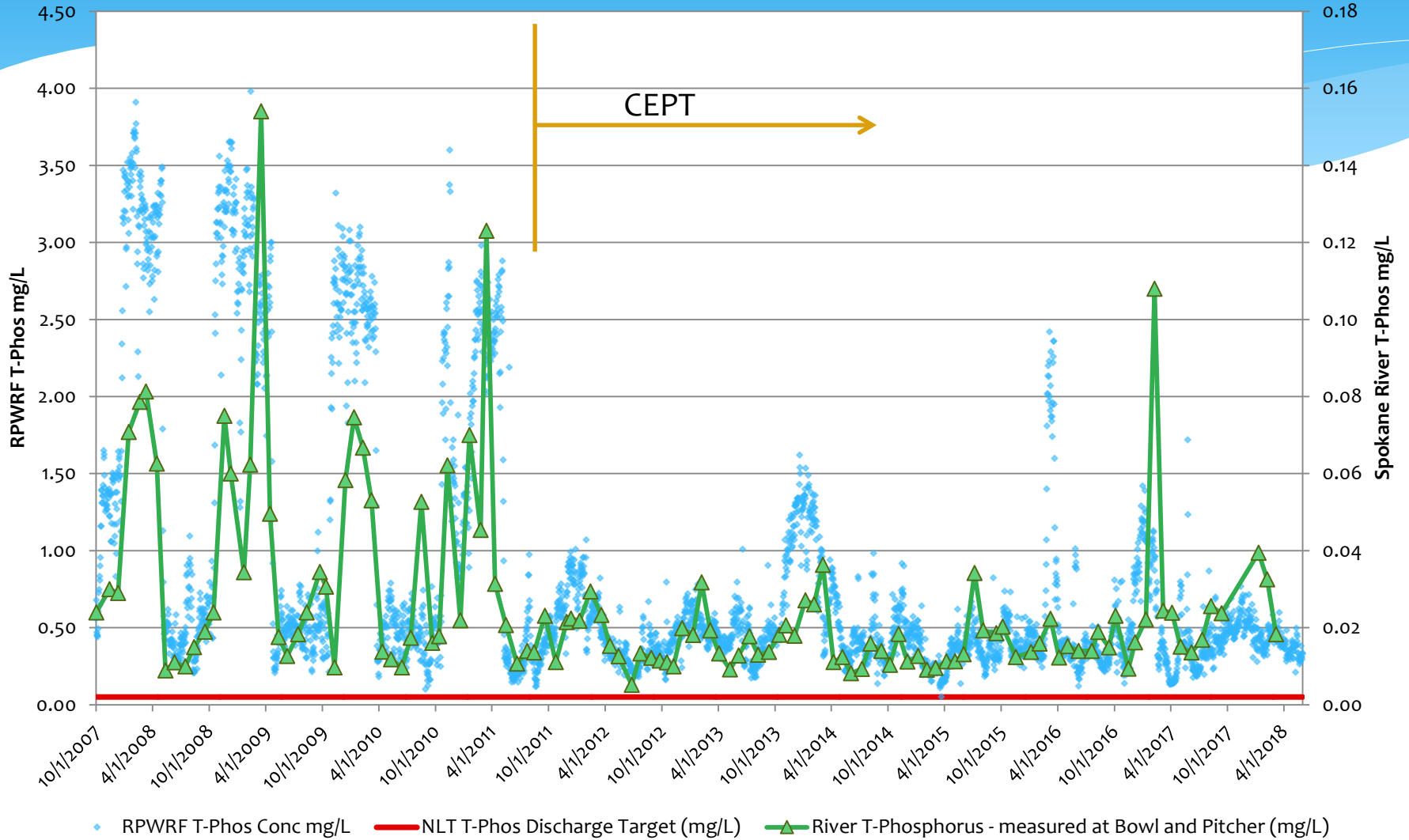
Aeration Basin Modifications



NLT Membrane Facility



RPWRF and Spokane River Phosphorus Concentrations



CSO Tanks

in Operation

CSO Basin	Name	Location	Volume
2	Hollywood	A.L. White Pkwy. (East of RPWRF)	367,000
6	Shadle Bluff	NW Blvd & Garland	900,000
7	Downriver	Downriver Dr.	5,000
10	Above TJ Meenach	Nettleton & York	137,000
12	Doomsday Hill	Pettet Drive	694,000
16	People's Park	Clark & Riverside	194,000
19	7th @ Inland Empire	I-90 Bridge (East Side)	5,000
20	Hatch Rd.	Garfield & 43rd	205,000
33-2	East University District	East Sprague & Hamilton	366,000
34-2	Underhill	Underhill Park	1,134,000
34-3	Ray St.	21st & Ray	883,000
38	Riverton Ave.	South Riverton	431,300
41	Upriver Dr.	Upriver at Rebecca	10,000
42	Surro	Surro Ave.	110,000
I-04	Bosch Lot	Summit & Monroe	980,000
TOTAL			6,421,300

CSO Tanks

Under Construction and Ready for Construction

CSO Basin	Name	Location	Volume	Construction Start
14	Green solutions	West Central	51,000	Late 2017
15	Green solutions	West Central	56,000	Late 2017
23	Kendall Yards	West Central	50,000	Early 2018 (23-1 is operating; 23-2 is under construction)
24	Adams St.	First & Adams	2,000,000	Early 2017/GCCM
25	Cedar & Main	Cedar at Main	25,000	Early 2018
26	City Hall	Spokane Falls Blvd	2,100,000	Early 2017/GCCM
33-1	Liberty Park	West of Liberty Park	2,040,000	Early 2017
33-C	Third Ave Basin	Pacific & Perry	100,000	Late 2018
34-1	Lee St.	Riverside & Lee	1,600,000	Middle 2017
I-03	TJ Meenach	NW Blvd & TJ Meenach	1,240,000	Middle 2017
I-07	Napa St.	Riverside & Napa	180,000	Middle 2017
TOTAL			9,442,000	

CSO Construction: CSO 34-1



CSO Construction: CSO 24



CSO Construction: CSO 26



CSO Construction: CSO 33-1

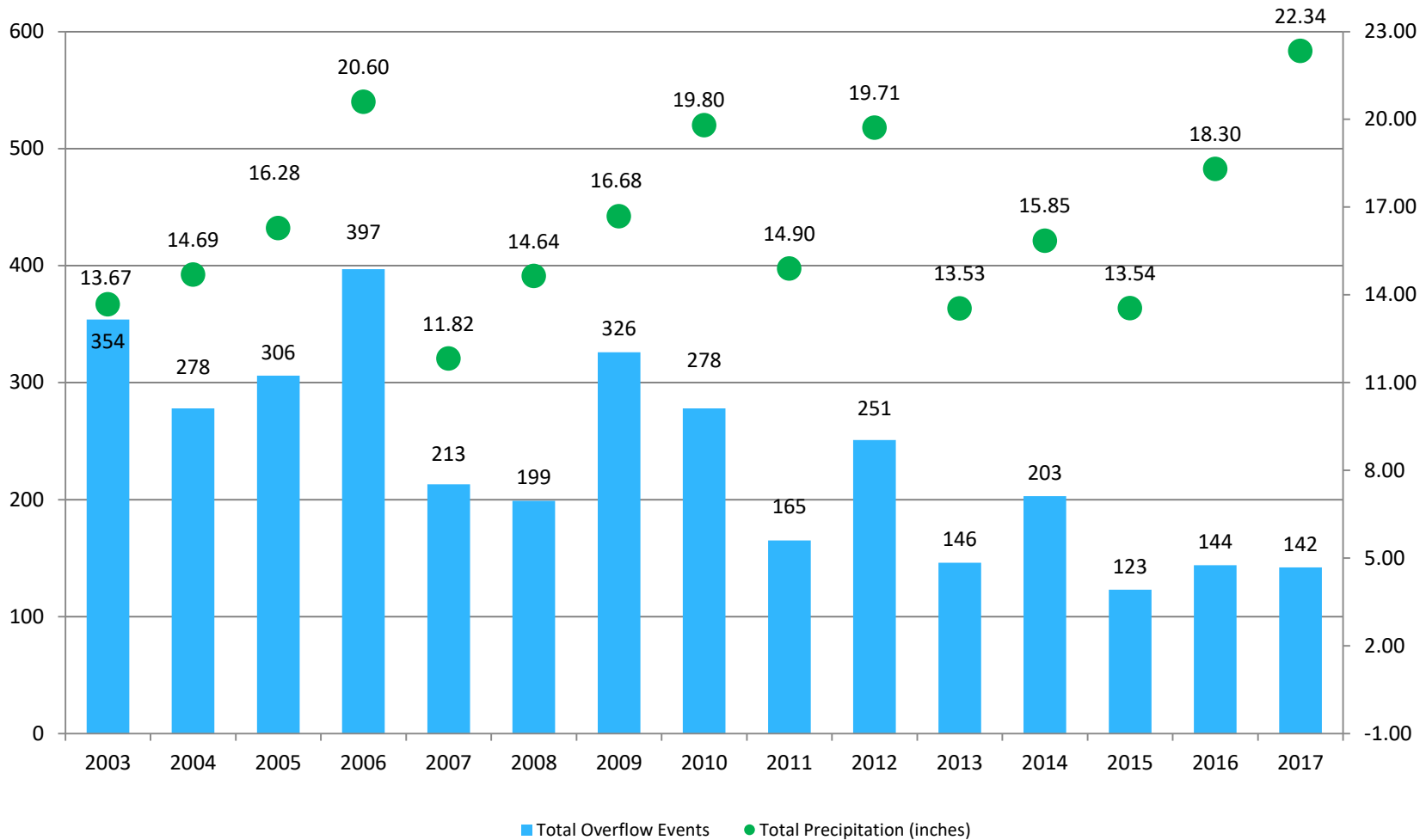


CSO Construction: I-07



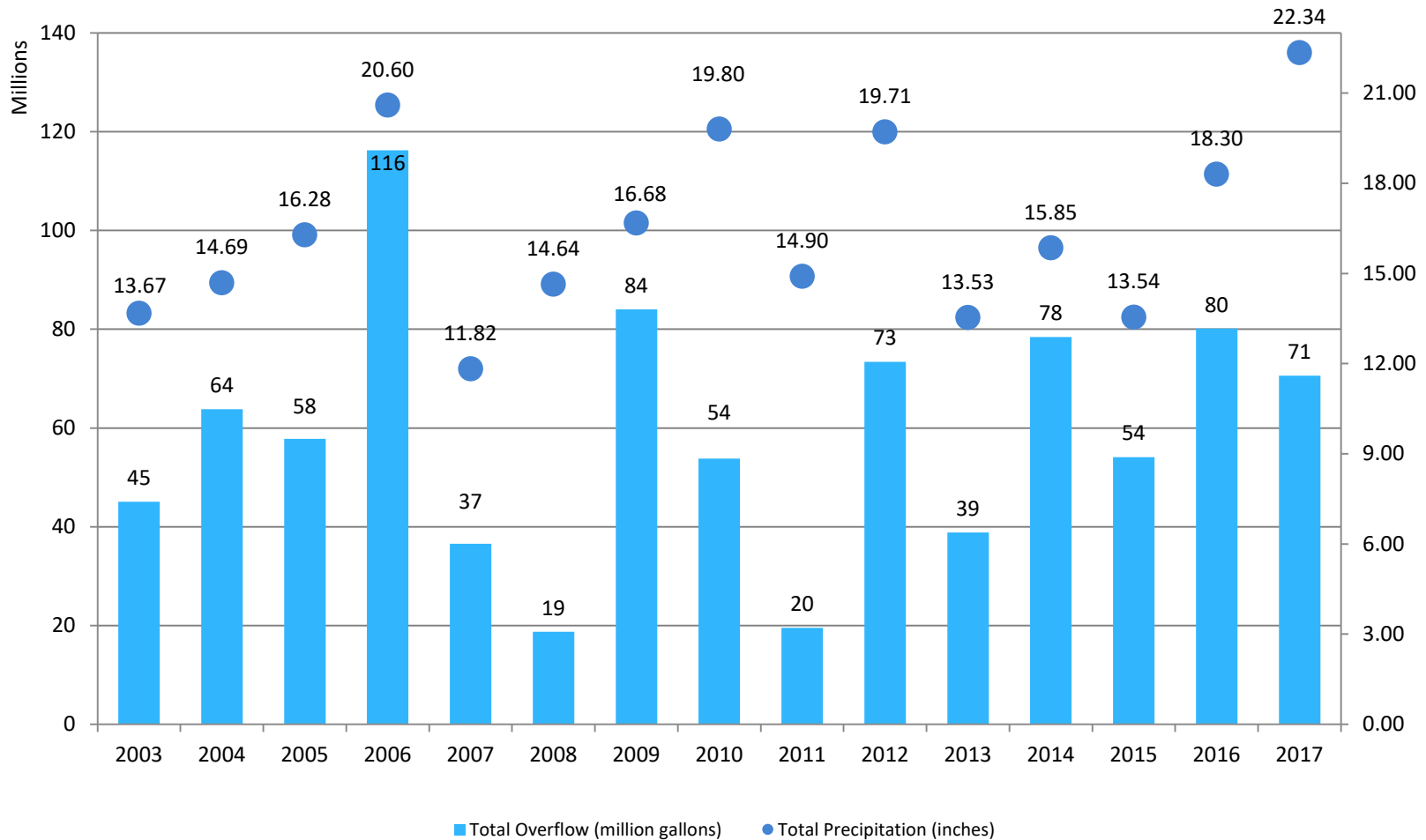
CSO Progress - Frequency

CSO Overflow Events & Precipitation 2003 - 2017

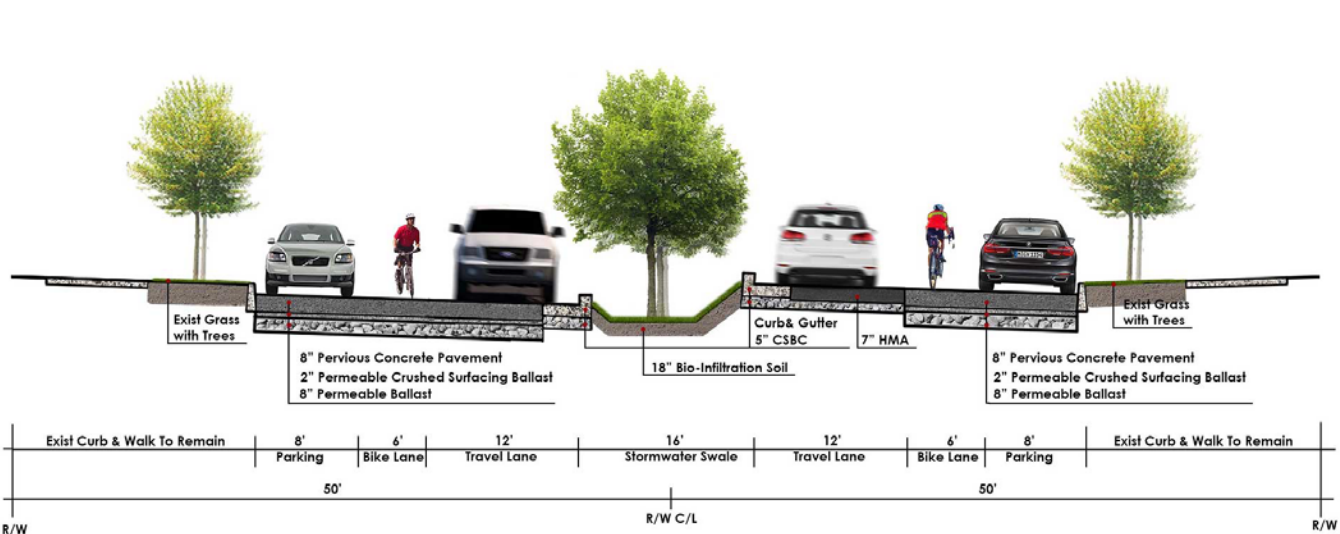


CSO Progress - Volume

CSO Overflow Volume & Precipitation 2003 - 2017



Sharp Ave Permeable Pavement Stormwater Pilot Project



Questions?

