



# Interpreting Nutrient WQS Duration and Frequency into VPDES Permits

**ACWA 2019 Nutrients Permitting Workshop**  
**Alexandria, VA**

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Virginia Department of Environmental Quality  
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# Virginia's 1988 Policy for Nutrient Enriched Waters

## **9VAC25-40-30. Strategy for "nutrient enriched waters" outside of Chesapeake Bay Watershed.**

A. All dischargers authorized by VPDES permits to discharge 1.0 MGD or more to "nutrient enriched waters" shall meet a monthly average total phosphorus effluent limitation of 2.0 mg/l.

B. New dischargers as defined in 9VAC25-31 with a permit issued after July 1, 1988, and are authorized by VPDES permits to discharge 0.050 MGD or more to "nutrient enriched waters" shall be required to meet a monthly average total phosphorus effluent limitation of 2.0 mg/l.

C. This regulation shall not be construed to relax any effluent limitation concerning a nutrient that is imposed under any other requirement of state or federal law.

D. Any discharger to "nutrient enriched waters" that is located within the Chesapeake Bay Watershed is not subject to the requirements of this section.

### Statutory Authority

§ 62.1-44.15 of the Code of Virginia; § 303 of the federal Clean Water Act.

### Historical Notes

Derived from VR680-14-02 § 3, eff. May 25, 1988; amended, Virginia Register Volume 22, Issue 3, eff. November 16, 2005.

# TBELs within the Chesapeake Bay Watershed

## 9VAC25-40-70. Strategy for Chesapeake Bay Watershed.

A. As specified herein, the board shall include technology-based effluent concentration limitations in the individual permit for any facility that has installed technology for the control of nitrogen and phosphorus whether by new construction, expansion, or upgrade. Such limitations shall be based upon the technology installed by the facility and shall be expressed as annual average concentrations.

§ 62.1-44.19:16 of the Code of Virginia requires TBELs in the Chesapeake Bay watershed be written as annual average concentrations

## Site-specific Total Phosphorus effluent limitations established elsewhere by regulation:

9VAC25-415-40 Policy for the Potomac Embayments

0.18 mg/l monthly average

9VAC25-260-310.m Discharges to the Chickahominy Watershed

0.10 mg/l monthly average with exception of 0.30 mg/l monthly average for one industrial facility

**9VAC25-260-185. Criteria to protect designated uses from the impacts of nutrients and suspended sediment in the Chesapeake Bay and its tidal tributaries.**

A. Dissolved oxygen. The dissolved oxygen criteria in the following table apply to all Chesapeake Bay waters according to their specified designated use and supersede the dissolved oxygen criteria in 9VAC25-260-50.

Designated Use	Criteria Concentration/Duration	Temporal Application
Migratory fish spawning and nursery	7-day mean $\geq 6$ mg/l (tidal habitats with 0-0.5 ppt salinity)	February 1 - May 31
	Instantaneous minimum $\geq 5$ mg/l	
Open water <sup>1</sup>	30-day mean $\geq 5.5$ mg/l (tidal habitats with 0-0.5 ppt salinity)	year-round <sup>2</sup>
	30-day mean $\geq 5$ mg/l (tidal habitats with $> 0.5$ ppt salinity)	
	7-day mean $\geq 4$ mg/l	
	Instantaneous minimum $\geq 3.2$ mg/l at temperatures $< 29^{\circ}\text{C}$ Instantaneous minimum $\geq 4.3$ mg/l at temperatures $\geq 29^{\circ}\text{C}$	
Deep water	30-day mean $\geq 3$ mg/l	June 1 - September 30
	1-day mean $\geq 2.3$ mg/l	
	Instantaneous minimum $\geq 1.7$ mg/l	
Deep channel	Instantaneous minimum $\geq 1$ mg/l	June 1 - September 30
<p><sup>1</sup>In applying this open water instantaneous criterion to the Chesapeake Bay and its tidal tributaries where the existing water quality for dissolved oxygen exceeds an instantaneous minimum of 3.2 mg/l, that higher water quality for dissolved oxygen shall be provided antidegradation protection in accordance with 9VAC25-260-30 A 2.</p> <p><sup>2</sup>Open-water dissolved oxygen criteria attainment is assessed separately over two time periods: summer (June 1-September 30) and nonsummer (October 1-May 31) months.</p>		



## MEMORANDUM

**SUBJECT:** Annual Permit Limits for Nitrogen and Phosphorus for Permits Designed to Protect Chesapeake Bay and its tidal tributaries from Excess Nutrient Loading under the National Pollutant Discharge Elimination System

**FROM:** James A. Hanlon, Director  
Office of Wastewater Management

**TO:** Jon Capacasa, Director  
Water Permits Division, EPA Region 3

Rebecca Hammer, Director  
Chesapeake Bay Program Office

This memo responds to your proposal to use National Pollutant Discharge Elimination System (NPDES) permit effluent limits for nitrogen and phosphorus expressed as an annual limit in lieu of daily maximum, weekly average, or monthly average effluent limitations, for the protection of Chesapeake Bay and its tidal tributaries from excess nutrient loading. Based on the information provided by your staff and for the reasons and under the circumstances outlined herein, I concur that permit limits expressed as an annual limit are appropriate and that it is reasonable in this case to conclude that it is “impracticable” to express permit effluent limitations as daily maximum, weekly average, or monthly average effluent limitations. This memo describes the scientific and policy rationales that support this approach.



*COMMONWEALTH of VIRGINIA*  
*DEPARTMENT OF ENVIRONMENTAL QUALITY*

**General Permit No.: VAN010008**

**Effective Date: January 1, 2017**

**Expiration Date: December 31, 2021**

**GENERAL PERMIT FOR TOTAL NITROGEN AND TOTAL PHOSPHORUS DISCHARGES AND NUTRIENT  
TRADING IN THE CHESAPEAKE WATERSHED IN VIRGINIA**

**AUTHORIZATION TO DISCHARGE UNDER THE VIRGINIA POLLUTANT DISCHARGE ELIMINATION SYSTEM  
AND THE VIRGINIA STATE WATER CONTROL LAW**

In compliance with the provisions of the Clean Water Act, as amended, and pursuant to the State Water Control Law and regulations adopted pursuant to it, owners of facilities holding a VPDES individual permit or owners of facilities that otherwise meet the definition of an existing facility, with total nitrogen or total phosphorus discharges, or both to the Chesapeake Bay or its tributaries, are authorized to discharge to surface waters and exchange credits for total nitrogen or total phosphorus, or both.

The authorized discharge shall be in accordance with the registration statement filed with DEQ, this cover page, Part I-Special Conditions Applicable to All Facilities, Part II-Special Conditions Applicable to New and Expanded Facilities, and Part III-Conditions Applicable to All VPDES Permits, as set forth herein.



LISTING OF DISCHARGERS WITH WASTE LOAD ALLOCATIONS (WLAs) AND DELIVERED ALLOCATIONS (DAs)

York River Basin – Total Nitrogen

Facility	Individual VPDES Permit No.	General Permit Registration No.	General Permit Outfall No.	Design Flow (MGD)	Discharged TN Wasteload Allocation (lbs/yr)	TN Delivery Factor	Delivered TN Wasteload Allocation (lbs/yr)	Limit Effective Date	Basis for Limits	Changes to WQMP Allocations (see footnotes)
Caroline Co. Regional STP	VA0073504	VAN030045	500	1.50	9,137	0.58	5,299	1/1/2017	A	
Caroline Co. Regional STP	VA0073504	VAN030045	500	3.00	9,137	0.58	5,299	-	A	
Gordonsville STP	VA0021105	VAN030046	500	0.94	17,177	0.05	859	1/1/2017	A	
Hanover County Aggregate	-	VAN030051	500	-	-	-	192,054	1/1/2017	A	
Ashland WWTP	VA0024899	-	501	2.00	36,547	0.62	22,659	-	A	
Doswell WWTP	VA0029521	-	502	1.00	18,273	0.57	10,416	-	A	
Totopotomoy WWTP	VA0089915	-	503	10.00	182,734	0.87	158,979	-	A	
Bear Island Paper Company	VA0029521	VAN030133	500	4.20	47,328	0.51	24,137	1/1/2017	A	
Plains Marketing, L.P. - Yorktown	VA0003018	VAN030047	500	53.80	167,128	1.00	167,128	1/1/2017	A	
HRSD York River Aggregate	-	VAN030052	500	-	-	-	288,315	1/1/2017	-	
York River STP	VA0081311	-	501	15.00	275,927	1.00	275,927	-	A	(2)
West Point STP	VA0075434	-	502	0.60	10,964	1.00	10,964	-	A	
King William STP	VA0088102	-	504	0.10	1,424	1.00	1,424	-	B	
Parham Landing WWTP	VA0088331	VAN030048	500	2.00	36,547	1.00	36,547	1/1/2017	A	
WestRock CP, LLC - West Point	VA0003115	VAN030049	500	23.00	259,177	1.00	259,177	1/1/2017	A	
Lake Land' Or WWTP	VA0060887	VAN030110	500	0.22	5,695	0.58	3,303	(1)	B	
Louisa Co. Water Authority Aggregate	-	VAN030154	500	-	-	-	7,404	1/1/2017	-	
Louisa Regional WWTP	VA0067954	-	501	0.80	22,780	0.26	5,923	-	B	
Zion Crossroads WWTP	VA0090743	-	502	0.311	5,695	0.26	1,481	-	B	
Zion Crossroads WWTP	VA0090743	-	502	0.70	5,695	0.26	1,481	-	B	
Lake Anna Environmental Services STP	VA0072079	VAN030146	500	0.099	1,139	0.05	57	(1)	B	
Woodford Estates MHC WWTP	VA0061409	VAN030156	500	0.04	1,424	0.58	826	(1)	B	
<b>York River Basin Totals</b>					<b>1,099,096</b>		<b>985,106</b>			



# Permit No. 1 Westrock Paper Mill



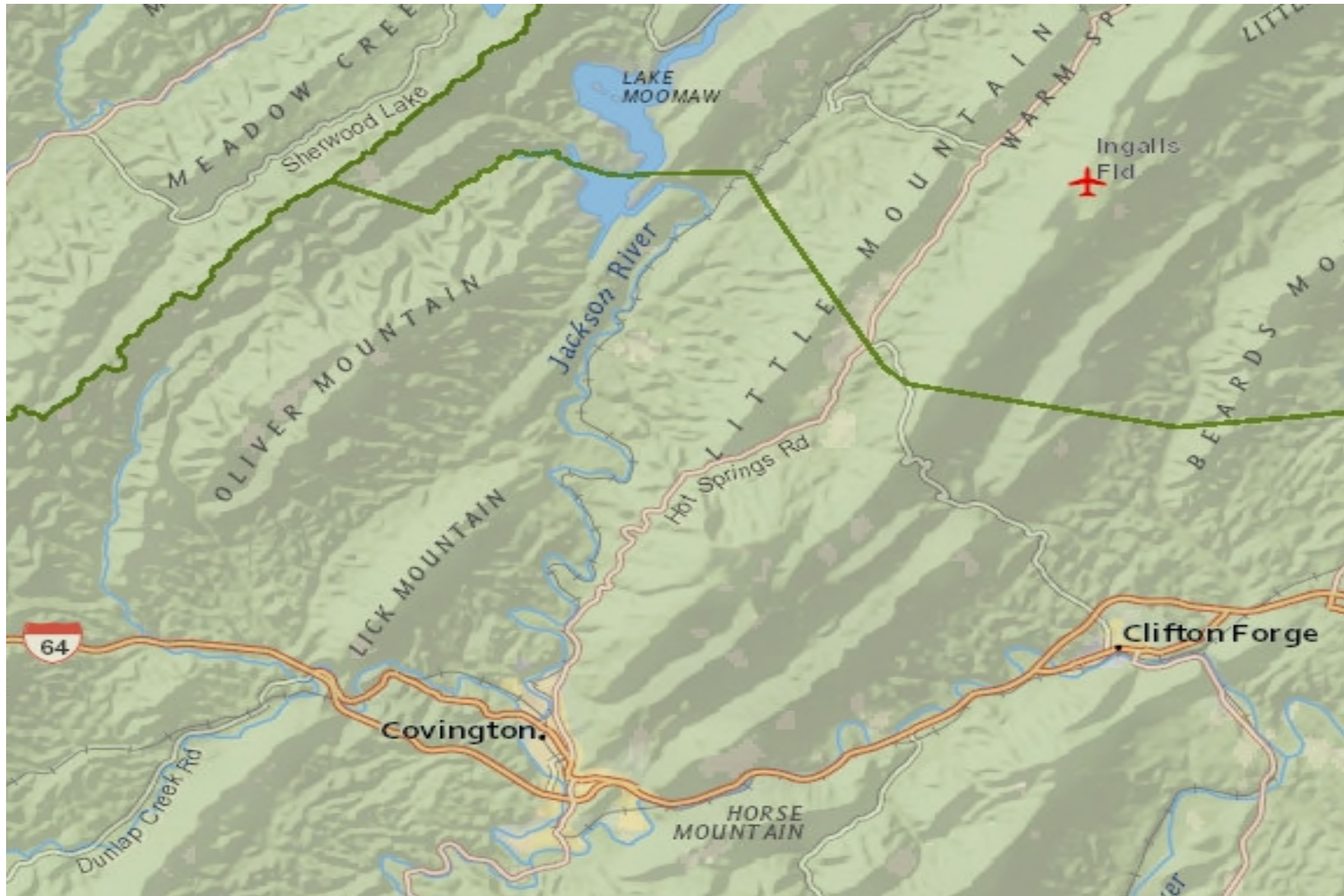
# Jackson River TMDL

- TMDL expressed as seasonal loads





# Jackson River TMDL



A. Final Limitations and Monitoring Requirements

- During the period beginning with the permit's effective date and lasting until the permit's expiration date, the permittee is authorized to discharge from outfall number 001. This discharge shall be limited and monitored at outfall 001 as specified below:

<u>EFFLUENT CHARACTERISTICS</u>	<u>DISCHARGE LIMITATIONS</u>				<u>MONITORING REQUIREMENTS</u>	
	<u>Monthly Average</u>	<u>Weekly Average</u>	<u>Minimum</u>	<u>Maximum</u>	<u>Frequency</u>	<u>Sample Type</u>
Flow (MGD) (2)	NL	NA	NA	NL	Continuous	TIRE
pH (Standard Units)	NA	NA	6.0	9.0	1/Day	Grab
Biochemical Oxygen Demand (BOD <sub>5</sub> ) (3,4)	30 mg/L 340 kg/d	45 mg/L 510 kg/d	NA	NA	5 Days/Week	24 HC
Total Suspended Solids (3,4)	30 mg/L 340 kg/d	45 mg/L 510 kg/d	NA	NA	5 Days/Week	24 HC
Total Nitrogen (TN) (3,5)	NL mg/L	NA	NA	NL mg/L	1/Week	24 HC
Total Phosphorus (TP) (3)	NL mg/L	NA	NA	NL mg/L	1/Week	24 HC
TP, annual ave (3,6)	0.50 mg/L	NA	NA	NA	1/Year	Calculated
TN, monthly load (3,5)	NL lb/mo	NA	NA	NA	1/Mo	Calculated
TP, monthly load (3)	NL lb/mo	NA	NA	NA	1/Mo	Calculated
TN, total load June - Oct (3,5)	NA	NA	NA	22968 lb	1/Year	Calculated
TP, total load June - Oct (3)	NA	NA	NA	1914 lb	1/Year	Calculated
<i>Escherichia coli</i> (7)	126/100mL	NA	NA	NA	1/Day	Grab
Chronic toxicity (8)	NA	NA	NA	44 TUc	1/Year	24 HC

NA = Not Applicable NL = No Limitation, monitoring required  
24 HC = 24 hour flow proportional composite

1/Day = once per day

1/Week = once per week  
TIRE = Totalizing, Indicating, Recording Equipment

- The design flow for this facility is 3.00 MGD, see I.B.2.
- See Part I.B.1 for quantification levels and reporting requirements.
- At least 85% removal for BOD<sub>5</sub> and TSS must be attained for this effluent.
- Total Nitrogen, which is the sum of TKN and nitrate plus nitrite, shall be derived from the results of those tests.
- Total Phosphorus limit is an annual average concentration, which shall be reported once a year on the DMR due in January using parameter code 811. This facility has Total Nitrogen and Total Phosphorus calendar year load limits associated with this outfall included in the current Registration List under registration number VAN040065, enforceable under the General VPDES Watershed Permit Regulation for Total Nitrogen and Total Phosphorus Discharges and Nutrient Trading in the Chesapeake Watershed in Virginia. Data and QLs from this General Permit Regulation shall be used to calculate the annual average.
- Limit is a geometric mean; samples shall be collected between 10 a.m. and 4 p.m.
- See I.C for additional instructions.
- There shall be no discharge of floating solids or visible foam in other than trace amounts.

Annual average TBEL matching technology installed

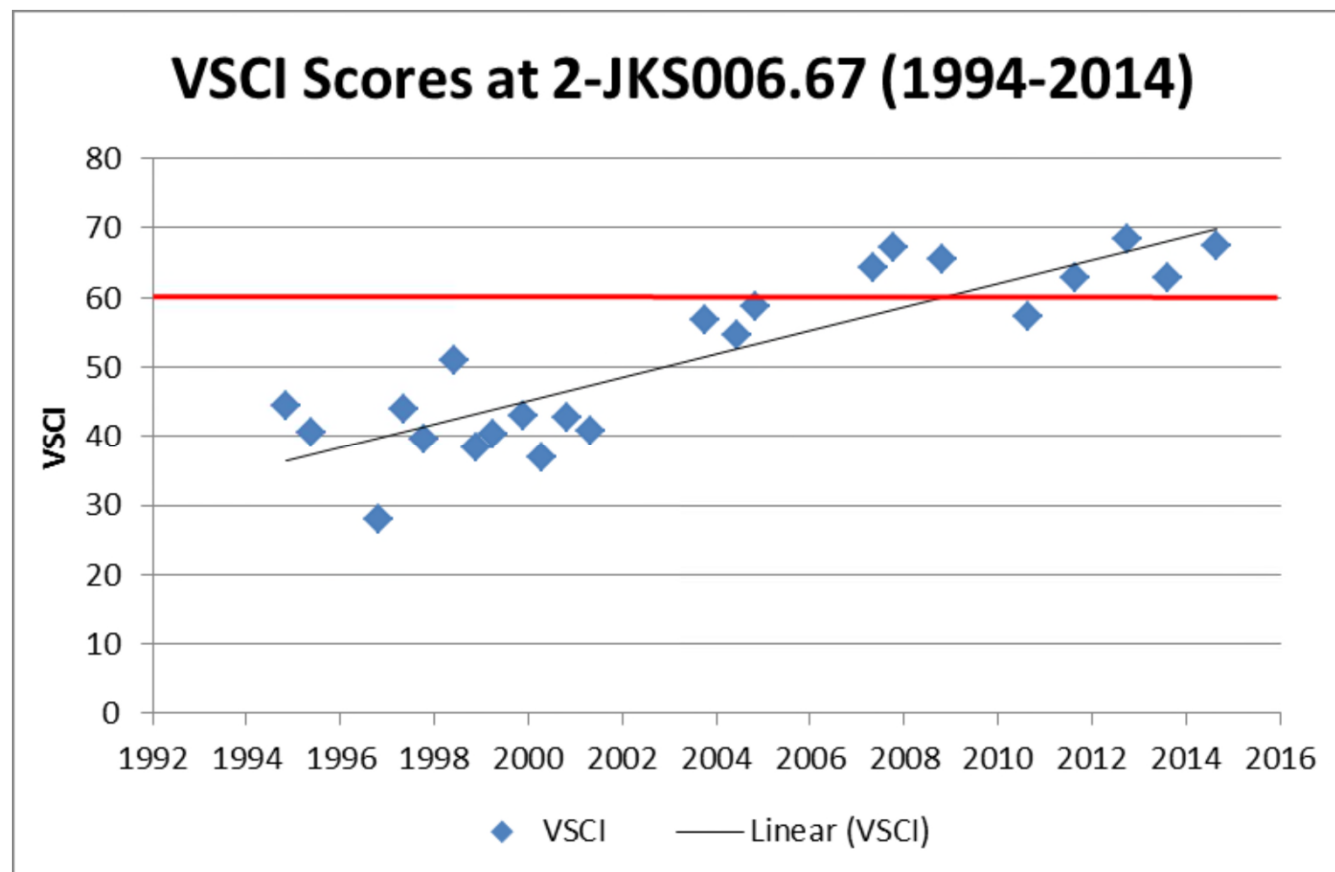
Seasonal WQBEL load limits from local TMDL

Annual WQBEL TN and TP load limits for CB TMDL included in watershed general permit

Trading allowed under both TMDLs



- 10 of the 24 impaired miles of the Jackson River and 20 miles of the James river saw a benthic macroinvertebrate community recover as shown by an increase in VSCI scores above the impairment threshold of 60




## Permit No. 2

### Sussex Service Authority WWTP - Sprint Branch TMDL

- TMDL WLA expressed as annual load and TMDL indicated that the WLA would be implemented as an annual load



Annual WQBEL load  
limits from local  
TMDL



EFFLUENT CHARACTERISTICS	DISCHARGE LIMITS				MONITORING REQUIREMENTS	
	MONTHLY AVERAGE	WEEKLY AVERAGE	MINIMUM	MAXIMUM	FREQUENCY	SAMPLE TYPE
794 Total Phosphorus – Calendar Year <sup>[c]</sup>	NA	NA	NA	145.82 kg/year	1 per Year	Calculated
806 Total Phosphorus – Year to Date <sup>[c]</sup> (kg/year)	NA	NA	NA	NL	1 per Month	Calculated

"NL" means no limitation is established. Monitoring and reporting, however, are required.

"NA" means not applicable.

"8 HC" means 8-hour composite sample.

"2 per Month" means two samples taken during each calendar month, no less than 7 days apart.

"1 per Year" means one sample taken every calendar year, to be reported on the DMR due no later than January 10 of the following year.

[a] See Part I.C for alternate disinfection requirements.

[b] The limitation is expressed in two significant figures.

[c] See Part I.D.12 for phosphorus reporting calculations.

[d] See Part I.D.7 for quantification levels and reporting requirements.

[e] See Part I.B for the Schedule of Compliance.



## Permit No. 3

### Fork Union WWTP - North Creek TMDL

- TMDL expressed as annual and daily loads





A. EFFLUENT LIMITATIONS AND MONITORING REQUIREMENTS

1. During the period beginning with the permit's effective date and lasting until the permit's expiration date, or until three consecutive monthly average flows equal or exceed 0.060 MGD, whichever occurs first, the permittee is authorized to discharge from Outfall 002.

This discharge shall be limited and monitored as specified below:

EFFLUENT CHARACTERISTICS			DISCHARGE LIMITATIONS				MONITORING REQUIREMENTS	
	Monthly Average		Weekly Average		Minimum	Maximum	Frequency	Sample Type
Flow (MGD) <sup>a</sup>	NL		NA		NA	NL	Continuous	TIRE
pH (standard units)	NA		NA		6.0	9.0	1/Day	Grab
CBOD <sub>5</sub> (Jun-Nov) <sup>c</sup>	10 mg/L	2.3 kg/d	15 mg/L	3.4 kg/d	NA	NA	1/Week	4 HC
CBOD <sub>5</sub> (Dec-May) <sup>c</sup>	25 mg/L	5.7 kg/d	40 mg/L	9.1 kg/d	NA	NA	1/Week	4 HC
Total Suspended Solids <sup>c,d</sup>	30 mg/L	6.8 kg/d	45 mg/L	10 kg/d	NA	NA	1/Week	4 HC
Total Phosphorus (as P) (mg/L) <sup>c,e</sup>	NL (mg/L)	0.185 kg/d	NA		NA	NA	1/Week	4 HC
E. coli (N/100 mL) <sup>b</sup>	126 Geometric Mean		NA		NA	NA	2/Week 10 a.m. to 4 p.m.	Grab
Dissolved Oxygen (mg/L)	NA		NA		5.5	NA	1/Day	Grab
Ammonia-N (Jun-Nov) (mg/L) <sup>c</sup>	4.1		6.1		NA	NA	1/Week	4 HC
Copper, Total Recoverable (µg/L) <sup>c,f</sup>	15		15		NA	NA	1/Month	4 HC
Total Hardness (as CaCO <sub>3</sub> )(mg/L)	NL		NA		NL	NA	1/Month	4 HC
TKN (mg/L) <sup>c</sup>	NA		NA		NA	NL	1/Year	4 HC
Nitrite-N + Nitrate-N (mg/L) <sup>c</sup>	NA		NA		NA	NL	1/Year	4 HC
Total Nitrogen (mg/L) <sup>c,g</sup>	NA		NA		NA	NL	1/Year	Calculated

NL = No Limitation, monitoring required      NA = Not Applicable      TIRE = Totalizing, Indicating, and Recording Equipment  
2/Week = 2 samples taken during the calendar week, no less than 48 hours apart

1/Year = Annual sampling with the results submitted with the DMR due January 10<sup>th</sup> of each year

- The design flow of this treatment facility is 0.099 MGD. The effluent limitations and monitoring requirements above are based on a permitted flow tier of 0.060 MGD.
- See Part I.B for disinfection requirements.
- See Part I.C for additional monitoring and reporting instructions.
- At least 85% removal for TSS shall be attained for this discharge.
- See Part I.E for Interim Limits and Schedule of Compliance.
- See Part I.F for Interim Limits and Schedule of Compliance.
- Total Nitrogen, which is the sum of TKN and Nitrite-N + Nitrate-N, shall be derived from the results of those tests.
- There shall be no discharge of floating solids or visible foam in other than trace amounts.

Monthly average WQBEL  
load limits from local  
TMDL

# So how are we doing?

- 3 Permits
- 3 TMDLs
- Permit limits expressed in 3 different manners
  - Seasonal load limits
  - Annual load limits
  - Monthly average load limit

**NOW  
HIRING**

## NPDES Permit Writers Wanted!

Candidates must have knowledge of:

- Development of water quality criteria for various parameters including appropriate designations of magnitude, frequency and duration
- Application of water quality models to develop WLAs
- NPDES permit regulations



# ~~Questions~~ Discussion

