

ACWA 2023 Nutrients Permitting Workshop Denver, CO

CASE STUDIES: LESSONS LEARNED (~~Success Stories~~)

Floating WLAs for Nutrient Control

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Background on Chesapeake Bay Watershed



- Portions of 5 states and the District of Columbia in 2 EPA regions lie within the Basin:
 - 64,000 square miles watershed
 - 11,684 miles of shoreline
 - 200 miles long and 21 ft. deep on average
- Significant portions of Chesapeake Bay and its tidal tributaries are listed as impaired because of nitrogen, phosphorus, and sediment
- Home to over 18 million people
- Agricultural land use grew by >100,000 acres between 2004 and 2014
- Largest land area per unit volume of water of any estuary in the world

Legislative Findings and Purposes

General Assembly finds and determines that adoption and utilization of a watershed general permit and market-based point source nutrient credit trading program will assist in:

- meeting the nutrient cap load allocations cost-effectively and as soon as possible in keeping with the 2010 timeline and objectives of the Chesapeake 2000 agreement,
- accommodating continued growth and economic development in the Chesapeake Bay watershed, and
- providing a foundation for establishing market-based incentives to help achieve the Chesapeake Bay Program's nonpoint source reduction goals.

Dual Permitting Approaches Since 2005

- **Water Quality-based Approach** - General VPDES Watershed Permit for Total Nitrogen and Total Phosphorus Discharges and Nutrient Trading in the Chesapeake Bay Watershed in Virginia (9 VAC 25-820-10)
 - General permit overlays individual NPDES permits and addresses **nutrient loads only**
 - Calendar year annual TN and TP load limits
 - Cap & Trade Program
 - “Bubbling” or aggregate permits allowed
 - Common schedule of compliance
 - Point Source-to-Point Source trading for existing facilities to meet initial load cap
 - Point Source-to-Nonpoint Source trading reserved to accommodate new and expanding facilities
 - Permittees given ownership of the market

Dual Permitting Approaches Since 2005

- **Technology-based Approach** - Regulation for Nutrient Enriched Waters and Dischargers within the Chesapeake Bay Watershed (9VAC25-40)
 - Establishes minimum treatment technologies for new and expanding facilities based on size and location
 - Biological Nutrient Removal (BNR) - 8 mg/l TN and 1 mg/l TP
 - “State of the Art” (SOA) – 3 mg/l TN and 0.3 mg/l TP
 - “Off Ramp” provision available if the designated level of treatment requires treatment not otherwise needed to meet WLA
 - Regulation requires no upgrades of existing facilities that are not expanding
 - Any facility that installs nutrient removal technology must meet an annual average concentration limitation matching the technology installed in their **individual VPDES permit**

Watershed General Permit

- Issued Effective January 1, 2007
 - Over 150 facilities
 - 119 Significant Dischargers plus smaller, new or expanding facilities
 - Covers facilities in each of the 5 watersheds
- Limits Effective January 1, 2011
 - Annual mass delivered loads for nitrogen and phosphorus for all dischargers
 - Based on TMDL implementation
 - More restrictive requirements as needed to meet local TMDLs or water quality standards in individual permits
 - Conditions for nutrient credit transactions

April 1st Nutrient Loads Report

2020 Nutrient Load Analysis

§ 62.1-44.19:18.D. of the State Water Control Law requires that by April 1st of each year, DEQ prepare a report containing the annual mass loads of Total Nitrogen and Total Phosphorus discharged by each permitted facility, the number of point source Nitrogen and Phosphorus credits generated or required by each facility in the previous calendar year, and to the extent there are insufficient point source credits available for exchange to provide for full compliance by every permittee, the number of credits to be purchased from the Nutrient Offset Fund.

Actual discharged and delivered loads are included for each discharger. The degree to which each discharge was over or under the wasteload allocation is listed in the next to last column of each spreadsheet. The bottom figure in that same column indicates the degree to which the basin as a whole was over or under the basin-wide delivered wasteload allocation. The final column reflects credits which are held by the Nutrient Offset Fund in accordance with Part I.J.2.e. of the watershed general permit.

Sufficient Nitrogen and Phosphorus credits are available in every basin. With adequate credits available from permitted facilities, no credits will be made available by the Nutrient Offset Fund. Permitted facilities must complete and report all trades to DEQ by June 1, 2021. DEQ will publish notice of all credit exchanges for the previous calendar year by July 1, 2021.

2020 James Total Nitrogen Discharges

Facility	Individual VPDES Permit No.	General Permit Registration No.	General Permit Outfall No.	Design Flow (MGD)	Discharged TN Wasteload Allocation (lbs/yr)	2017-2020 TN Delivery Factor	2017-2020 Delivered TN Wasteload Allocation (lbs/yr)	2020 Discharged TN (lbs)	2020 Delivered TN (lbs)	2020 Delivered TN Exceedance/ (Credit) (lbs)	Nutrient Offset Fund Held Credits (lbs)
Upper/Middle James											
Greif Packaging LLC	VA0006408	VAN040073	500	6.50	73,246	0.65	47,610	189,557	123,212	75,602	--
South Central Wastewater Authority WWTF	VA0025437	VAN040087	500	23.00	350,239	1.00	350,239	421,111	421,111	70,872	--
Buena Vista Public Service Authority-Buena Vista STP	VA0020991	VAN040063	500	2.25	41,115	0.56	23,024	55,039	30,822	7,798	--
City of Covington STP	VA0025542	VAN040065	500	3.00	54,820	0.21	11,512	72,665	15,260	3,748	--
VA Dept of Corrections - Augusta Correctional Center	VA0031621	VAN040118	500	0.44	1,823	0.21	371	7,537	899	718	--
Aqua Virginia Inc - Lake Monticello STP	VA0024945	VAN040074	500	0.995	18,182	0.67	12,182	17,314	11,600	-582	582
Tyson Foods Inc - Glen Allen	VA0004031	VAN040089	500	1.07	19,552	0.16	3,128	9,278	1,485	-1,643	--
Town of Crewe WWTP (Nottoway County)	VA0020303	VAN040100	500	0.50	9,137	0.29	2,650	2,903	842	-1,808	--
Aqua Virginia Inc - Manakin Farms WWTP	VA0027910	VAN040173	500	0.100	3,987	0.89	3,548	1,884	1,676	-1,872	--
Town of Amherst - Amherst-Rutledge Creek WWTP	VA0031321	VAN040071	500	0.60	10,964	0.34	3,728	4,848	1,648	-2,080	--
Buckingham County / Dillwyn WWTP	VA0027294	VAN040104	500	0.20	5,695	0.69	3,930	437	301	-3,628	--
VA Dept of Corrections - Powhatan Correctional Center	VA0020699	VAN040077	500	0.47	8,588	0.89	7,643	886	789	-6,854	--
Town of Farmville WWTP (Prince Edward County)	VA0083135	VAN040097	500	2.40	43,856	0.26	11,403	14,549	3,783	-7,620	--
WestRock Virginia LLC - Covington	VA0003646	VAN040070	500	35.00	394,400	0.11	43,384	269,199	29,612	-13,772	--
Maury Service Auth-Lexington-Rockbridge Regional WQCF	VA0088161	VAN040068	500	3.00	54,820	0.32	17,542	11,007	3,522	-14,020	--
Alleghany County Aggregate	--	VAN040069	500	--	--	--	19,005		4,483	-14,522	4,277
Low Moor WWTP	VA0027979	--	501	0.50	9,137	0.26		1,354			
Lower Jackson River WWTP	VA0090671	--	502	3.50	63,957	0.26		15,891			
Mohawk Industries, Inc.	VA0004677	VAN040067	500	2.00	30,456	0.59	17,969	1,773	1,046	-16,923	--
GP Big Island LLC	VA0003026	VAN040066	500	10.87	122,489	0.60	73,493	92,099	55,259	-18,234	--
The Sustainability Park LLC (001)	VA0002780	VAN040078	500	2.10	25,583	1.00	25,583	69	69	-25,514	--
BWXT Nuclear Operations Group Inc	VA0003697	VAN040072	500	1.00	187,000	0.65	121,550	140,103	91,067	-30,483	--
DuPont Specialty Products USA LLC - Spruance Plant	VA0004669	VAN040079	500	23.33	201,080	1.00	201,080	167,449	167,449	-33,631	--
Philip Morris USA Inc - Park 500 Wastewater Plant	VA0026557	VAN040084	500	2.90	139,724	1.00	139,724	34,620	34,620	-105,104	--
Rivanna Water & Sewer Authority - Moores Cr WRRF	VA0025518	VAN040076	500	15.00	282,831	0.67	189,606	74,541	49,942	-139,664	--
City of Lynchburg - Lynchburg Regional WWTP	VA0024970	VAN040075	500	22.00	536,019	0.65	348,412	270,944	176,114	-172,298	--
Chesterfield County Aggregate	--	VAN040080	500	--	--	--	564,952		381,663	-183,289	--
Falling Creek WWTP	VA0024996	--	501	10.10	153,801	1.00		140,611			
Proctors Creek WWTP	VA0060194	--	502	27.00	411,151	1.00		241,052			
VEPCO - Dominion-Chesterfield Power Station	VA0004146	VAN040086	500	--	272,036	1.00	272,036	27,687	27,687	-244,349	--
AdvanSix Resins and Chemicals LLC	VA0005291	VAN040082	500	121.00	1,090,798	1.00	1,090,798	680,626	680,626	-410,172	--
Henrico County Water Reclamation Facility	VA0063690	VAN040081	500	75.00	1,142,085	1.00	1,142,085	658,861	658,861	-483,224	--
City of Richmond WWTP	VA0063177	VAN040085	500	45.00	1,093,652	1.00	1,093,652	260,205	260,205	-833,447	--
City of Hopewell - Hopewell Water Renewal	VA0066630	VAN040083	500	50.00	1,827,336	1.00	1,827,336	803,786	803,786	-1,023,550	--
Upper/Middle James Subtotals							7,669,648		4,038,936	-3,630,712	4,858

 **Facilities exceeding TN WLA**

July 1st Nutrient Trades Report

2020 Nutrient Trades Report

§ 62.1-44.19:18.E. of the State Water Control Law requires that by July 1st of each year, DEQ publish notice of all nitrogen and phosphorus credit exchanges and purchases for the previous calendar year and make all documents relating to the exchanges and purchases available to any person requesting them.

For calendar year 2020 all but 20 registrants under the Watershed General Virginia Pollutant Discharge Elimination System Permit (9 VAC 25-820-70) met their wasteload allocations without the need for trading. All 20 facilities that exceeded their Total Nitrogen and/or Total Phosphorus wasteload allocations acquired enough credits to meet their compliance needs. An adequate supply of credits was available in every basin.

2020 Total Nitrogen Credit Transfers

Basin	Facility	Individual VPDES Permit No.	General Permit Registration No.	Design Flow (MGD)	Discharged TN Wasteload Allocation (lbs/yr)	TN Delivery Factor	Delivered TN Wasteload Allocation (lbs/yr)	2020 Discharged TN (lbs)	2020 Delivered TN (lbs)	2020 Delivered TN Exceedance (lbs)	2020 Delivered TN Credits Obtained (lbs)	Source of Credits
Rappahannock	City of Fredericksburg WWTF	VA0025127	VAN020095	4.50	54,820	1.00	54,820	61,663	61,663	6,843	6,843	VNCEA
Rappahannock	Spotsylvania County Nutrient Aggregate	--	VAN020055	--	--	--	163,242	--	168,072	4,830	4,830	VNCEA
	FMC WWTF	VA0068110		4.00	48,737	1.00		83,774				
	Massaponax WWTF	VA0025658		9.40	114,505	1.00		84,298				
Rappahannock	Hampton Roads Sanitation District - Urbanna WWTP	VA0026263	VAN020034	0.10	1,218	1.00	1,218	2,534	2,534	1,316	1,316	VNCEA
Rappahannock	Westmoreland Co - Montross-Westmoreland WWTP	VA0072729	VAN020032	0.13	1,584	0.74	1,172	2,710	2,005	833	833	VNCEA
York	WestRock CP LLC - West Point	VA0003115	VAN030049	23.00	259,177	1.00	259,177	302,843	302,843	43,666	43,666	VNCEA
James	Greif Packaging LLC	VA0006408	VAN040073	6.50	73,246	0.65	47,610	189,557	123,212	75,602	75,602	VNCEA
James	South Central Wastewater Authority WWTF	VA0025437	VAN040087	23.00	350,239	1.00	350,239	421,111	421,111	70,872	171,694	VAN040080
James	Buena Vista Public Service Authority-Buena Vista STP	VA0020991	VAN040063	2.25	41,115	0.56	23,024	55,039	30,822	7,798	7,798	VNCEA
James	City of Covington STP	VA0025542	VAN040065	3.00	54,820	0.21	11,512	72,665	15,260	3,748	3,748	VNCEA
Totals										215,508	316,330	



 TN Credits Acquired

Footnotes

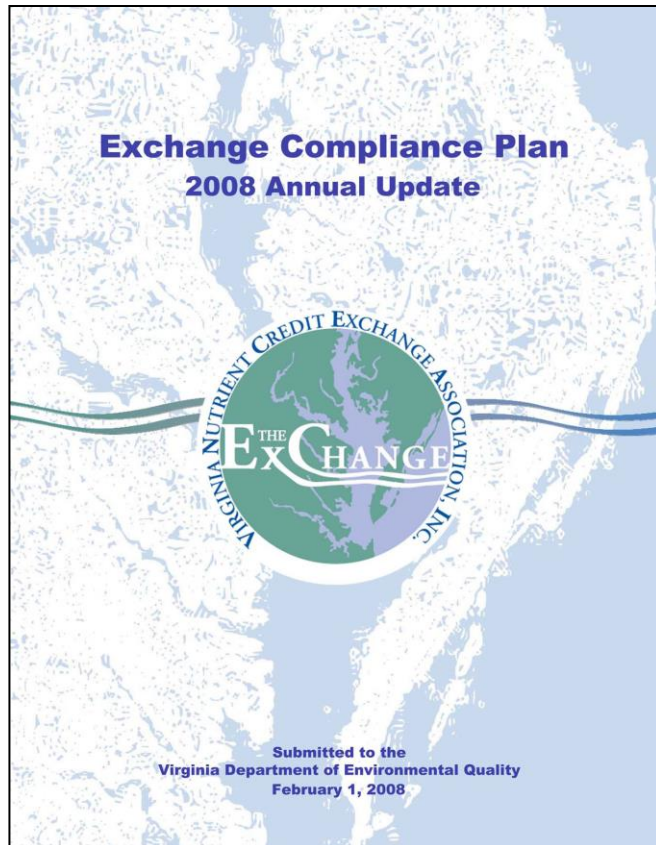
VNCEA = Virginia Nutrient Credit Exchange Association

VAN040080 - Chesterfield County

2020 Nutrient Trades

- 20 facilities required approximately 216,000 lbs of TN and 28,000 lbs of TP credits
- 1.3% of aggregate TN WLA and 2.4% of aggregate TP WLA
- Estimated \$1.5M market value

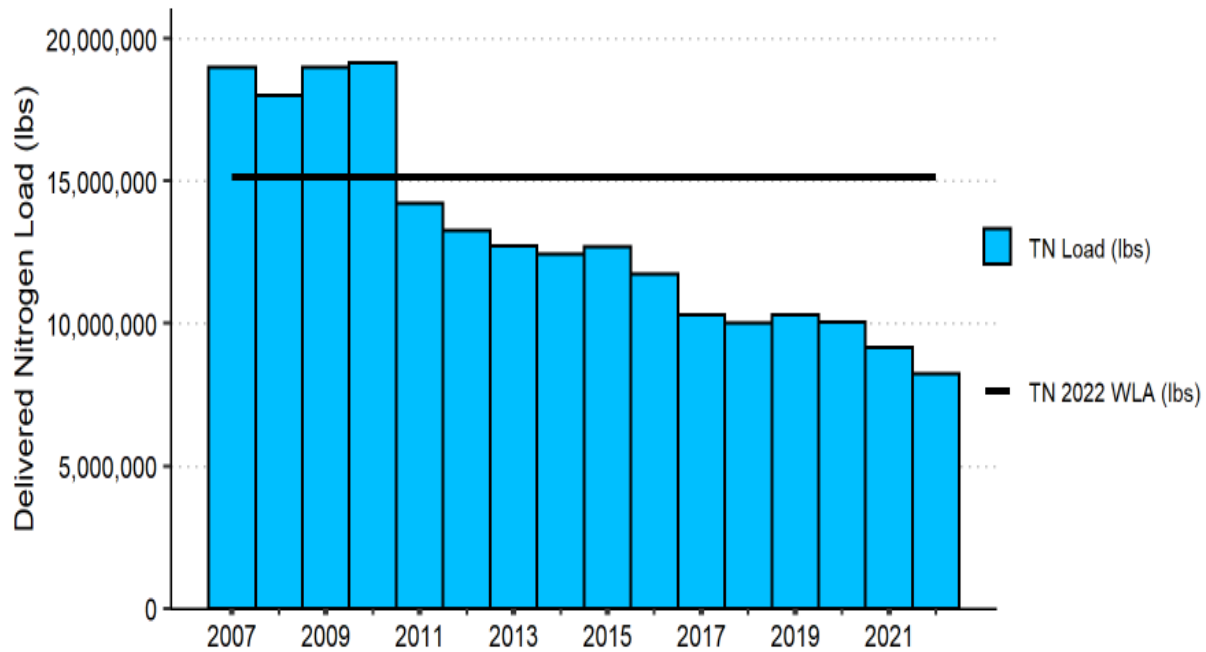
Primary Factors in Success of the Point Source Trading Program



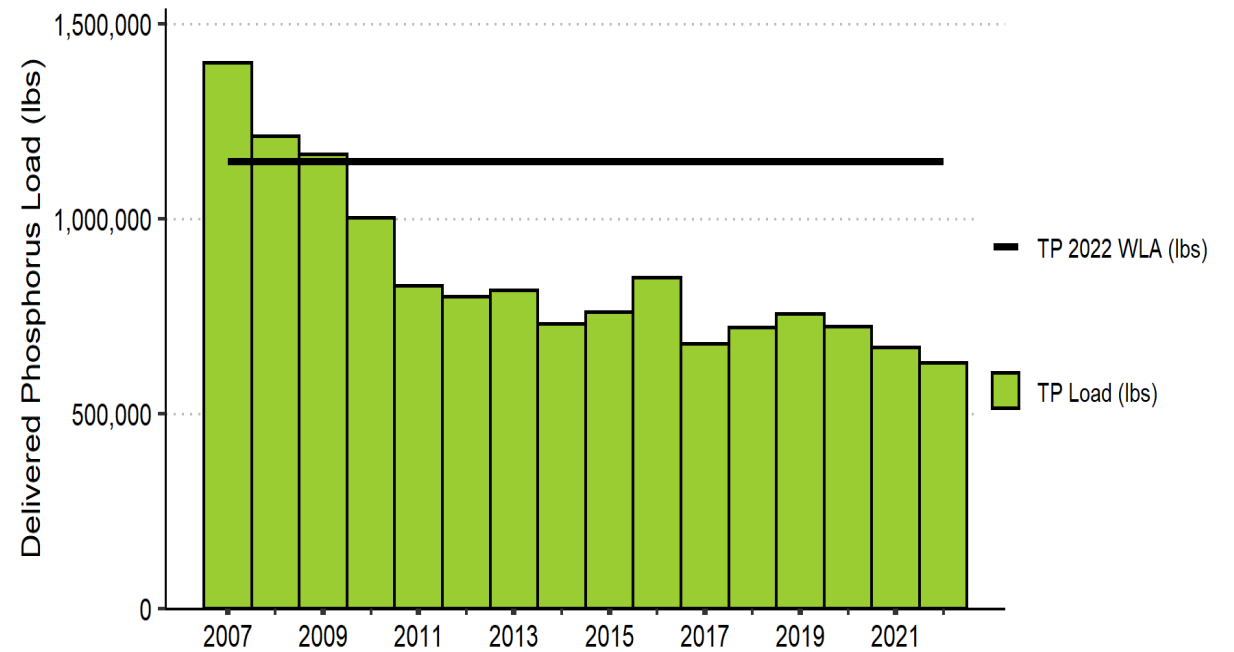
- Watershed general permit
 - Expedient – one negotiation
 - Common schedule of compliance
 - Consistent requirements
 - Provides permittees compliance alternatives
- Formation of the Virginia Nutrient Credit Exchange Association with voluntary membership
- Permittees given ownership of the market and have embraced the program

Reductions to Date

Statewide Delivered Nitrogen Loads (Based on 2022 Delivery Factors)



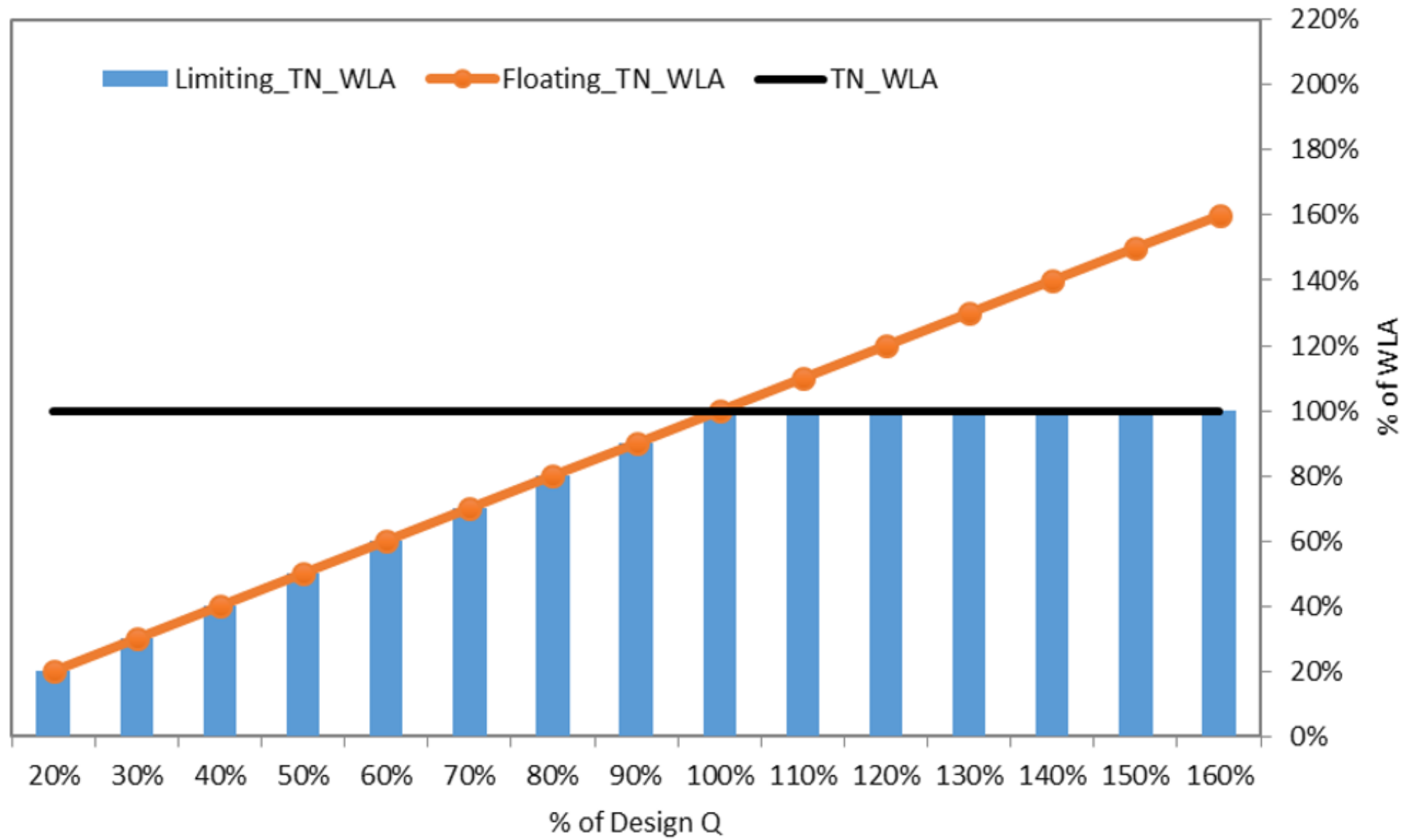
Statewide Delivered Phosphorus Loads (Based on 2022 Delivery Factors)



2019 Phase III Chesapeake Bay Watershed Implementation Plan (WIP)

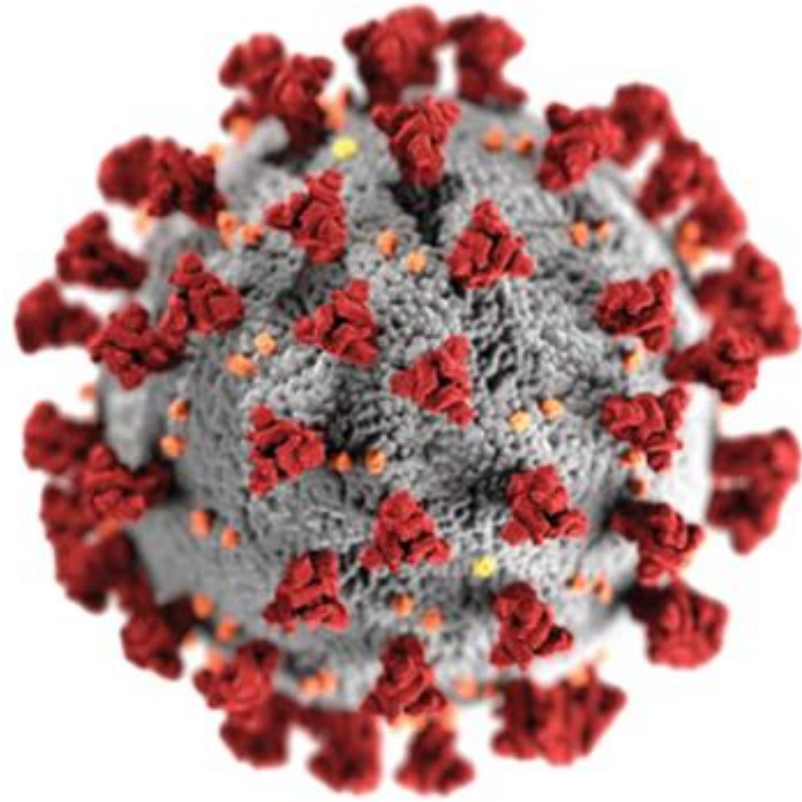
- Significant additional reductions required by 2026 to address climate change and lagging implementation in other sectors (\approx 9M lbs TN and 875K lbs of TP reductions needed)
- Initiative #52 proposed Floating WLAs for Virginia's municipal wastewater sector
- Floating WLA based on annual average flow and 4 mg/l TN and 0.3 mg/l TP
- In any given year the stringent of the existing WLA and the floating WLA would apply

TN WLA Based on 4 mg/L



Floating Wasteload Allocations

- Floating WLAs expected to produce additional reductions of 2.7 – 3.0M lbs of TN and 240 - 300K lbs of TP
- 25% TN reduction and 32% TP reduction for wastewater sector
- Notice of Intended Regulatory Action published November 2019
- Regulatory Advisory Panel (RAP) established to address to amend the Water Quality Management Planning Regulation 9VAC25-720 to:
 - Establish Floating WLAs
 - Reallocated unused industrial WLAs
 - Establish Chlorophyll-a based WLAs for the James River Basin





2020 Budget Provision – Item 377 #6c

"F.2. The Department shall work with permittees operating under the Chesapeake Bay Watershed Nutrient General Permit and interested stakeholders through a workgroup including local government representatives, the Chesapeake Bay Foundation and the James River Association to review the assumptions used in estimating the effluent nutrient concentrations and trends of wastewater facilities and to identify cost-effective options to achieve wastewater nutrient load levels with reasonable assurance consistent with the needs of the Chesapeake Bay TMDL Phase III Watershed Implementation Plan. The review shall be completed and provided to the Chairs of the House Appropriations Committee, the Senate Finance and Appropriations Committee, the House Committee on Agriculture, Chesapeake and Natural Resources, the Senate Committee on Agriculture, Conservation, and Natural Resources and the Virginia delegation of the Chesapeake Bay Commission by December 1, 2020. The Department shall continue issuing Water Quality Improvement Fund grants for additional nutrient removal projects in accordance with the appropriations under Items 379 and C-70 of this act and §§ 10.1-1186.01 and 10.1-2117 of the Code of Virginia."

Explanation:

(This amendment directs The Department of Environmental Quality to review the assumptions used to estimate nutrient concentrations and trends of wastewater facilities and to identify cost-effective options to achieve wastewater nutrient load levels consistent with the needs of Phase III of the Watershed Implementation Plan.)

Floating Wasteload Allocations

- Regulatory Advisory Panel (RAP) established to address:
 - Floating WLAs
 - Unused industrial WLAs
 - Chlorophyll-a based WLAs for the James River Basin
- Budget Workgroup established to address DEQ's assumptions for the wastewater sector in the Phase III Watershed Implementation Plan
- 9 RAP and 5 Budget Workgroup hybrid (in person and virtual) meetings held through October 2020
- Strong opposition from the point source sector

Key Findings

*Review of Wastewater Nutrient Concentrations and Trends in Virginia's
Chesapeake Bay TMDL Phase III Watershed Implementation Plan*

Virginia Department of Environmental Quality
COMMONWEALTH OF VIRGINIA

December 1, 2020

- Estimated nutrient concentrations and loads for wastewater sector were conservative
- Conservative assumptions did not impact the decision to proceed with Floating WLAs in Initiative #52
- Since 2010, wastewater sector responsible for 97% of all TN reductions and 75% of all TP reductions in VA's Chesapeake Bay watershed
- Floating WLAs represent the Commonwealth's best opportunity to achieve significant, reliable and timely nutrient reductions under the TMDL

Amendments to the Water Quality Management Planning Regulation

- Proposed amendments to Water Quality Management Planning Regulation drafted with input from Regulatory:
 - Floating WLAs for 36 municipal facilities (all but 15 of 36 previously upgraded and 10 of 15 had previously planned upgrades – 5 incremental facilities)
 - Reassign WLAs for 5 industrial facilities to the Nutrient Offset Fund
 - Establish Chlorophyll-a based TP WLAs for 7 facilities in the upper tidal freshwater segment of the James River
- Notice of Public Comment (NOPC) approved by State Water Control Board on December 9, 2020

Example Floating WLA Provisions

¹ The wasteload allocations for any given calendar year are the lesser of (i) the values above and (ii) the floating wasteload allocations calculated as follows:

TN WLA (lbs/yr) = Annual average treated flow (MGD) x (4.0, 8.0 or 12.0) mg/l x 8.345 x 365

TP WLA (lbs/yr) = Annual average treated flow (MGD) x 0.30 mg/l x 8.345 x 365

Annual average treated flow is the sum of 12 monthly average treated flows divided by 12. Floating wasteload allocations shall be calculated to the nearest pound without regard to mathematical rules of precision.

Note: the use of “treated flow” allows WWTP’s with significant reclamation and reuse or other treatment systems which divert flow from the discharge to calculate floating WLAs using influent flow.



Enhanced Nutrient Reduction Certainty (ENRC) Program – House Bill 2129/Senate Bill 1354

- HB 2129 established the Enhanced Nutrient Reduction Certainty (ENRC) Program
- Eliminates the floating WLA approach developed by DEQ
- Commits to upgrade/consolidation projects at 13 POTWs and WLA reductions at 7 POTWs
- Achieves approximately the same reductions as the floating WLAs would have required ($\approx 3\text{M lbs/yr TN}$ and 300K lbs/yr TP)
- Prioritizes funding of ENRC projects by Virginia's Water Quality Improvement Fund (WQIF)
- DEQ has amended the individual VPDES permits to implement the ENRC Program and adopted remaining WQMP Reg elements



Lessons Learned

- Engage your stakeholders early and often!
 - Floating WLA concept was not discussed with the municipal treatment facilities during the early stages of the WIP III development process
- Keep as many tools as possible at your disposal (e.g. VA's dual technology and water quality based approaches)
- Try to resolve issues within the Executive Branch!

Questions?



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