DO Water Quality Standard Stoplight Analysis For Lower Susquehanna River Watershed Assessment

Modeling Workgroup Quarterly Review

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WQSTM Scenarios Used in Analysis*

- 2010 No Action N-Based
- 1985 Scenario
- Base Case – Calibration
- 2007 Progress
- 2009 Progress
- 2010 Progress
- 2010 Progress w/ simulated deposition and scour of the Conowingo reservoir removed from WSM loads.
- 2010 Progress w/ 0% N, 50% P, 100% TSS increase in annual loads
- 2010 Progress w/ 0% N, 70% P, 250% TSS increase in annual loads
- TMDL (Level of Effort)
- TMDL (LoE) w/ simulated deposition and scour of the Conowingo reservoir removed from WSM loads.
- TMDL (LoE) w/ 0% N, 50% P, 100% TSS increase in annual loads
- TMDL (LoE) w/ 0% N, 70% P, 250% TSS increase in annual loads
- 2010 E3 N-Based
- All Forest

* All scenarios are based on Phase 5.3.2 loads.

DO Stoplight Decision Rules:

- Applied standard Phase I & II Allocation decision rules of rounding to the nearest whole number of nonattainment and allowing 1% nonattainment for uncertainties in overall analysis procedure.
- A CB4MH and PATMH Deep Water variance of 7%.
- A CB4MH and EASMH Deep Channel variance of 2%.
- A CHSMH Deep Chanel variance of 16%.

DO Deep Channel

Cbseg	Scenario → Year → State	2010 No Action N-Based Scenario 371 TN, 37.6 TP, 10630TSS '93-'95 DO Deep Channel	1985 Scenario 353 TN, 24.6 TP, 10100 TSS '93-'95 DO Deep Channel	'91 -'00 Base Scenario 318 TN, 20.3 TP, 9440 TSS '93-'95 DO Deep Channel	2007 Scenario 269 TN, 19.5 TP, 8770 TSS '93-'95 DO Deep Channel	2009 Scenario 266 TN, 19.1 TP, 8520 TSS '93-'95 DO Deep Channel	2010 Scenario 263 TN 19.4 TP 8360 TSS '93-'95 DO Deep Channel	2010 No Conowingo 272 TN 20 TP 9263 TSS '93-'95 DO Deep Channel	2010 scour100% '93-'95 DO Deep Channel	2010 scour250% '93-'95 DO Deep Channel	TMDL Scenario 191 TN 15 TP 6675 TSS '93-'95 DO Deep Channel	TMDL No Conowingo 200 TN 15 TP 7394 TSS '93-'95 DO Deep Channel	TMDL scour100% '93-'95 DO Deep Channel	TMDL scour250% '93-'95 DO Deep Channel	E3 2010 N-Based Scenario 135 TN, 10.4 TP, 4850 TSS '93-'95 DO Deep Channel	All Forest Scenario 54 TN, 2.6 TP, 1340 TSS '93-'95 DO Deep Channel
CB3MH	MD	22%	17%	14%	12%	11%	5%	7%	8%	7%	0%	0%	0%	0%	0%	0%
CB4MH	MD	54%	49%	46%	40%	38%	23%	26%	30%	30%	1.49%	2.73%	3.39%	4.25%	0%	0%
CB5MH	both	22%	17%	15%	10%	9%	0%	1%	2%	3%	0%	0%	0%	0%	0%	0%
CHSMH	MD	45%	39%	39%	36%	36%	28%	34%	31%	34%	15.01%	15.66%	15.66%	18.81%	5%	0%
EASMH	MD	38%	29%	27%	24%	24%	14%	15%	17%	16%	1.09%	2.49%	3.73%	5.33%	0%	0%
MD5MH	MD	31%	25%	24%	19%	17%	2%	4%	8%	8%	0%	0%	0%	0%	0%	0%
PATMH	MD	46%	42%	28%	25%	25%	18%	24%	23%	23%	0%	0%	0%	0%	0%	0%
POMMH	MD	27%	20%	20%	13%	10%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
POTMH	both	27%	20%	20%	13%	10%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
RPPMH	VA	29%	23%	19%	6%	4%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
VA5MH	VA	12%	7%	4%	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%

Initial DO Findings – Deep Channel:

- Applied standard Phase I Allocation decision rules of rounding to the nearest whole number of nonattainment and allowing 1% nonattainment for uncertainties in overall analysis procedure.
- Complete attainment of the Deep Channel water quality standard (WQS) is estimated at the TMDL Level of Effort Scenario.
- With variances and application of the standard stoplight analysis decision rules there is still estimated complete attainment of the Deep Channel WQS with the simulated Conowingo Pool absent, but attainment levels are decreased by about 1% in CB4MH and EASMH. Nonattainment of the Deep Channel WQS is widespread under the 100% and 250% scour scenarios.

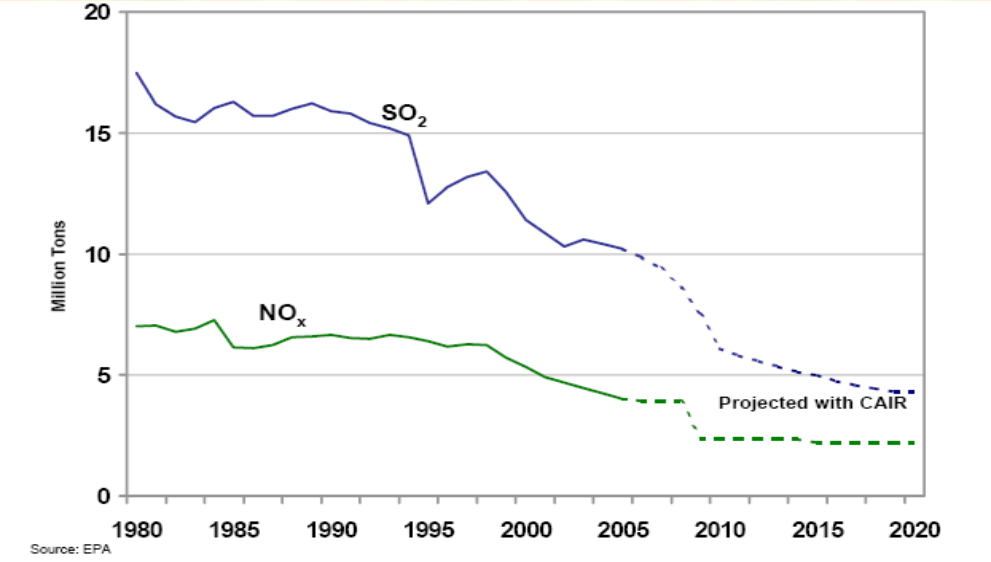
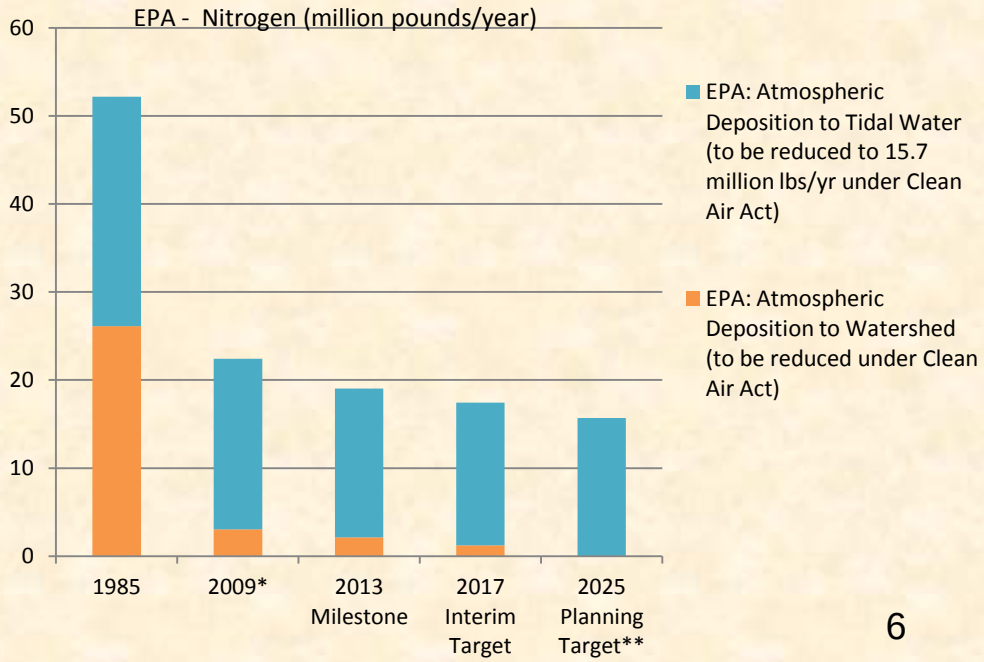


Figure 5-7. Estimated nationwide emissions of NO_x and SO_2 from EGUs since 1980 and estimated emissions to 2020.

Is there any there there?



DO Deep Water

Cbseg	Scenario → Year → State	2010 No Action N-Based Scenario 371 TN, 37.6 TP, 10630TSS '93-'95 DO Deep Water	1985 Scenario 353 TN, 24.6 TP, 10100 TSS '93-'95 DO Deep Water	'91 -'00 Base Scenario 318 TN, 20.3 TP, 9440 TSS '93-'95 DO Deep Water	2007 Scenario 269 TN, 19.5 TP, 8770 TSS '93-'95 DO Deep Water	2009 Scenario 266 TN, 19.1 TP, 8520 TSS '93-'95 DO Deep Water	2010 Scenario 263 TN 19.4 TP 8360 TSS '93-'95 DO Deep Water	2010 No Conowingo 272 TN 20 TP 9263 TSS '93-'95 DO Deep Water	2010 scour100% '93-'95 DO Deep Water	2010 scour250% '93-'95 DO Deep Water	TMDL Scenario 191 TN 15 TP 6675 TSS '93-'95 DO Deep Water	TMDL No Conowingo 200 TN 15 TP 7394 TSS '93-'95 DO Deep Water	TMDL scour100% '93-'95 DO Deep Water	TMDL scour250% '93-'95 DO Deep Water	E3 2010 N-Based Scenario 135 TN, 10.4 TP, 4850 TSS '93-'95 DO Deep Water	All Forest Scenario 54 TN, 2.6 TP, 1340 TSS '93-'95 DO Deep Water
CB3MH	MD	4%	2%	2%	2%	2%	1%	1%	1%	1%	0%	0%	0%	0%	0%	0%
CB4MH	MD	28%	22%	20%	17%	16%	11%	11%	12%	12%	4.7%	5.5%	5.7%	5.9%	3%	0%
CB5MH	both	7%	5%	4%	3%	3%	2%	2%	2%	2%	0%	0%	0%	0%	0%	0%
CB6PH	VA	1%	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
CHSMH	MD	39%	32%	26%	21%	19%	11%	13%	13%	13%	0%	2.7%	3.3%	3.9%	1%	0%
EASMH	MD	34%	14%	6%	4%	4%	2%	2%	2%	2%	0.90%	1.2%	1.1%	1.1%	0%	0%
MD5MH	MD	14%	10%	9%	7%	7%	4%	4%	5%	5%	0.86%	1.2%	1.3%	1.5%	0%	0%
PATMH	MD	31%	21%	13%	11%	11%	6%	9%	7%	7%	0%	0.9%	1.0%	1.0%	0%	0%
PAXMH	MD	23%	12%	7%	4%	3%	0%	1%	4%	3%	0%	0%	0%	0%	0%	0%
POMMH	MD	10%	5%	4%	2%	2%	0%	1%	1%	1%	0%	0%	0%	0%	0%	0%
POTMH	both	9%	5%	4%	2%	2%	0%	1%	1%	1%	0%	0%	0%	0%	0%	0%
RPPMH	VA	13%	8%	6%	3%	1%	0%	0%	1%	1%	0%	0%	0%	0%	0%	0%
SBEMH	VA	5%	3%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
VA5MH	VA	1%	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
YRKPH	VA	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%

Initial DO Findings – Deep Water:

- Applied standard Phase I Allocation decision rules of rounding to the nearest whole number of nonattainment and allowing 1% nonattainment for uncertainties in overall analysis procedure.
- There is widespread attainment of the Deep Water standard at the TMDL (LoE). The No Conowingo scenario increases nonattainment by less than 1% in 4 segments and nonattainment in the Chester Mesohaline Deep Water. Nonattainment increases under the 100% and 250% scour scenarios.

Open Water

Cbseg	Scenario → Year → State	2010 No Action N-Based Scenario 371 TN, 37.6 TP, 10630TSS '93-'95 DO Open Water	1985 Scenario 353 TN, 24.6 TP, 10100 TSS '93-'95 DO Open Water	'91 -'00 Base Scenario 318 TN, 20.3 TP, 9440 TSS '93-'95 DO Open Water	2007 Scenario 269 TN, 19.5 TP, 8770 TSS '93-'95 DO Open Water	2009 Scenario 266 TN, 19.1 TP, 8520 TSS '93-'95 DO Open Water	2010 Scenario 263 TN 19.4 TP 8360 TSS '93-'95 DO Open Water	2010 No Conowingo 272 TN 20 TP 9263 TSS '93-'95 DO Open Water	2010 scour100% '93-'95 DO Open Water	2010 scour250% '93-'95 DO Open Water	TMDL Scenario 191 TN 15 TP 6675 TSS '93-'95 DO Open Water	TMDL No Conowingo 200 TN 15 TP 7394 TSS '93-'95 DO Open Water	TMDL scour100% '93-'95 DO Open Water	TMDL scour250% '93-'95 DO Open Water	E3 2010 N-Based Scenario 135 TN, 10.4 TP, 4850 TSS '93-'95 DO Open Water	All Forest Scenario 54 TN, 2.6 TP, 1340 TSS '93-'95 DO Open Water
APPTF	VA	11%	11%	0%	0%	0%	5%	5%	5%	5%	0%	0%	0%	0%	0%	0%
BACOH	MD	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
BIGMH	MD	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
BOHOH	MD	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	0%	1%
BSHOH	MD	20%	0%	1%	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
CB1TF	MD	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
CB2OH	MD	3%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
CB3MH	MD	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
CB4MH	MD	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
CB5MH	both	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
CB6PH	VA	4%	3%	2%	1%	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
CB7PH	VA	9%	7%	6%	4%	4%	0%	0%	1%	1%	0%	0%	0%	0%	0%	0%
CB8PH	VA	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
CHKOH	VA	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
CHOMH1	MD	4%	2%	2%	1%	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
CHOMH2	MD	20%	11%	4%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%

Initial DO Findings – Open Water:

- Applied standard Phase I Allocation decision rules of rounding to the nearest whole number of nonattainment and allowing 1% nonattainment for uncertainties in overall analysis procedure.
- Estimating unchanged DO response and attainment levels for Open Water at the TMDL level of reductions for all Conowingo scoping scenarios.

Conclusions:

- These are preliminary findings and much work needs to be done to complete the 2017 assessment of the influence of Conowingo infill on the Chesapeake TMDL.
- Estimates are that attainment of the DO criteria in some Deep Channel and Deep Water designated uses decreases by about 0.5 to 1% with simulated conditions of no Conowingo Pool (Step 1 type scenario) and decreases further under Step 2 type scoping scenarios of 100% and 250% scour.
- The Open Water DO WQS are unaffected by simulated Conowingo infill scenarios.