Interim BMP: Denitrifying Ditch Bioreactor
Chesapeake Bay Program Phase 6.0 Modeling Tools

Agriculture Workgroup
Approved April 19, 2018

BMP Name: Denitrifying Ditch Bioreactor

BMP Definition: This BMP represents the edge-of-field treatment for tile-drained cropland areas through practices that reduce nitrogen pollutant loads by diverting tile-line flow through a carbon-source filter to enhance denitrification.

Measurement Names to be submitted: acres treated, county of treatment acres

Model Simulation: The carbon material, typically wood chips, serves as a food source for microorganisms in the low-oxygen environment of the bioreactor, converting nitrate-N in drainage water into nitrogen gas (N_2). The Agricultural Ditch Management Expert Panel recommends an efficiency value of 20% for total nitrogen load leaving the drainage area treated, for planning purposes only. This value is a conservative estimate subject to change as the Expert Panel continues to formulate final recommendations for a larger suite of agricultural ditch management practices. The life-span of this practice is preliminarily recommended to be 10 years.

States will submit acres of cropland treated in a way consistent with the interim BMP definition. Acres identified for planning will be associated with default pounds of N in the Phase 6.0 Model for representative land use and cropping system. The Agricultural Modeling Subcommittee (AMS) has defined the pounds of N per acre for cropland production based on available literature values. The AMS recommendations have been reviewed and approved by the Agriculture Workgroup (AgWG) for use in the Phase 6.0 modeling tools.

The Chesapeake Bay Program Office will create an interim BMP for Phase 6.0 that will be listed as "DRAFT" in the NEIEN Appendix. This will allow states to use the interim BMP for planning purposes, and to report subsequent implementation information to NEIEN. However, the interim BMP will not receive credit through annual progress reporting until the availability of a partnership approved BMP Expert Panel recommendation report.

References:

Addy, K., A.J. Gold, L, E, Christianson, M.B. David, L.A. Schipper, and N.A. Ratigan. 2016. Denitrifying bioreactors for nitrate removal: A meta-analysis. J. Environ. Qual. 45(3): p. 873-881. doi: 10.2134/jeq2015.07.0399

Jaynes, D.B., T.C. Kasper, T.B. Moorman, and T.B. Parkin. 2008. In situ bioreactor and deep drain -pipe installation nitrate losses in artificially drained fields. J. Environ. Qual. 37(2): p. 429-426. doi: 10.2134/jeq2007.0279.

USDA NRCS. 2015. Conservation Practice Standard 605: Denitrifying Bioreactor. https://www.nrcs.usda.gov/wps/portal/nrcs/detailfull/national/technical/cp/ncps/?cid=nrcs143_026849 (accessed 14 Mar. 2018).