Evaluating Manufactured Treatment Devices for Treatment of Stormwater in Virginia

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Outline

- Introduction
- Virginia Water Quality Issues
  - Chesapeake Bay TMDL
  - Virginia Stormwater Management Program
- Virginia Technology Assessment Protocol/VTAP
  - Chronology
  - Features and Basis
  - Nonproprietary BMP Expert Panel
- Next Wave of Treatment Practices
- Summary
Research and Extension Program

- Implement and assess innovative BMPs (adaptive management in design)
- Develop predictive models of BMP behavior
- Integrate economics and evaluate over BMP life cycle
- Evaluate behavior of BMPs in watersheds
- Develop outreach programs to inform and assist in implementation of emerging BMPs
Chesapeake Bay TMDL

- Issued in late 2010 for Sediment, N, P, significant reductions by all sectors by 2025
- Will require massive investments in SW, WW, and Ag sectors
- New technologies will be essential in meeting goals

Source: Chesapeake Bay Program, 2005.
Aquatic Health and Tributary Scores

Source: Chesapeake Bay Report Card, 2008, Integration and Application Network, University of Maryland Center for Environmental Science (UMCES) and EcoCheck, a partnership of National Oceanographic and Atmospheric Administration (NOAA) and UMCES.
Currently Impaired Waters in Virginia

Source: VDEQ Final 2008 305(b)/303(d) Water Quality Assessment Integrated Report
- New focus upon runoff volume control, LID principles
- Mix of old and new (LID) BMPs, 15 “non-proprietary” (public domain) approved
- Consensus credit (Clearinghouse, DCR, CWP) based upon literature data
- New standards part of Chesapeake Bay TMDL WIP
- Phased in, July 1, 2014
MTD History in Virginia

- MTDs Emerged over last 15-20 years
- Six listed in 1999 VA SWM Handbook
- Often involve “proprietary” (trade-secret) processes or components
- Often underground to save surface space
- Limited performance testing
- Testing has focused on TSS removal, NOT nutrients
Regulatory Background

- DCR Director approves BMPs for use in Virginia
- Approved BMPs listed on BMP Clearinghouse website
- Sources of previous evaluations:
  - National Pollutant Removal Database (CWP)
  - International BMP Database (ASCE)
  - Test results through other state testing programs
  - Advice from recognized and reliable sources, such as:
    - Center for Watershed Protection (CWP)
    - Chesapeake Stormwater Network
    - EPA Chesapeake Bay Program
Evolution of VTAP

- In 2007, DCR established the VA Stormwater BMP Clearinghouse: [http://vwrrc.vt.edu/swc/](http://vwrrc.vt.edu/swc/)
- Main discussions focused upon testing procedures to evaluate nutrient (TP) pollutant removal of BMPs
- Expert panel report in 2010
- Guidance manual adopted in late 2011 as draft
- Regulations drafted/passed in late 2012
- Regulatory review
- Anticipated transfer of SW program to DEQ
- Evaluation of applications-beginning mid-2013
VTAP origins

- Other programs:
  - TARP (six states including Virginia, but principally New Jersey)
  - TAPE (state of Washington)
  - USEPA monitoring standards and procedures
  - ASTM testing procedures

Expert Panel Recommendations

- Goal of program is to characterize mass flux
- Minimum number of tests, 24, or statistically significant
- Sequential sampling (back to back events)
- TP, TSP, SRP, TSS, SSC, PSC
- P avg. 0.3 mg/L
- QAPP, TER review
- Certified labs
- Recommended better testing at fewer sites

Condensed, poly-, and organic phosphates should not be construed to be equal in concentration.

All "soluble" forms are operationally defined as those passing the filter pore size selected (usually 0.45 μm).

Total phosphorus - TP (rigorous acid digestion with heat)
Key Features of Adopted VTAP

- Sequential events modified to 5 dual events
- Dropped installation limitations, sites to 2
- Additions
  - Added certifications for sediment, N (TN, TDN, Ammonia-N, Ox-N)
  - Pretreatment
  - Nonproprietary
- Created Contract Evaluator
- COI

Unique Accomplishments

- TMDL driving force
- LID paradigm shift
- Other
  - Purple State?
  - Fiscal considerations
  - Government structure: Dillon rule
New Expert Panel on Nonproprietary BMPs

- Classify potential nonproprietary BMPs
  - “Classic” Input/output BMPs
  - Ecological BMPs
  - Agricultural/management BMPs
  - Enhancement devices
  - Additional?

- Identify the key elements that will apply for each class of BMP

- Balance need for information, lack of “advocate”
Emerging Technologies-Floating Wetlands

- Retrofit of existing wet pond
- Heavily urbanized headwater catchment
- NFWF/Ches. Bay Fund
Emerging Technologies—Algal Turf Scrubbers (ATS)

- Green economy, researched by Odum
- ATS uses native algae attached to a screen in a shallow, flowing flume (patented, Alday)
- ATS uses suspended algae, making it easier to harvest than attached algae
- Demonstrations underway at VIMS, Exelon (PA), MD

Summary

- New technologies, and their evaluation, are essential to meet the TMDL
- Balance must be achieved among competing objectives
- VTAP is a stakeholder model
- Investments in monitoring (on federal/state level) need to increase
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