WASHINGTON STATE DEPARTMENT OF ECOLOGY

August 2014

CONDITIONAL USE LEVEL DESIGNATION FOR BASIC (TSS) AND PHOSPHORUS TREATMENT
For
CONTECH Engineered Solutions
Stormwater Management StormFilter®
with PhosphoSorb® media

Ecology's Decision:

1. **Based on Contech Engineered Solutions application, Ecology hereby issues the following use level designation for the Stormwater Management StormFilter® using PhosphoSorb® media cartridges:**

   - **Conditional Use Level Designation (CULD) for Basic Treatment (total suspended solids) and for Phosphorus (total phosphorus) treatment.**
     - **Sized at a hydraulic loading rate of no greater than 1.67 gallon per minute (gpm) per square foot (sq ft.) of media surface, per Table 1.**
     - **Using Contech's PhosphoSorb media. Specifications for the media shall match the specifications provided by the manufacturer and approved by Ecology.**

Table 1. StormFilter design flow rates for 18-inch diameter cartridges with PhosphoSorb media, operating at 1.67 gpm/sq ft.

Effective cartridge height (in)	Cartridge flow rate (gpm/cartridge)
12	8.35
18	12.53
27	18.79

2. **Ecology approves StormFilter systems containing PhosphoSorb media for treatment at the cartridge flow rate shown in Table 1, to achieve the maximum water quality design flow rate. Calculate the water quality design flow rates using the following procedures:**
   - **Western Washington: For treatment installed upstream of detention or retention, the water quality design flow rate is the peak 15-minute flow rate as calculated using the latest version of the Western Washington Hydrology Model or other Ecology-approved continuous runoff model.**
   - **Eastern Washington: For treatment installed upstream of detention or retention, the water quality design flow rate is the peak 15-minute flow rate as calculated using one of the three methods described in Chapter 2.2.5 of the Stormwater Management Manual for Eastern Washington (SWMMEW) or local manual.**
   - **Entire State: For treatment installed downstream of detention, the water quality design flow rate is the full 2-year release rate of the detention facility.**
3. **The use level designation expires on June 30, 2017 unless Ecology extends the date, and is subject to the conditions specified below.**

Ecology's Conditions of Use:

StormFilter systems containing PhosphoSorb media shall comply with these conditions:

1. **Design, assemble, install, operate, and maintain StormFilter systems containing PhosphoSorb media in accordance with applicable Contech Engineered Solutions manuals, documents, and the Ecology Decision.**
2. **Use sediment loading capacity, in conjunction with the water quality design flow rate, to determine the target maintenance interval.**
3. **Owners shall install StormFilter systems in such a manner to bypass flows exceeding the water quality treatment rate or flows through the system will not re-suspend captured sediments.**
4. **Contech Engineered Solutions shall complete all required testing and submit a TER for Ecology review by September 15, 2016.**
5. **Contech Engineered Solutions may request Ecology to grant deadline or expiration date extensions, upon showing cause for such extensions.**
6. **This CULD approval allows up to ten (10) installations of StormFilter systems containing PhosphoSorb media within the State of Washington for development and redevelopment projects (as defined by the *Stormwater Management Manual Western Washington*). The limit of ten sites applies to the total number of installations, whether for basic or for phosphorus treatment.**

7. **Maintenance: The required maintenance interval for stormwater treatment devices is often dependent upon the degree of pollutant loading from a particular drainage basin. Therefore, Ecology does not endorse or recommend a "one size fits all" maintenance cycle for a particular model/size of manufactured filter treatment device.**
    - **Typically, CONTECH designs StormFilter systems for a target filter media replacement interval of 12 months. Maintenance includes removing accumulated sediment from the vault, and replacing spent cartridges with recharged cartridges.**
    - **Indications of the need for maintenance included the effluent flow decreasing to below the design flow rate, as indicated by the scumline above the shoulder of the cartridge.**
    - **Owners/operators must inspect StormFilter with PhosphoSorb media for a minimum of twelve months from the start of post-construction operation to determine site-specific maintenance schedules and requirements. You must conduct inspections monthly during the wet season, and every other month during the dry season. (According to the *SWMMWW,* the wet season in western Washington is October 1 to April 30. According to *SWMMEW,* the wet season in eastern Washington is October 1 to June 30). After the first year of operation, owners/operators must conduct inspections based on the findings during the first year of inspections.**
    - **Conduct inspections by qualified personnel, follow manufacturer's guidelines, and you must use methods capable of determining either a decrease in treated effluent flowrate and/or a decrease in pollutant removal ability.**
    - **When inspections are performed, the following findings typically serve as maintenance triggers:**
        - **Accumulated vault sediment depths exceed an average of 2 inches, or**
        - **Accumulated sediment depths on the tops of the cartridges exceed an average of 0.5 inches, or**
        - **Standing water remains in the vault between rain events.**
        - **Bypass during storms smaller than the design storm.**
    - **Note: If excessive floatables (trash and debris) are present, perform a minor maintenance consisting of gross solids removal, not cartridge replacement.**
8. **Discharges from the StormFilter systems containing PhosphoSorb media shall not cause or contribute to water quality standards violations in receiving waters.**

Applicant:	CONTECH Engineered Solutions
Applicant's Address:	11835 NE Glenn Widing Dr. Portland, OR 97220

Application Documents:

- Contech StormFilter with PhosphoSorb media operating at 0.67 gpm/ft^2
    - Evaluation of the Removal of Sil-Co-Sil 106 by PhosphoSorb in the Stormwater Management StormFilter® at 7.5 gpm (28 L/min) and 15 gpm (56 L/min).
    - *Ortho-Phosphate Adsorption Equilibrium and Breakthrough on Filtration Media for Stormwater Runoff Treatment*. Ma, J. et al., 2010. Journal of Irrigation and Drainage Engineering. September 3, 2010.
    - Phosphorus Removal in Urban Runoff Using Adsorptive Filtration Media. Ma, J. et al. StormCon 2009.
    - Performance of the Stormwater Management StormFilter with PhosphoSorb Media Relative to Ecology's Basic and Phosphorus Treatment Standards.
    - Cable Street Stormwater Management StormFilter Field Evaluation Project.
    - The Int'l Corporate Center Stormwater Treatment System Field Evaluation: The Stormwater StormFilter (StormFilter) with PhosphoSorb and CONFIDENTIAL Media at specific flow rate of 0.67 gal/min/ft^2.
- The Stormwater Management StormFilter, PhosphoSorb at a Specific Flow Rate of 1.67 gpm/ft^2, Conditional Use Level Designation Application. August 2012.
- Quality Assurance Project Plan The Stormwater Management StormFilter® PhosphoSorb® at a Specific Flow Rate of 1.67 gpm/ft^2 Performance Evaluation. August 2012.

Applicant's Use Level Request:

- Conditional use level designation as a basic (TSS) and phosphorus (total phosphorus) treatment device in accordance with Table 2 of Ecology's 2011 *Technical Guidance Manual for Evaluating Emerging Stormwater Treatment Technologies Technology Assessment Protocol – Ecology (TAPE).*

Applicant's Performance Claims:

Based on results from laboratory and field-testing, the applicant claims:

- The Stormwater Management StormFilter® with PhosphoSorb® media operating at 1.67 gpm/ft^2 is able to remove 80% of Total Suspended Solids (TSS) for influent concentrations greater than 100 mg/L and achieve a 20 mg/L effluent for influent concentrations less than 100 mg/L.
- The StormFilter with PhosphoSorb media is able to remove 50% or greater total phosphorus for influent concentrations between 0.1 to 0.5 mg/L.

Recommendations:

Ecology finds that:

- CONTECH Engineered Solutions qualifies for the opportunity to demonstrate, through field-testing in the Pacific Northwest, whether the StormFilter system with PhosphoSorb media can attain Ecology's basic and phosphorus treatment goals.

Findings of Fact:

Laboratory testing

- A Phosphosorb StormFilter cartridge test unit, operating at 28 L/min (equivalent to 1.0 gpm/ft2), and subject to SSC with a silt loam texture (25% sand, 65% silt, and 10% clay by mass) originating from SCS 106 provides a mean SSC removal efficiency of 88%;
- A Phosphosorb StormFilter cartridge test unit, operating at 56 L/min (equivalent to 1.0 gpm/ft2), and subject to SSC with a silt loam texture (25% sand, 65% silt, and 10% clay by mass) originating from SCS 106 provides a mean turbidity reduction of 82%;
- Laboratory testing of PhosphoSorb media in a Horizontal Flow Column (HFC; a $1/24^{th}$ scale of a full cartridge) resulted in 50 percent dissolved phosphorus removal for the first 1,000 bed volumes. Granular activated carbon (GAC) tested under the same conditions resulted in 30 percent removal of dissolved phosphorus.

Field testing

- Contech conducted monitoring of a StormFilter system using PhosphoSorb media treating runoff from 1.6-acres of 100 percent impervious residential roadway. Six (6) cartridges operating at 0.67 gpm/ft^2 were tested over 12 storm events. Average TSS removal for influent concentrations from 30 to 490 mg/L (12 events) was 74 percent. Average total phosphorus removal for events with influent TP over 0.1 mg/L (nine events) was 55 percent.
- Contech conducted monitoring of a StormFilter system using PhosphoSorb media treating runoff from 2800 square feet of roadway from February to June 2012. The system was operated at 1.67 gpm/ft^2. Twelve (12) storm events were monitored. Influent TSS concentration ranged from 182 to 780 mg/L. Discrete TSS removal efficiency ranged from 65 to 98 percent, with an average of 89 percent. Influent total phosphorus concentration ranged from 0.14 to 0.42 mg/L. Discrete total phosphorus removal efficiency ranged from 18 to 98 percent, with an average of 68 percent.

Other StormFilter system with PhosphoSorb media the Company must address:

1. Test the system under normal operating conditions, such that pollutants partially fill the settling basin. Results obtained for "clean" systems may not be representative of typical performance.
2. Conduct field-testing at sites that are indicative of the treatment goals.
3. Conduct testing to obtain information about maintenance requirements in order to come up with a maintenance cycle.
4. Conduct loading tests on the filter to determine maximum treatment life of the system.

Technology Description: Download at: http://www.conteches.com/Products/Stormwater-Management/Treatment/Stormwater-Management-StormFilter®.aspx

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Revision History

Date	Revision
December 2012	Original use-level-designation document: CULD for basic and phosphorus treatment.
January 2013	Revised document to match standard formatting
August 2014	Revised TER and expiration dates