



February 2014

**CONDITIONAL USE LEVEL DESIGNATION FOR BASIC TREATMENT
Using CPZ Mix™ filter media
&
PILOT USE LEVEL DESIGNATION FOR BASIC TREATMENT
Using Hydro Filter Sand, CPS Mix™ and Perlite filter media**

For

Hydro International, Inc. Up-Flo® Filter

Ecology's Decision:

Based on Hydro International's application submissions, Ecology hereby issues the following use level designations:

1. Conditional use level designation (CULD) for the Up-Flo® Filter for basic treatment:
 - Using a carbon-peat-zeolite (CPZ Mix™) filter media as specified by Hydro International.
 - Sized at hydraulic loading rate of no more than 22.7 gpm/ft² per filter module (given a filter Module surface area of 1.1 ft² containing 2 filter bags with combined filter media depth of 8 inches).
2. Pilot use level designation (PULD) for the Up-Flo® Filter for basic treatment:
 - Using Hydro Filter Sand media as specified by Hydro International.
 - Sized at hydraulic loading rate of no more than 22.7 gpm/ft² per filter module (given a filter Module surface area of 1.1 ft² containing 2 filter bags with combined filter media depth of 8 inches).
3. Pilot use level designation (PULD) for the Up-Flo® Filter for basic treatment:
 - Using a carbon-peat-sand (CPS Mix™) filter media as specified by Hydro International.
 - Sized at hydraulic loading rate of no more than 22.7 gpm/ft² per filter module (given a filter Module surface area of 1.1 ft² containing 2 filter bags with combined filter media depth of 8 inches).
4. Pilot use level designation (PULD) for the Up-Flo® Filter for basic treatment:
 - Using a perlite filter media as specified by Hydro International.
 - Sized at hydraulic loading rate of no more than 22.7 gpm/ft² per filter module (given a filter Module surface area of 1.1 ft² containing 2 filter bags with combined filter media depth of 8 inches).

5. Ecology approves Hydro International Up-Flo[®] Filter systems containing various types of media for treatment at the hydraulic loading rates shown above, and sized based on the water quality design flow rate. Calculate the water quality design flow rate 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.

6. The use level designations expire on March 1, 2016 unless extended by Ecology, and to the conditions specified below:

Ecology's Conditions of Use:

Up-Flo[®] Filter units shall comply with these conditions:

1. Design, assemble, install, operate, and maintain Up-Flo[®] Filter units in accordance with Hydro International's applicable manuals and documents and the Ecology Decision.
2. Hydro International commits to submitting a QAPP for Ecology review and approval by August 1, 2014 that meets the TAPE requirements for attaining a GULD for basic treatment for the CPZ Mix[™], Hydro Filter Sand, CPS Mix[™], and/or perlite media filters. Ecology must review and approve additional QAPPs for each field site in Washington State. Hydro International should select sites reflective of the product's treatment intent.
3. Local jurisdictions must file a "Pilot Level Technologies Notice of Intent" form with the Department of Ecology prior to authorizing Up-Flo[®] filter for a pilot use level application.
4. Hydro International shall complete all required testing and submit a TER Ecology review by September 1, 2015.
5. Hydro International may request Ecology to grant deadline or expiration date extensions, upon showing cause for such extensions.
6. Discharges from the Up-Flo[®] Filter units shall not cause or contribute to water quality standards violations in receiving waters.

Applicant: Hydro International

Applicant's Address: 94 Hutchins Drive
Portland, ME, 04102-1930

Application Documents:

- Field Verification Report: Up-Flo[®] Filter. Bama Belle Test Site for NJDEP Final Field Certification, Tuscaloosa, AL. December 6, 2013.
- *Up-FloTM Filter*: Washington Department of Ecology Submission, Version 3.0 (December 2007) which includes:
 - *The Up-FloTM Filter Stormwater Treatment System Product Development and Performance Overview* (December 2007)
 - *Final Report Upflow Filters for the Rapid and Effective Treatment of Stormwater at Critical Source Areas*, U.S. Infrastructure, Inc. July 31, 2003
 - *Field Verification Report for the Up-FloTM Filter* by: Robert Pitt and Uday Khambhammettu, April 2006

Applicant's Use Level Request:

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

Applicant's Performance Claims:

- Using either CPZ MixTM, CPS MixTM, or perlite filter media, the Up-Flo[®] Filter can meet the performance goals for oil control in runoff from pollution-generating impervious and pervious surfaces at high-use sites.
- Using either CPZ MixTM, filter sand, CPS MixTM, or perlite filter media, the Up-FloTM Filter can remove greater than 80% of total suspended solids in runoff from pollution generating impervious and pervious surfaces on residential, commercial, and industrial sites.
- Using either CPZ MixTM or CPS MixTM the Up-FloTM Filter can remove greater than 50% of total phosphorus in runoff from pollution-generating impervious and pervious surfaces on residential, commercial, and industrial sites.
- Using the CPZ MixTM, the Up-Flo[®] Filter can provide 60% removal of dissolved Zinc and 30% removal of dissolved Copper in runoff from pollution-generating impervious surfaces.

Ecology's Recommendations:

Ecology finds that:

- Ecology should provide Hydro International with the opportunity to demonstrate, through additional laboratory and field testing, whether the Up-Flo[®] Filter can attain Ecology's basic treatment goals.

Findings of Fact:

- Hydro International conducted field-testing of an Up-Flo[®] Filter containing CPZ Mix[™] media in Tuscaloosa, Alabama in 2012 and 2013.
 - The unit tested included six (6) Filter Modules rates at 25 gpm each (total of 150 gpm). The installation was on-line, with bypass occurring within the unit.
 - Thirty (30) storm events were monitored. The last 10 storm events were not included in the final analysis due to excessive site erosion (although the unit continued to provide sufficient treatment. The peak 5-minute rainfall intensities ranged from 0.16 in/hr to 3.56 in/hr.
 - For 18 (of the 20) qualifying events, influent TSS ranged from 11 to 571 mg/L, with an average influent concentration of 104 mg/L. The average particle size distribution for the 18 storm events was D50 \approx 345 microns.
 - 17 of the above 18 events had influent TSS concentrations within the TAPE range. Storm event depth for these 17 events ranged from 0.18 to 2.24 inches. For influent TSS > 100 mg/L, average removal rate was 83 percent (median, 90 percent). For influent 20-100 mg/L, the average effluent was 11.4 mg/L (median, 9.5 mg/L).
- Based on laboratory testing at a flowrate of 25 GPM per filter module, the Up-Flo[®] Filter containing CPZ Mix[™] media had an average suspended solids concentration removal efficiency of 87% using Sil-Co-Sil 106 with an average influent concentration of about 260 mg/L and zero initial sediment loading.
- Based on laboratory testing at a flowrate of 23 GPM per filter module, the Up-Flo[®] Filter containing filter sand media had an average suspended solids concentration removal efficiency of 92% using Sit-Co-Sil 106 with an average influent concentration of about 295 mg/L and zero initial sediment loading.
- Based on laboratory testing at a flowrate of 25 GPM per filter module, the Up-Flo[®] Filter containing CPS Mix[™] media had an average suspended solids concentration removal efficiency of 88% using Sil-Co-Sil 106 with an average influent concentration of about 151 mg/L and zero initial sediment loading.
- Based on laboratory testing at a flowrate of 25 GPM per filter module, the Up-Flo[®] Filter containing perlite media had an average suspended solids concentration removal efficiency of 88% using Sil-Co-Sil 106 with an average influent concentration of about 103 mg/L and zero initial sediment loading.

Other Up-Flo Filter[®] Related Issues to be Addressed By the Company:

1. Hydro International should test a variety of operating rates to establish conservative design rates. Hydro International should also determine pollutant loading capacities of and breakthrough data on the filter media to better predict maintenance cycles.
2. Test the system under normal operating conditions, with a partially filled settling basin. Results obtained for "clean" systems may not be representative of typical performance.
3. Conduct field testing at sites that are indicative of the treatment goals.
4. Conduct testing to obtain information about maintenance requirements in order to develop a maintenance cycle.
5. Conduct loading tests on the filter(s) to determine maximum treatment life of the system.

Technology Description: Download at: <http://www.hydro-int.com/us/products/up-flo-filter>

Contact Information:

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Applicant website: <http://www.hydro-int.com/>

Ecology web link: <http://www.ecy.wa.gov/programs/wq/stormwater/newtech/index.html>

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Revision History

Date	Revision
May 2008	Original Draft Pilot Use Level-Designation document for basic
May 2009	Update Contact Information
June 2010	Extend due dates for QAPP, TER, and Expiration
January 2013	Modified Design Storm Description, added Revision Table, updated contact information
April 2013	Revised due dates and contact information
February 2014	CULD awarded for Up-Flo [®] Filter using CPZ Mix [™] media and revised due dates