Lisa Lemont, CPSWQ  
Business Development Manager  
Hydro International  
94 Hutchins Drive  
Portland, ME 04102

Re: MTD Lab Certification  
First Defense® HC (FDHC) Stormwater Treatment Device by Hydro International

TSS Removal Rate 50%

Dear Ms. Lemont:

The Stormwater Management rules under N.J.A.C. 7:8-5.5(b) and 5.7 (c) allow the use of manufactured treatment devices (MTDs) for compliance with the design and performance standards at N.J.A.C. 7:8-5 if the pollutant removal rates have been verified by the New Jersey Corporation for Advanced Technology (NJCAT) and have been certified by the New Jersey Department of Environmental Protection (NJDEP). Hydro International has requested an MTD Laboratory Certification for the First Defense® HC Stormwater Treatment Device.


NJCAT verification documents submitted to the NJDEP indicate that the requirements of the aforementioned protocol have been met or exceeded. The NJCAT letter also included a recommended certification TSS removal rate and the required maintenance plan. The NJCAT Verification Report with the Verification Appendix (dated February 2016) for this device is published online at http://www.njcat.org/verification-process/technology-verification-database.html.

The NJDEP certifies the use of the First Defense® HC Stormwater Treatment Device by Hydro International at a TSS removal rate of 50% when designed, operated and maintained in accordance with the information provided in the Verification Appendix and the following conditions:

1. The maximum treatment flow rate (MTFR) for the manufactured treatment device (MTD) is calculated using the New Jersey Water Quality Design Storm (1.25 inches in 2 hrs) in N.J.A.C. 7:8-5.5.
2. The First Defense® HC Stormwater Treatment Device shall be installed using the same configuration reviewed by NJCAT and shall be sized in accordance with the criteria specified in item 6 below.

3. This First Defense® HC Stormwater Treatment Device cannot be used in series with another MTD or a media filter (such as a sand filter) to achieve an enhanced removal rate for total suspended solids (TSS) removal under N.J.A.C. 7:8-5.5.

4. Additional design criteria for MTDs can be found in Chapter 9.6 of the New Jersey Stormwater Best Management Practices (NJ Stormwater BMP) Manual which can be found on-line at www.njstormwater.org.

5. The maintenance plan for a site using the First Defense® HC Stormwater Treatment Device shall incorporate, at a minimum, the maintenance requirements noted in the attached document. However, it is recommended to review the maintenance website at http://www.hydro-int.com/UserFiles/downloads/FD_O%2BM_F1512.pdf for any changes to the maintenance requirements.

6. Sizing Requirements:

The example below demonstrates the sizing procedure for the First Defense® HC Stormwater Treatment Device:

Example: A 0.25 acre impervious site is to be treated to 50% TSS removal using a First Defense® HC Stormwater Treatment Device. The impervious site runoff (Q) based on the New Jersey Water Quality Design Storm was determined to be 0.79 cfs.

**Maximum Treatment Flow Rate (MTFR) Evaluation:**

The site runoff (Q) was based on the following:

- time of concentration = 10 minutes
- i=3.2 in/hr (page 5-8, Fig. 5-3 of the NJ Stormwater BMP Manual)
- c=0.99 (curve number for impervious)
- Q=ciA=0.99x3.2x0.25=0.79 cfs

Given the site runoff is 0.79 cfs and based on Table 1 below, the First Defense® HC Model 4-ft with a MTFR of 1.5 cfs would be the smallest model approved that could be used for this site that could remove 50% of the TSS from the impervious area without exceeding the MTFR.

The sizing table corresponding to the available system models is noted below. Additional specifications regarding each model can be found in the Verification Appendix under Table A-1 and Table A-2 of the NJCAT Verification Report.
Table 1 First Defense® HC Models

<table>
<thead>
<tr>
<th>First Defense® Model</th>
<th>Manhole Diameter (ft)</th>
<th>Maximum Treatment Flowrate, MTFR (cfs)</th>
</tr>
</thead>
<tbody>
<tr>
<td>4-ft</td>
<td>4-ft</td>
<td>1.50</td>
</tr>
<tr>
<td>6-ft</td>
<td>6-ft</td>
<td>3.38</td>
</tr>
<tr>
<td>8-ft</td>
<td>8-ft</td>
<td>6.00</td>
</tr>
</tbody>
</table>

Be advised a detailed maintenance plan is mandatory for any project with a Stormwater BMP subject to the Stormwater Management Rules, N.J.A.C. 7:8. The plan must include all of the items identified in the Stormwater Management Rules, N.J.A.C. 7:8-5.8. Such items include, but are not limited to, the list of inspection and maintenance equipment and tools, specific corrective and preventative maintenance tasks, indication of problems in the system, and training of maintenance personnel. Additional information can be found in Chapter 8: Maintenance of the New Jersey Stormwater Best Management Practices Manual.

If you have any questions regarding the above information, please contact Mr. Titus Magnancao of my office at (609) 633-7021.

Sincerely,

James Murphy, Chief
Bureau of Nonpoint Pollution Control

Attachment: Maintenance Plan
C: Chron File
   Richard Magee, NJCAT
   Vince Mazzei, DLUR
   Ravi Patraju, NJDEP
   Gabriel Mahon, BNPC
   Titus Magnancao, BNPC

Page 3
Operation and Maintenance Manual

First Defense® and First Defense®-HC
Vortex Separator for Stormwater Treatment
Introduction
The First Defense® is an enhanced vortex separator that combines an effective and economical stormwater treatment chamber with an integral peak flow bypass. It efficiently removes total suspended solids (TSS), trash and hydrocarbons from stormwater runoff without washing out previously captured pollutants. The First Defense® is available in several model configurations (refer to Section II. Model Sizes & Configurations, page 4) to accommodate a wide range of pipe sizes, peak flows and depth constraints.

Operation
The First Defense® operates on simple fluid hydraulics. It is self-activating, has no moving parts, no external power requirement and is fabricated with durable non-corrosive components. No manual procedures are required to operate the unit and maintenance is limited to monitoring accumulations of stored pollutants and periodic clean-outs. The First Defense® has been designed to allow for easy and safe access for inspection, monitoring and clean-out procedures. Neither entry into the unit nor removal of the internal components is necessary for maintenance, thus safety concerns related to confined-space-entry are avoided.

Pollutant Capture and Retention
The internal components of the First Defense® have been designed to optimize pollutant capture. Sediment is captured and retained in the base of the unit, while oil and floatables are stored on the water surface in the inner volume (Fig.1).

The pollutant storage volumes are isolated from the built-in bypass chamber to prevent washout during high-flow storm events. The sump of the First Defense® retains a standing water level between storm events. This ensures a quiescent flow regime at the onset of a storm, preventing resuspension and washout of pollutants captured during previous events.

Accessories such as oil absorbent pads are available for enhanced oil removal and storage. Due to the separation of the oil and floatable storage volume from the outlet, the potential for washout of stored pollutants between clean-outs is minimized.
II. Model Sizes & Configurations

The First Defense® inlet and internal bypass arrangements are available in several model sizes and configurations. The components of the First Defense®-4HC and First Defense®-6HC have modified geometries as to allow greater design flexibility needed to accommodate various site constraints.

All First Defense® models include the internal components that are designed to remove and retain total suspended solids (TSS), gross solids, floatable trash and hydrocarbons (Fig.2a - 2b). First Defense® model parameters and design criteria are shown in Table 1.

First Defense® Components

1. Built-In Bypass
2. Inlet Pipe
3. Inlet Chute
4. Floatables Draw-off Port
5. Outlet Pipe
6. Floatables Storage
7. Sediment Storage
8. Inlet Grate or Cover

Fig.2a) First Defense®-4 and First Defense®-6; b) First Defense®-4HC and First Defense®-6HC, with higher capacity dual internal bypass and larger maximum pipe diameter.

III. Maintenance

Overview

The First Defense® protects the environment by removing a wide range of pollutants from stormwater runoff. Periodic removal of these captured pollutants is essential to the continuous, long-term functioning of the First Defense®. The First Defense® will capture and retain sediment and oil until the sediment and oil storage volumes are full to capacity. When sediment and oil storage capacities are reached, the First Defense® will no longer be able to store removed sediment and oil. Maximum pollutant storage capacities are provided in Table 1.

The First Defense® allows for easy and safe inspection, monitoring and clean-out procedures. A commercially or municipally owned sump-vac is used to remove captured sediment and floatables. Access ports are located in the top of the manhole.

Maintenance events may include Inspection, Oil & Floatables Removal, and Sediment Removal. Maintenance events do not require entry into the First Defense®, nor do they require the internal components of the First Defense® to be removed. In the case of inspection and floatables removal, a vactor truck is not required. However, a vactor truck is required if the maintenance event is to include oil removal and/or sediment removal.

Maintenance Equipment Considerations

The internal components of the First Defense®-HC have a centrally located circular shaft through which the sediment storage sump can be accessed with a sump vac hose. The open diameter of this access shaft is 15 inches in diameter (Fig.3). Therefore, the nozzle fitting of any vactor hose used for maintenance should be less than 15 inches in diameter.

Determining Your Maintenance Schedule

The frequency of clean out is determined in the field after installation. During the first year of operation, the unit should be inspected every six months to determine the rate of sediment and floatables accumulation. A simple probe such as a Sludge-Judge® can be used to determine the level of accumulated solids stored in the sump. This information can be recorded in the maintenance log (see page 9) to establish a routine maintenance schedule.

The vactor procedure, including both sediment and oil / flotables removal, for a 6-ft First Defense® typically takes less than 30 minutes and removes a combined water/oil volume of about 765 gallons.

Table 1. First Defense® Pollutant Storage Capacities and Maximum Clean out Depths

<table>
<thead>
<tr>
<th>First Defense® Model Number</th>
<th>Diameter</th>
<th>Oil Storage Capacity</th>
<th>Oil Clean Out Depth</th>
<th>Maximum Sediment Storage Capacity</th>
<th>Recommended Sediment Clean-out Capacity</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>(in / cm)</td>
<td>(gal / L)</td>
<td>(in / cm)</td>
<td>(yd³ / m³)</td>
<td>(yd³ / m³)</td>
</tr>
<tr>
<td>FD-4</td>
<td>4 / 1.2</td>
<td>180 / 681</td>
<td>&lt;23.5 / 60</td>
<td>1.3 / 1.0</td>
<td>33 / 84</td>
</tr>
<tr>
<td>FD-4HC</td>
<td>191 / 723</td>
<td>244 / 923</td>
<td>&lt;24.4 / 62</td>
<td>1.3 / 1.0</td>
<td>33 / 84</td>
</tr>
<tr>
<td>FD-6</td>
<td>420 / 1,590</td>
<td>235 / 860</td>
<td>&lt;23.5 / 60</td>
<td>3.3 / 2.5</td>
<td>37.5 / 95</td>
</tr>
<tr>
<td>FD-6HC</td>
<td>496 / 1,878</td>
<td>28.2 / 72</td>
<td>&lt;28.2 / 72</td>
<td>3.3 / 2.5</td>
<td>37.5 / 95</td>
</tr>
</tbody>
</table>

NOTE

Sediment storage capacity and clean out depth may vary, as larger sediment storage sump volumes are provided when required.
Inspection Procedures

1. Set up any necessary safety equipment around the access port or grate of the First Defense® as stipulated by local ordinances. Safety equipment should notify passing pedestrian and road traffic that work is being done.

2. Remove the grate or lid to the manhole.

3. Without entering the vessel, look down into the chamber to inspect the inside. Make note of any irregularities. Fig.4 shows the standing water level that should be observed.

4. Without entering the vessel, use the pole with the skimmer net to remove floatables and loose debris from the components and water surface.

5. Using a sediment probe such as a Sludge Judge®, measure the depth of sediment that has collected in the sump of the vessel.

6. On the Maintenance Log (see page 9), record the date, unit location, estimated volume of floatables and gross debris removed, and the depth of sediment measured. Also note any apparent irregularities such as damaged components or blockages.

7. Securely replace the grate or lid.

8. Take down safety equipment.

9. Notify Hydro International of any irregularities noted during inspection.

Floatables and Sediment Clean Out Procedures

Floatables clean out is typically done in conjunction with sediment removal. A commercially or municipally owned sump-vac is used to remove captured sediment and floatables (Fig.5).

Floatables and loose debris can also be netted with a skimmer and pole. The access port located at the top of the manhole provides unobstructed access for a vactor hose and skimmer pole to be lowered to the base of the sump.

Scheduling

• Floatables and sump clean out are typically conducted once a year during any season.

• Floatables and sump clean out should occur as soon as possible following a spill in the contributing drainage area.

Maintenance at a Glance

<table>
<thead>
<tr>
<th>Activity</th>
<th>Frequency</th>
</tr>
</thead>
<tbody>
<tr>
<td>Inspection</td>
<td>• Regularly during first year of installation</td>
</tr>
<tr>
<td></td>
<td>• Every 6 months after the first year of installation</td>
</tr>
<tr>
<td>Oil and Floatables Removal</td>
<td>• Once per year, with sediment removal</td>
</tr>
<tr>
<td></td>
<td>• Following a spill in the drainage area</td>
</tr>
<tr>
<td>Sediment Removal</td>
<td>• Once per year or as needed</td>
</tr>
<tr>
<td></td>
<td>• Following a spill in the drainage area</td>
</tr>
</tbody>
</table>

NOTE: For most clean outs the entire volume of liquid does not need to be removed from the manhole. Only remove the first few inches of oils and floatables from the water surface to reduce the total volume of liquid removed during a clean out.
What is HX?

HX is Hydro Experience, it is the essence of Hydro. It’s interwoven into every strand of Hydro’s story, from our products to our people, our engineering pedigree to our approach to business and problem-solving.

HX is a stamp of quality and a mark of our commitment to optimum process performance. A Hydro solution is tried, tested and proven.

There is no equivalent to Hydro HX.