



State of New Jersey

Department of Environmental Protection

Division of Science, Research and Technology

Bureau of Sustainable Communities & Innovative Technologies

PO Box 409

Trenton, NJ 08625-0409

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Richard J. Codey
Acting Governor

Bradley M. Campbell
Commissioner

May 11, 2005

Pamela Deahl
Vice President
Hydro International
94 Hutchins Drive
Portland, ME 04102

RE: Interim Certification of Hydro International's *Downstream Defender*[®]

Dear Ms. Deahl:

In accordance with the Energy and Environmental Technology Verification (EETV) Act at N.J.S.A. 13:1D-134, the New Jersey Department of Environmental Protection (NJDEP) is pleased to issue a **Conditional Interim Certification** for the *Downstream Defender*[®] developed by Hydro International. This conditional interim certification is being issued as a result of the March 28, 2005 submission of the New Jersey Corporation for Advanced Technology (NJCAT) final verification report, and **must be used in conjunction with the enclosed Conditional Interim Certification Findings document.**

According to NJCAT's verification report, and as indicated in the attached Conditional Interim Certification Findings, the Hydro International *Downstream Defender*[®], sized at a hydraulic loading rate of 20 gpm/ft³ has been shown to have a 70% solids mass removal efficiency (as per NJDEP treatment efficiency calculation methodology) for F-95 sand with an average influent concentration of 240 mg/l, an average d₅₀ particle size of 120 microns and zero initial sediment loading in laboratory studies using simulated storm water. Based on this demonstrated laboratory performance, the NJDEP feels confident that the *Downstream Defender*[®] has the capability of achieving in field applications, at a minimum, a TSS removal efficiency of 50%. Therefore, NJDEP certifies that the *Downstream Defender*[®] is capable of achieving a TSS removal efficiency of 50% from stormwater runoff at the respective maximum designed flow rates as given in Table 1 of the enclosed Conditional Interim Certification Findings document, and shall be permitted accordingly. In addition, the following conditions shall apply to the conditional interim certification:

1. The *Downstream Defender*[®] should be the first component, if used as part of a treatment train (i.e., utilized in front of best management practices such as detention, retention, and

infiltration basins, etc., as defined in the NJ Stormwater Best Management Practices Manual).

2. The *Downstream Defender*[®] shall be designed in accordance with New Jersey's water quality design storm, as required in the Stormwater Management Rules (N.J.A.C. 7:8).
3. A Quality Assurance Project Plan supporting the Technology Acceptance and Reciprocity Partnership (TARP) Tier II Protocol for Stormwater Best Management Practice Demonstration (July, 2003), and including any additional field testing requirements that the NJDEP shall request, shall be submitted to NJDEP and/or NJCAT within six (6) months from the date of this Conditional Interim Certification letter.
4. Field evaluation data that are consistent with the Tier II Protocol and any additional NJDEP requirements shall be submitted to NJDEP and/or NJCAT by February 28, 2007.
5. **As previously stated, this certification letter must be used in conjunction with the Conditional Interim Certification Findings document.**

Please note that this approval letter shall expire on August 31, 2007, unless extended by NJDEP. For final certification of the *Downstream Defender*[®], verified data must be generated from a full-scale field demonstration utilizing the TARP Tier II Protocol and additional NJDEP field testing requirements. If you have any questions about this conditional interim certification, please contact Ravi Patraju of my staff at (609) 292-0125.

Sincerely,



Martin Rosen
Chief - Bureau of Sustainable Communities
and Innovative Technologies

Enclosure

- c: Lisa Jackson, Assistant Commissioner, Land Use Management
Sam Wolfe, Assistant Commissioner, Environmental Regulation
Larry Baier, Director, Watershed Management Program
Eileen Murphy, Director, Division of Science, Research, and Technology
Mark Mauriello, Director, Land Use Regulation
Narinder Ahuja, Director, Division of Water Quality
Rhea Brekke, Executive Director, New Jersey Corporation for Advanced Technology

October 11, 2007

Addendum to the Hydro International's *Downstream Defender*[®]
Conditional Interim Certification

Notification of the completion of the field testing phase for the Hydro International's *Downstream Defender*[®] with a summary of the preliminary data was received by the NJDEP on October 2, 2007. A full report with the performance data would be developed and submitted to NJCAT for final verification. Therefore, the Conditional Interim Certification of the Hydro International's *Downstream Defender*[®] is hereby extended until **December 31, 2007**, at which time a decision would be made for additional extensions, if necessary.

Conditional Interim Certification Findings

NJDEP Technology Certification Program:

Bureau of Sustainable Communities & Innovative Technologies
Division of Science, Research & Technology
401 E State Street
P.O. Box 409
Trenton, NJ 08625
(609) 292-9692

Stormwater Manufactured Treatment Device:

Hydro International's *Downstream Defender*[®]

Applicant Information:

Hydro International
94 Hutchins Drive
Portland, ME 04102
(207) 756-6200

Technology Description:

A brief description of Hydro International's *Downstream Defender*[®] is reproduced from the New Jersey Corporation for Advanced Technology (NJCAT) verification report as follows:

Hydro International's Hydrodynamic Vortex Separators (HDVS) differ from other types of vortex separators in that the internal flow modifying components have been designed to ensure that the current generation of HDVS are highly efficient, relatively "low energy", rotary flow devices, with stable macro-flow fields over a wide range of flows and pressure drops (i.e. head loss) typically less than 4 inches at design flows. The HDVS create an axial return flow above the cone region in the form of an inner helical vortex (see Figure 1). This increases the overall path-line between inlet and outlet and reduces the potential for short-circuiting.

The *Downstream Defender*[®] is unique in that the sediment and oil storage areas are outside the treatment flow path. Previously collected solids, oil, and floatables are thereby protected from re-entrainment into the effluent during major storms or surcharge conditions. Furthermore, as sediment, floatables and oil are collected and stored over a period of several months, treatment capacities are not reduced as pollutants accumulate between cleanouts. After a storm event, the water level in the *Downstream Defender*[®] drains down to the invert of the outlet pipe, keeping the unit wet. Maintaining a wet unit has two major advantages:

1. It keeps the oil and floatables stored on the water surface separate from sediment stored below the vortex chamber, providing the option for separate oil disposal, such as passive skimmers, if desired.
2. It prevents stored sediment from solidifying in the base of the unit. The clean-out procedure becomes much more difficult and labor intensive if the system allows fine sediment to dry-out and consolidate. When this occurs, clean-out crews must enter the chamber and manually remove the sediment; a labor intensive operation in a hazardous environment.

The *Downstream Defender*[®] has large clear openings and no internal restrictions or weirs, minimizing the risk of blockage and hydraulic losses, and is considered a water quality improvement device applicable for treatment of stormwater in a variety of development situations including:

- New developments and retrofits
- Construction sites
- Streets and roadways
- Parking lots
- Vehicle maintenance wash-down yards
- Industrial and commercial facilities
- Wetlands protection

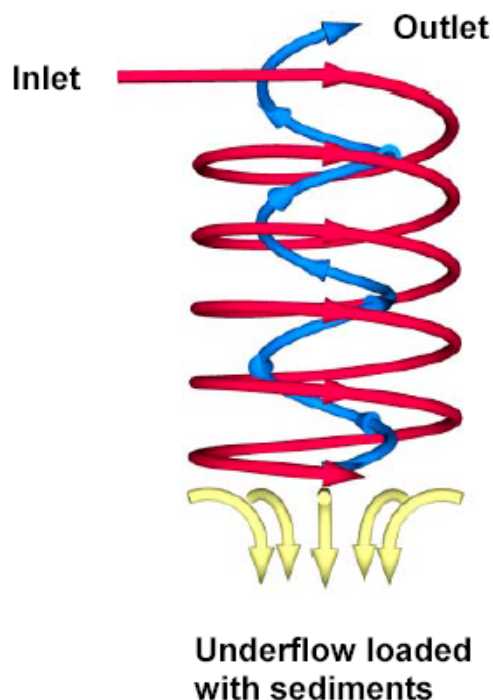


Figure 1. Simplified Flow Pattern Showing Outer and Inner Helical Flows

New Jersey Corporation for Advanced Technology Verified Claim:

The Hydro International *Downstream Defender*[®], sized at a hydraulic loading rate of 20 gpm/ft³ has been shown to have a 70% solids mass removal efficiency (as per NJDEP treatment efficiency calculation methodology) for F-95 sand with an average influent concentration of 240 mg/l, an average d₅₀ particle size of 120 microns and zero initial sediment loading in laboratory studies using simulated storm water.

Technology Limitations/Concerns:

- Lack of maintenance may cause the system to operate at a reduced efficiency and eventually fill with sediment. Therefore, inspections of accumulated pollutants should be performed as recommended by the manufacturer. Inspections would need to be conducted more frequently in the winter where sanding operations may lead to rapid accumulations.

NJDEP Conditional Interim Certification:

Based on this demonstrated laboratory performance, the NJDEP feels confident that the *Downstream Defender*[®] has the capability of achieving in field applications, at a minimum, a TSS removal efficiency of 50%. Therefore, NJDEP certifies that the *Downstream Defender*[®] is capable of achieving a TSS removal efficiency of 50% from stormwater runoff at the respective maximum designed flow rates as given in **Table 1** below, and shall be permitted accordingly. In addition, the following conditions shall apply to the conditional interim certification:

1. The *Downstream Defender*[®] should be the first component, if used as part of a treatment train (i.e., utilized in front of best management practices such as detention, retention, and infiltration basins, etc., as defined in the NJ Stormwater Best Management Practices Manual).
2. The *Downstream Defender*[®] shall be designed in accordance with New Jersey's water quality design storm, as required in the Stormwater Management Rules (N.J.A.C. 7:8).
3. A Quality Assurance Project Plan supporting the Technology Acceptance and Reciprocity Partnership (TARP) Tier II Protocol for Stormwater Best Management Practice Demonstration (July, 2003), and including any additional field testing requirements that the NJDEP shall request, shall be submitted to NJDEP and/or NJCAT within six (6) months from the date of the Conditional Interim Certification letter.
4. Field evaluation data that are consistent with the Tier II Protocol and any additional NJDEP requirements shall be submitted to NJDEP and/or NJCAT by February 28, 2007.
5. The appropriate devices satisfying site selection and sizing criteria must be consistent with the specifications as described in **Table 1**.

Diameter (ft)	Max Flow Rate = (20 gpm/ft³ x πr^3)
4	502 gpm (1.1 cfs)
6	1696 gpm (3.8 cfs)
8	4020 gpm (9.0 cfs)
10	7860 gpm (17.5 cfs)

Table 1. Design Criteria for *Downstream Defender*[®] Units