



State of New Jersey

DEPARTMENT OF ENVIRONMENTAL PROTECTION

Bureau of Nonpoint Pollution Control

Division of Water Quality

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http://www.state.nj.us/dep/dwq/bnpc_home.htm

JON S. CORZINE
Governor

MARK N. MAURIELLO
Acting Commissioner

November 6, 2009

Craig Beatty, President
KriStar Enterprises, Inc.
P.O. Box 6419
Santa Rosa, CA 95406

Re: Addendum to the Conditional Interim Certification for the FloGard® Dual Vortex Hydrodynamic Separator by KriStar Enterprises Inc. dated October 2, 2009

Expiration Date: May 15, 2011

TSS Removal Rate: 50%

Dear Mr. Beatty:

This letter is a response to the KriStar Enterprises, Inc. (KriStar) request for an addendum to the Conditional Interim Certification (CIC) dated October 2, 2009. KriStar has requested the addition of three models to the CIC and a revision to the Operations and Maintenance Manual attached to the October CIC.

Within the CIC dated October 2, 2009 the various models for use were contained in Table 1 entitled: "FloGard® Dual-Vortex Hydrodynamic Separator Models". The NJDEP certifies the use of the additional models of the FloGard Dual-Vortex Hydrodynamic Separator by KriStar Enterprises, Inc. at a TSS removal rate of 50%, subject to the following conditions:

1. The various models and associated water quality flow capacities shall be sized for the peak flow of the New Jersey water quality design storm per N.J.A.C. 7:8-5, as shown in Table 1.
2. The FloGard® Dual-Vortex Hydrodynamic Separator is certified as an off-line system only. Any flow above the New Jersey water quality design storm must be bypassed around the system.
3. A hydrodynamic separator, such as the FloGard® Dual-Vortex, cannot be used in series with another hydrodynamic separator to achieve an enhanced removal rate for total suspended solids (TSS) removal under N.J.A.C. 7:8-5.5.

4. The maintenance plan for sites using this device shall incorporate, at a minimum, the revised maintenance requirements for the FloGard® Dual-Vortex Hydrodynamic Separator shown in the attachment.

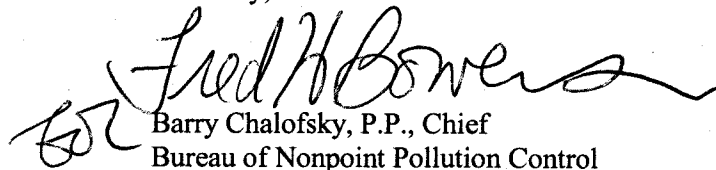
Table 1. FloGard® Dual-Vortex Hydrodynamic Separator Models

Model	Diameter (ft)	Treatment Flow Rate
DVS-36	3	180 gpm (0.4 cfs)
DVS-48	4	449 gpm (1.0 cfs)
DVS-60	5	898 gpm (2.0 cfs)
DVS-72	6	1,526 gpm (3.4 cfs)
DVS-84	7	2,424 gpm (5.4 cfs)
DVS-96	8	3,591 gpm (8.0 cfs)
DVS-120	10	7,002 gpm (15.6 cfs)
DVS-144	12	12,118 gpm (27 cfs)

In addition to the attached Version 1.01 - October 6, 2009 of the "FloGard® Dual Vortex Hydrodynamic Separator Operations and Maintenance Manual (for use with NJDEP projects)", the detailed maintenance plan must include all of the items identified in Chapter 8: Maintenance of the New Jersey Stormwater Best Management Manual. 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 operation and maintenance information associated with this manufactured treatment device is available from the vendor to assist in the development of a complete maintenance plan.

The Department anticipates proposing further adjustments to this process through the readoption of the Stormwater Management Rules. Additional information regarding the implementation of the Stormwater Management Rules N.J.A.C. 7:8 are available at www.njstormwater.org. If you have any questions regarding the above information, please contact Ms. Sandra Blick of my office at (609) 633-7021.

Sincerely,

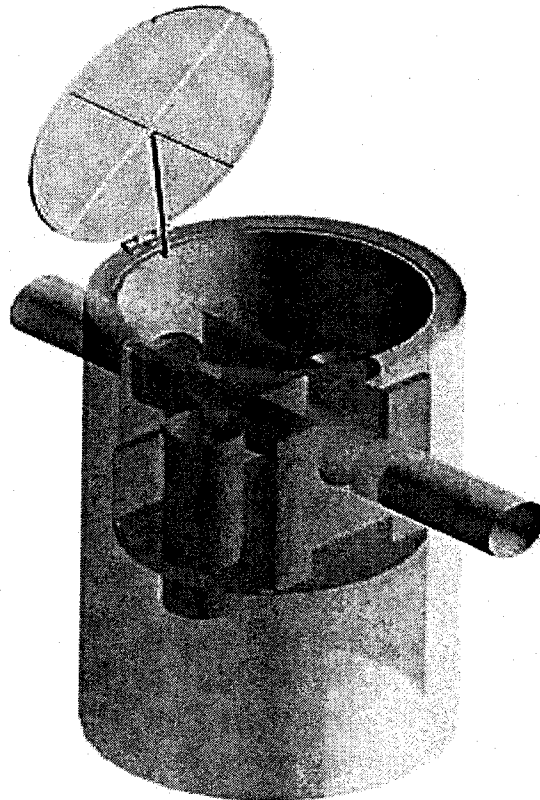

 Barry Chalofsky, P.P., Chief
 Bureau of Nonpoint Pollution Control

- c: Tom Micai, NJDEP
 Mary Beth Brenner, NJDEP
 Rhea Weinberg Brekke, NJCAT
 Elizabeth Dragon, NJDEP



FloGard[®] Dual Vortex Hydrodynamic Separator

Operations and Maintenance Manual
(for use with NJDEP projects)



FloGard® Dual-Vortex Hydrodynamic Separator

Description / Basic Function

The Dual-Vortex Hydrodynamic Separator is a stormwater filtration device used to reduce pollutant loading in runoff from urban developments. Impervious surfaces and other urban and suburban landscapes generate a variety of contaminants that can enter stormwater, polluting downstream receiving waters. The DVS captures and retains sediment, oils, metals and other target constituents close to the source and reduces the total discharge load.

DVS units are designed to effect greater than 80% removal of TSS reflective of typical urban runoff. Units are sized to treat stormwater at the design removal efficiency in an equal or smaller footprint than other typical hydrodynamic separators. DVS units offer an economical alternative structural BMP for use in developments where land area necessitates compact, effective treatment for removal of suspended pollutants from stormwater runoff.

The DVS internal components may be manufactured from durable stainless steel, concrete or marine-grade fiberglass materials. The internal components are configured to fit into industry standard precast concrete circular or rectangular manholes.

How It Works

Particle settling or floatation is accelerated by centripetal forces induced by the tangential flow pattern augmented by a highly circuitous flow path. The unit uses two independent cylindrical separators: Low flow is diverted by the inlet to the first separator, while moderate flow begins to overflow the first control weir and enter the second separator. Settled particles collect in the bottom storage area of the unit which is isolated from the fluid outlet, minimizing resuspension. Floating debris and oils are temporarily held at the top of each separator and deposited in the upper storage area by peak storm events. Once the unit treatment capacity is exceeded, excess flow breaches a second control weir at the inlet and passes through the bypass pipe without decreasing the treatment flow or re-entraining captured pollutants.

Maintenance Overview for DVS Systems

State and Local regulations require that stormwater management systems be maintained and serviced on a recurring basis. The purpose of maintaining a clean and obstruction-free system is to preserve the performance and function of the device to ensure the protection of downstream receiving waters. Trash and debris, floatables, gross pollutants and sediment are intended to build up in any stormwater treatment system. Without consistent maintenance, pollutant buildup can cause the system to function improperly by reducing removal efficiency, increasing the potential for pollutant loss through scour, or by impeding flow in or out of the system. Upstream areas may run the risk of flooding and deleterious environmental impact downstream could occur.

Recommended Frequency of Service

It is recommended that FloGard® Dual-Vortex Hydrodynamic Separators be inspected on a regularly occurring basis. Inspections should occur not less than two (2) times per year to assess the sediment level in the sump and remove floatable debris and trash from the collection areas. If the sediment level

exceeds 50% of the depth of the sump, sediment removal should be scheduled immediately to maintain the operating efficiency of the system.

In accordance with the NJDEP Protocol for Manufactured Hydrodynamic Sedimentation Devices for Total Suspended Solids Based on Laboratory Analysis (August 2009, revised September 1, 2009), the required sediment removal intervals are shown in the table below:

Required Sediment Removal Interval (Years) =

$$\frac{(50\% \text{ of MTD's Maximum Sediment Storage Volume})}{(3.366)(\text{MTFR})(\text{TSS Removal Efficiency})}$$

Model	MTFR ¹ (cfs)	% TSS Removal ¹	Maximum Sediment Storage Volume (cf)	Required Sediment Removal Interval (mo)
DVS-36	0.35	50%	8	71
DVS-48	0.63	50%	18	64
DVS-60	1.00	50%	35	62
DVS-72	1.40	50%	60	63
DVS-84	1.90	50%	95	63
DVS-96	2.50	50%	142	63
DVS-120	3.90	50%	278	64
DVS-144	5.70	50%	481	64

Service Procedures

1. Open the access cover
 - a. If equipped with an EZ Lift cover, pull the cover back to an upright position and check to see it is locked in place.
 - b. If equipped with cast iron access covers, remove the covers and set to one side.
2. Then either:
 - a. Use an industrial vacuum with an extension to remove collected floating debris and hydrocarbons from surface, or;
 - b. Manually remove collected floating debris and hydrocarbons from the surface.
3. Measure depth of sediment buildup at bottom of tank through separator tube. Inspect tank and internal components for damage and obstructions.
4. As required, use an industrial vacuum with an extension to remove sediment from the bottom of the tank through the separator tubes.
5. The EZ-Lift manhole cover shall be pulled back into place, or the cast iron access covers replaced.

Inspection / Maintenance Requirements

Listed below are some recommendations for equipment and training for personnel to inspect and maintain a FloGard® Dual-Vortex Hydrodynamic Separator system.

- Personnel – OSHA Confined Space Entry training and certification is a prerequisite for entrance into a system.

- Equipment –
 - Record Taking (pen, paper, voice recorder)
 - Proper Clothing (appropriate footwear, gloves, hardhat, safety glasses, etc.)
 - Flashlight
 - Tape Measure
 - Measuring Stick
 - Pry Bar
 - Traffic Control (Flagging, barricades, signage, cones, etc.)
 - First aid materials
 - Debris and Contaminant collectors
 - Debris and Contaminant containers
 - Vacuum Truck

- Parts - There are no replacement wear parts required. Should any of the internal components be damaged in some manner, contact Kristar for locally available materials.

Disposal of Pollutants

The collected gross pollutants, hydrocarbons, sediment, and absorbent (where applicable) shall be disposed of in accordance with local, state and/or federal agency requirements.



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JON S. CORZINE
Governor

MARK N. MAURIELLO
Acting Commissioner

May 27, 2009

Skip Short
P.O. Box 6419
Santa Rosa, CA 95406

Re: Extension of Conditional Interim Certification for the FloGard Dual-Vortex Hydrodynamic Separator by KriStar Enterprises, Inc.

Expiration Date: May 15, 2011

Dear Mr. Short:

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 New Jersey Corporation for Advanced Technology and have been certified by the New Jersey Department of Environmental Protection (NJDEP).

The certification process has been revised. The revised process places MTDs into five categories. The FloGard Dual-Vortex Hydrodynamic Separator by KriStar Enterprises, Inc. has been qualified for Category II, MTDs with Interim Certifications.

The NJDEP received the maintenance plan required under Category II and acknowledges that the requirements for this category are met; therefore, the expiration of the interim certification letter dated January 4, 2008 has been extended until May 15, 2011.

The Department anticipates proposing further adjustments to this process through the readoption of the Stormwater Management Rules. Additional information regarding the implementation of the Stormwater Management Rules N.J.A.C. 7:8 are available at www.njstormwater.org. If you have any questions regarding the above information, please contact Ms. Sandra Blick of my office at (609) 633-7021.

Sincerely,

Barry Chalofsky, P.P., Chief
Bureau of Nonpoint Pollution Control



State of New Jersey
DEPARTMENT OF ENVIRONMENTAL PROTECTION
Office of the Commissioner
401 E. State Street – 7th Floor
PO Box 402
Trenton, NJ 08625
Tel: 609-633-1123
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JON S. CORZINE
Governor

LISA P. JACKSON
Commissioner

January 4, 2008

Skip Short
Eastern Manager
KriStar Enterprises, Inc.
P.O. Box 6419
Santa Rosa, CA 95406

Dear Mr. Short:

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 FloGard[®] Dual-Vortex Hydrodynamic Separator developed by KriStar Enterprises, Inc. This Conditional Interim Certification is being issued pursuant to this program's receipt and review of the New Jersey Corporation for Advanced Technology (NJCAT) verification report, for the FloGard[®] Dual-Vortex Hydrodynamic Separator, dated August 2007.

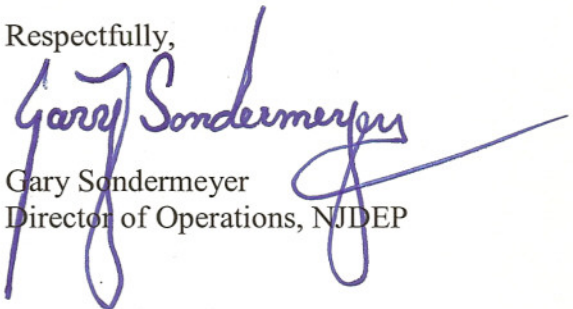
Based on the NJCAT verified laboratory performance, the NJDEP feels that the FloGard[®] Dual-Vortex Hydrodynamic Separator Model DVS-48 has the capability of achieving in field applications a TSS removal efficiency of 50%. Therefore, the NJDEP certifies the **FloGard[®] Dual-Vortex Hydrodynamic Separator, Model DVS-48 at 50% TSS removal rate while operating at a treatment flow rate not to exceed 280 gpm (0.63 cfs)**. In addition, the various models of the FloGard[®] Dual-Vortex Hydrodynamic Separator, as presented in **Table 1** of the attached Conditional Interim Certification Findings, are also approved for use to achieve the same TSS removal efficiency of 50% from stormwater runoff, while operating at or below the respective designed treatment flow rates. Additional conditions regarding this Conditional Interim Certification are as follows:

1. Presently, the FloGard[®] Dual-Vortex Hydrodynamic Separator can only be used as an offline system. Therefore, the amount of stormwater runoff diverted to the device must not exceed the respective designed flow rate.
2. The FloGard[®] Dual-Vortex Hydrodynamic Separator is flow-based and shall be sized to accommodate the peak of the water quality design storm as defined in the stormwater management rules at N.J.A.C. 7:8-5.5(a). If the peak flow is attenuated by another device, the FloGard[®] Dual-Vortex Hydrodynamic Separator must be sized to

- accommodate the outflow from the attenuating device at a rate not to exceed the respective designed treatment flow rate.
3. Training must be provided to the users of the FloGard[®] Dual-Vortex Hydrodynamic Separator to perform scheduled maintenance, which must be based at a minimum on inspection, for clogging, and excessive debris and sediment accumulation, to be performed at least four times annually as well as after every storm that exceeds 1 inch of rainfall.
 4. A field test of the FloGard[®] Dual-Vortex Hydrodynamic Separator in accordance with the requirements of the Technology Acceptance and Reciprocity Partnership (TARP) Tier II Protocol for Stormwater Best Management Practice Demonstration (July, 2003), and New Jersey Tier II Stormwater Test Requirements must be performed and the performance data be submitted to NJCAT for final verification. However, before a field test can be initiated, a Quality Assurance Project Plan (QAPP) must be submitted to NJCAT and NJDEP within six (6) months from the date of the Conditional Interim Certification letter.
 5. Field evaluation data that are consistent with the TARP Tier II Protocol and New Jersey Tier II Stormwater Test Requirements, which are available from NJCAT or www.state.nj.us/dep/dsr/bscit/Documents.htm, shall be submitted to the NJDEP and NJCAT by June 30, 2009.
 6. The Conditional Interim Certification of the FloGard[®] Dual-Vortex Hydrodynamic Separator shall expire on December 31, 2009.

Failure to satisfy any of the above conditions may result in the rescission of this Conditional Interim Certification letter. If you have any questions about this Conditional Interim Certification, please contact Ravi Patraju at (609) 292-0125.

Respectfully,



Gary Sondermeyer
Director of Operations, NJDEP

Enclosure

Larry Baier, Director, Division of Watershed Management
Tom Micai, Director, Land Use Regulation Program
Eileen Murphy, Director, Division of Science, Research, and Technology
Narinder Ahuja, Director, Division of Water Quality
Rhea Brekke, Executive Director, New Jersey Corporation for Advanced Technology
Ravi Patraju, Research Scientist, Division of Science, Research, and Technology

Conditional Interim Certification Findings

Manufactured Treatment Device

FloGard[®] Dual-Vortex Hydrodynamic Separator

Applicant Information

Skip Short
Eastern Manager
KriStar Enterprises, Inc.
P.O. Box 6419
Santa Rosa, CA 95406
770-889-4338

Technology Description

As presented in the verification report from New Jersey Corporation for Advanced Technology (NJCAT), the schematic diagram of the FloGard[®] Dual-Vortex Hydrodynamic Separator shown in Figure 1 describes a hydrodynamic treatment system for stormwater runoff in which dual vortex separators are used to remove sediments from runoff. The separators are designed to function in stages, with the first separator treating low flows and the second separator becoming active as flows increase. At peak flow, an in-line bypass allows any excess flow to pass through the treatment system, thereby preventing backup of stormwater, while at the same time leaving accumulated materials undisturbed.

The vortex separators themselves consist of cylindrical tubes, extending downwardly from the pass-through member through a central platform, to a debris holding reservoir below the platform. A first weir at its base directs the initial, low flow to the first passageway, thus carrying first flow stormwater to the first of the two vortex separators. A second weir, taller than the first, directs overflow from the first weir to a second transport passageway to the second, vertically oriented vortex separator. When flows from storm runoff increase beyond the capacity of the two separators, water will flow over the second weir, thereby continuing through the assembly, without decreasing the treatment flow rate or re-entraining captured pollutants, and exit into the storm drain system for discharge or treatment. The capacity of the pass-through member must be equal to or larger than that of the drainage pipe supplying the system, to prevent the possibility of backup.

NJCAT Verified Claim

The FloGard[®] Dual-Vortex Hydrodynamic Separator, Model DVS-48, at a flow rate of 280 gpm (0.63 cfs), has been shown to have a 60% total suspended solids (TSS) removal efficiency, measured as suspended solids concentration (SSC) (as per the NJDEP methodology for calculation of treatment efficiency) using NJDEP specified material with an average d_{50} particle size of 70 microns, an average influent concentration of 202 mg/L and 100% initial sediment loading in laboratory studies using simulated stormwater.

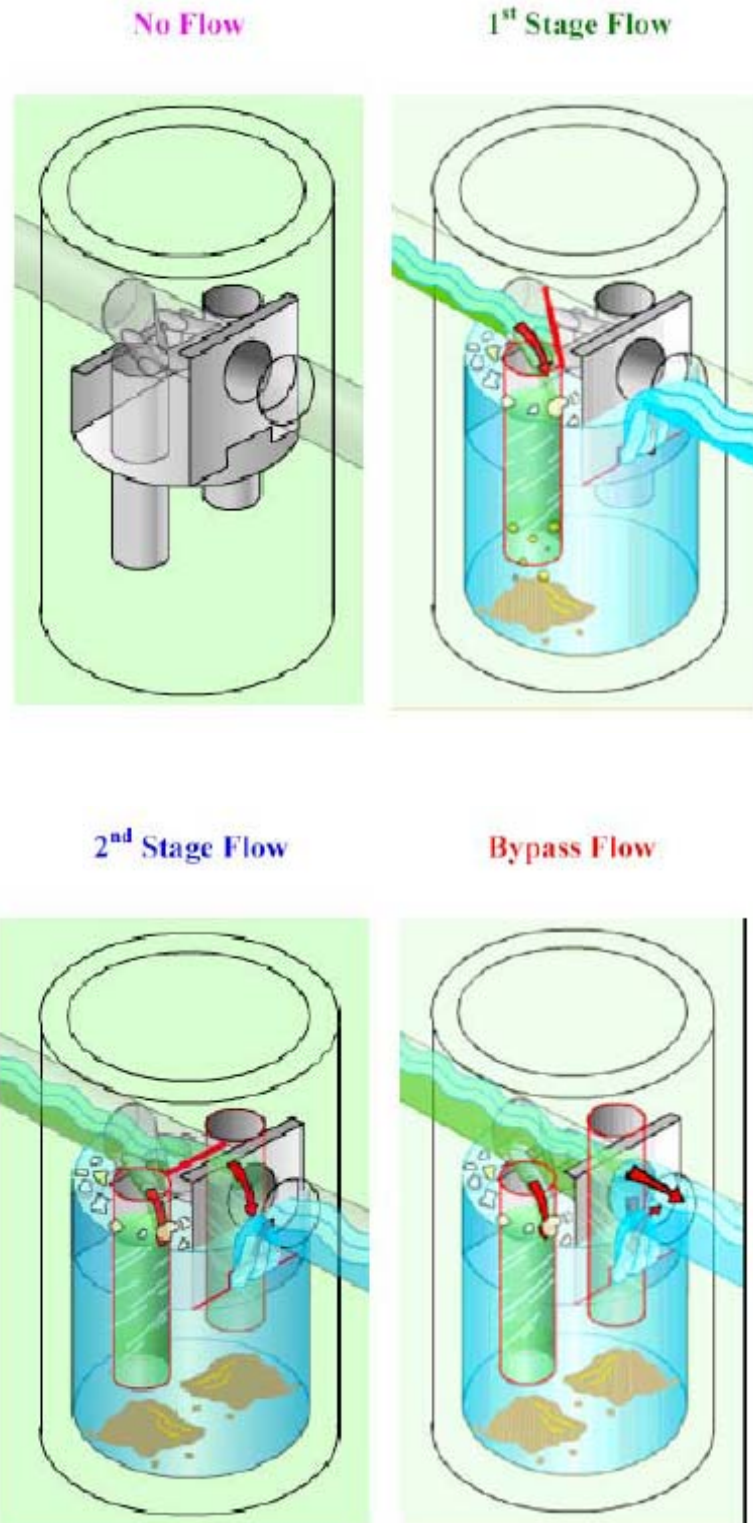


Figure 1. FloGard[®] Dual-Vortex Hydrodynamic Separator

NJDEP Conditional Interim Certification

Based on the NJCAT verified laboratory performance, the NJDEP feels that the FloGard[®] Dual-Vortex Hydrodynamic Separator Model DVS-48 has the capability of achieving in field applications a TSS removal efficiency of 50%. Therefore, the **NJDEP certifies the FloGard[®] Dual-Vortex Hydrodynamic Separator, Model DVS-48 at 50% TSS removal rate while operating at a treatment flow rate not to exceed 280 gpm (0.63 cfs)**. In addition, the various models of the FloGard[®] Dual-Vortex Hydrodynamic Separator, as presented in **Table 1**, are also approved for use to achieve the same TSS removal efficiency of 50% from stormwater runoff, while operating at or below the respective designed treatment flow rates.

Table 1. FloGard[®] Dual-Vortex Hydrodynamic Separator Models

Model	Diameter (ft)	Treatment Flow rate
DVS-36	3	160 gpm (0.35 cfs)
DVS-48	4	280 gpm (0.63 cfs)
DVS-60	5	440 gpm (0.98 cfs)
DVS-72	6	630 gpm (1.4 cfs)
DVS-96	8	1120 gpm (2.5 cfs)

The following conditions shall also apply to the Conditional Interim Certification:

1. Presently, the FloGard[®] Dual-Vortex Hydrodynamic Separator can only be used as an offline system. Therefore, the amount of stormwater runoff diverted to the device must not exceed the respective designed flow rate.
2. The FloGard[®] Dual-Vortex Hydrodynamic Separator is flow-based and shall be sized to accommodate the peak of the water quality design storm as defined in the stormwater management rules at N.J.A.C. 7:8-5.5(a). If the peak flow is attenuated by another device, the FloGard[®] Dual-Vortex Hydrodynamic Separator must be sized to accommodate the outflow from the attenuating device at a rate not to exceed the respective designed treatment flow rate.
3. Training must be provided to the users of the FloGard[®] Dual-Vortex Hydrodynamic Separator to perform scheduled maintenance following recommended inspection for clogging, and accumulation of excessive debris and sediment. The frequency of inspection recommended by NJDEP is, at a minimum, at least four times annually as well as after every storm that exceeds 1 inch of rainfall. Maintenance recommendations are given below.
4. A field test of the FloGard[®] Dual-Vortex Hydrodynamic Separator in accordance with the requirements of the Technology Acceptance and Reciprocity Partnership (TARP) Tier II Protocol for Stormwater Best Management Practice Demonstration (July, 2003), and New Jersey Tier II Stormwater Test Requirements must be completed, and the performance data submitted to NJCAT for final verification. However, before a field test can be initiated, a Quality Assurance Project Plan (QAPP) must be submitted to NJCAT for approval within six (6) months from the date of the Conditional Interim Certification letter.
5. Field evaluation data that are consistent with the TARP Tier II Protocol and New Jersey Tier II Stormwater Test Requirements, which are available from NJCAT or www.state.nj.us/dep/dsr/bscit/Documents.htm, shall be submitted to the NJDEP and NJCAT by June 30, 2009.

6. The Conditional Interim Certification of the FloGard® Dual-Vortex Hydrodynamic Separator shall expire on December 31, 2009.

Maintenance Recommendations

- As described in the documentation supplied by KriStar Enterprises, Inc., maintenance must be performed when sediments accumulate in the various devices to the respective depths as described in Table 2.

Table 2. Sediment Depths for Scheduling Maintenance

Model	Unit ID (ft)	Floatable Storage Capacity (gal)	Maximum Floatable Depth (in)	Sediment Storage Capacity (cu ft)	Maximum Sediment Depth (in)
DVS-36	3	10	5.3	8	13.5
DVS-48	4	23	7.0	19	18.0
DVS-60	5	44	8.8	37	22.5
DVS-72	6	77	10.5	64	27.0
DVS-96	8	182	14.0	151	36.0

- Disposal of debris, trash, sediment, and other waste material should be done at suitable disposal/recycling sites and in compliance with all applicable local, state, and federal waste regulations.

Technology Limitations/Concerns

- Heavy loads of sediment will increase the needed maintenance frequency. Also, lack of maintenance may cause the system to operate at a reduced efficiency.
- The FloGard® Dual-Vortex Hydrodynamic Separator will not increase the net pollutant load to the downstream environment. However, pollutants may be transformed within the unit. For example, organic matter may decompose and release nitrogen in the form of nitrogen gas or nitrate. Steps should be taken to reduce the amount of organic matter to the device, especially in areas that may be sensitive to nitrogen.
- Although the FloGard® Dual-Vortex Hydrodynamic Separator is a self-contained unit, the design does incorporate standing water in the chambers, which can be a breeding site for mosquitoes. The technology has not been tested to identify mosquito related effects.