State of New Jersey
DEPARTMENT OF ENVIRONMENTAL PROTECTION
401-02B
Bureau of Nonpoint Pollution Control
Division of Water Quality
Post Office Box 420
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609-633-7021 Fax: 609-777-0432
http://www.state.nj.us/dep/dwq/bnpc_home.htm

CHRIS CHRISTIE
Governor

KIM GUADAGNO
Lt. Governor

BOB MARTIN
Commissioner

August 31, 2011

Joel Garbon
Imbrium Systems
3811 S.W. Corbett Avenue
Portland, OR 97239

Re: MTD Laboratory Test Certification for the Jellyfish Filter by Imbrium Systems Corporation

Effective Date: September 1, 2011
Expiration Date: September 1, 2013
TSS Removal Rate: 80%

Dear Mr. Garbon:

The Stormwater Management Rules at N.J.A.C. 7:8 allow the use of manufactured treatment devices (MTDs) for compliance with the design and performance standards provided that the pollutant removal rates have been verified by New Jersey Corporation for Advanced Technology, NJCAT, and certified by the New Jersey Department of Environmental Protection (NJDEP).

The certification process was revised through the "Transition for Manufactured Treatment Devices," dated July 15, 2011. NJDEP has determined that Jellyfish Filter by Imbrium Systems Corporation is consistent with the criteria under *A. Manufactured Treatment Devices with Interim Certifications.* Therefore, **NJDEP certifies the use of the 54-inch long filtration tentacles of the Jellyfish Filter by Imbrium Systems Corporation with an 80% TSS removal rate, provided that the project design is consistent with 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.

2. The peak inflow of the Water Quality Design Storm is limited to 0.11 cfs per cartridge. The maximum inflow area per cartridge is limited to 0.17 acres of impervious area.

3. Sufficient draindown cartridges must be placed in any system to ensure that the draindown time for the Water Quality Design Storm does not exceed thirty-six (36) hours.

4. The bottom of the Jellyfish tentacles must be a minimum of 2 feet above the bottom of the vault. Each cartridge must have a minimum of 26.2 cf of wet volume.

5. The Jellyfish Filter can only be used off-line. Any flow above the New Jersey Water Quality Design Storm must be bypassed around the system.

6. This certification does not extend to the enhanced removal rates under N.J.A.C. 7:8 – 5.5 through the addition of settling chambers (such as hydrodynamic separators) or media filtration practices (such as a sand filter).

7. The maintenance plan for the sites using this device shall incorporate at a minimum, the maintenance requirements for the Jellyfish Filter shown attached.

In addition to the attached, any project with a Stormwater BMP subject to the Stormwater Management Rules, N.J.A.C. 7:8, must include a detailed maintenance plan. The detailed maintenance plan must include all of the items identified in 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 Manual.

NJDEP 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,

Ed Frankel, P.P., Acting Bureau Chief
Bureau of Nonpoint Pollution Control

C: Richard S. Magee, NJCAT
Chron file

Jellyfish™ Filter System
Inspection and Maintenance Information

Jellyfish™ Inspection and Maintenance

Regular inspection and maintenance are proven, cost-effective ways to maximize water resource protection for all stormwater pollution control practices, and are required to insure proper functioning of the Jellyfish filter system. Inspection of the Jellyfish filter system is easily performed from the surface, while proper maintenance requires a combination of procedures conducted from the surface and with worker entry into the structure. The Jellyfish filter system's patent pending technology has no moving parts, keeping the process simple.

Please refer to the following information and guidelines before conducting inspection and maintenance activities.

When is inspection needed?

- Post-construction inspection is required prior to putting the Jellyfish filter system into service.
- Routine inspections are recommended during the first year of operation to accurately assess the sediment and floatable pollutant accumulation, and to ensure that the automatic backwash feature is functioning properly.
- Specifically for New Jersey installations, regulations require all BMPs to be inspected a minimum four times per year and after every storm with greater than one inch of rainfall.
- Inspections should also be performed immediately after an oil, fuel or other chemical spill.

When is maintenance service needed?

- For optimum performance, the unit should be cleaned out once the sediment depth reaches 12 inches of accumulation. Generally, the minimum cleaning frequency is once annually, although the frequency can be based on historical inspection results.
- Filter cartridges should be cleaned and re-commissioned, or replaced, every 12 months or when the automatic backwash feature no longer functions, whichever occurs first. The automatic backwash function will be disabled if the filter cartridges become saturated with sediment. This saturated condition is indicated if the backwash pool contains more than 3 inches depth of water after 12 or more hours of dry weather have elapsed since the most recent rainfall/runoff event.
- The unit should be cleaned out immediately after an oil, fuel or chemical spill.

What conditions can compromise the Jellyfish filter system's performance?

- If sediment accumulates beyond 12 inches in depth, filter cartridge life and sediment removal efficiency may be reduced.
- If filter cartridges become saturated with sediment, the system may not provide filtration treatment at the designed water quality flow rate, and unfiltered water may bypass the filter cartridges.

- If an oil spill(s) exceeds the oil capacity of the system, subsequent spills may not be captured and may cause fouling of the filter cartridges.
- If debris clogs the inlet of the system, removal efficiency of sediment, hydrocarbons, and gross pollutants may be reduced.
- If a downstream blockage occurs, a backwater condition may occur in the system and removal efficiency of sediment, hydrocarbons, and gross pollutants may be reduced.

What training is required?

The Jellyfish filter system is inspected and maintained by professional vacuum cleaning service providers with experience in the maintenance of underground tanks, sewers and catch basins. Since some of the maintenance procedures require manned entry into the Jellyfish structure, only professional maintenance service providers trained in confined space entry procedures should enter the vessel. Service provider companies typically have personnel who are trained and certified in confined space entry procedures according to local, state, and federal standards.

For typical inspection and maintenance activities, no specific supplemental training is required for the Jellyfish filter system. Information provided in this document or the Jellyfish Filter System Operation and Maintenance Manual (provided to the system owner) contains sufficient guidance to maintain the system properly.

What equipment is typically required for inspection?

- Manhole access cover lifting tool
- Oil dipstick or sampling tool
- Sediment probe
- Flashlight
- Camera
- Data log
- Safety cones and caution tape
- Hard hat, safety shoes, safety glasses, and chemical-resistant gloves

How is the Jellyfish filter system inspected?

- The Jellyfish filter system can be inspected from the surface through the standard surface manhole access cover or custom doors.
- Sediment and oil depth inspections are performed with a sediment probe and oil dipstick. Sediment and oil depth are measured through the 30-inch diameter maintenance access pipe.
- Visual inspection for floatable pollutant accumulation such as litter and hydrocarbons is also performed by shining a flashlight into the 30-inch diameter maintenance access pipe.
- Visual inspection of the backwash pool (6-inch high kidney-shaped or oval-shaped weir) should also be performed to check for standing water in the pool. If at least 12 hours of dry weather have elapsed since the most recent rainfall/runoff event and the backwash pool contains more than 3 inches of water, this condition indicates that the filter cartridges are saturated with sediment and should be cleaned or replaced.

- Inspections also involve a visual inspection of the internal components of the system for obvious damage.

What equipment is typically required for maintenance?

- Vacuum truck equipped with water hose and jet nozzle
- Small pump and tubing for oil removal, if necessary
- Manhole access cover lifting tool
- Oil dipstick or sampling tool
- Sediment probe
- Flashlight
- Camera
- Data log
- Safety cones and caution tape
- Hard hats, safety shoes, safety glasses, chemical-resistant gloves, and hearing protection for service providers
- Gas analyzer, respiratory gear, and safety harness for specially trained personnel if confined space entry is required
- Replacement cartridges are required if manual cleaning and re-commissioning of existing cartridges is not possible or adequate to restore proper system function.
- Jellyfish Cartridge Backflush Pipe

How is the Jellyfish filter system maintained?

- The Jellyfish filter system can be maintained through the standard surface manhole access cover. All access covers should be removed to provide additional light and ventilation. If custom doors were installed instead of frames and covers, open all doors
- Insert the oil dipstick or sampling tool into the 30-inch diameter maintenance access pipe. If oil is present, pump off the oil layer into separate containment using a small pump and tubing. Some maintenance service providers may elect to use the vacuum hose if the oil amount is small.
- Maintenance cleaning of accumulated floatable litter and sediment is performed with a vacuum hose inserted through the 30-inch diameter maintenance access pipe.
- Using the vacuum hose, decant the water from the lower chamber to the sanitary sewer, if permitted by the local regulating authority, or into a separate containment tank.
- Remove the sludge from the bottom of the unit using the vacuum hose.
- For larger Jellyfish systems, (8-ft, 10-ft, 12-ft diameter), complete sediment removal may be facilitated by inserting a water hose with jet nozzle through a hole in the cartridge deck where a filter cartridge has been removed. Use the water jet to break up sediment on the bottom of vessel that is farthest from the 30-inch diameter maintenance access pipe. Rinse this sediment toward the maintenance access pipe for easy vacuum removal.
- To access the cartridge deck for manual cleaning or replacement of filter cartridges, descend the ladder that is built into structure's sidewall, observing all precautions for safe and proper confined space entry. Note that the cartridge

deck may be slippery. Care should be taken to avoid stepping directly onto the cartridge heads or onto the backwash pool weir.

- A manual backflush of the cartridges is recommended to remove a high percentage of accumulated sediment from the filtration tentacles, restore flow capacity, and extend the service life of the cartridges. A Jellyfish Cartridge Backflush Pipe (12-inch diameter x 3-feet length threaded plastic pipe with flapper valve) may be purchased from Imbrium Systems that allows each cartridge to be selectively backwashed using water that is supplied from either (a) the previously decanted water stored in a vactor truck compartment; (b) clean water from a separate water truck delivered to the site; or (c) water from a nearby fire hydrant or other clean water source.
- Manual backflush procedure: Twist the threaded lid on the cartridge head counter-clockwise to remove the lid and expose the tentacle holes. Carefully screw in the threaded Jellyfish Cartridge Backwash Pipe over the exposed tentacle holes. Do not over-tighten. Fill the Pipe with water (approximately 16 gallons). Pull the cord to open the flapper valve and backflush the water through the cartridge. Refill the Pipe and backflush a second time. The full Pipe contents should drain within approximately 20 seconds to remove a high percentage of accumulated sediment and restore the flow capacity of the cartridge. Remove the Pipe and re-install the lid hand-tight.
- Inspection of cartridge after manual backflushing: After manually backwashing the first cartridge, a visual inspection of the filtration tentacles is recommended. With the threaded lid removed, lift the cartridge (using the lifting loops in the cartridge head) so that most or all of the filtration tentacle bundle is exposed. If upon visual inspection the degree or nature of any remaining sediment accumulation on the tentacles shows that the manual backwash was not effective, provisions must be made to replace all the spent cartridges with new cartridges as soon as possible. To re-commission a cleaned and regenerated cartridge, or to install a new cartridge, place the cartridge into the cartridge hole and re-install the threaded lid hand-tight to secure the cartridge.
- New cartridges are lightweight (less than 20 pounds), and can be easily lowered down to a worker on the cartridge deck. Care should be taken not to bend or otherwise damage the tentacles during the handling and installation procedures.
- For maximum safety, it is recommended that each spent cartridge be removed and replaced one at a time, such that there is never more than one cartridge hole exposed. Removable cartridge hole cover plates can be purchased from Imbrium Systems if required.
- Remove spent cartridges from the vessel.
- After cartridge service has been completed, the backflush water may be removed by vacuum hose.
- Re-fill the lower chamber with water where required by the local jurisdiction.

What is required for proper disposal?

- Disposal requirements for recovered pollutants and spent filter cartridges may vary depending on local guidelines. In most areas the sediment and spent filter cartridges, once dewatered, can be disposed of in a sanitary landfill. It is not anticipated that the sediment would be classified as hazardous waste.

What about oil spills?

- Petroleum-based pollutants captured by the Jellyfish filter system (oil/chemical/fuel spills) should be removed and disposed of by a licensed waste management company.
- Although the Jellyfish filter system captures virtually all free oil, a sheen at the outlet **does not** mean the unit isn't working. A rainbow or sheen can be visible at oil concentrations of less than 10 mg/L (ppm).

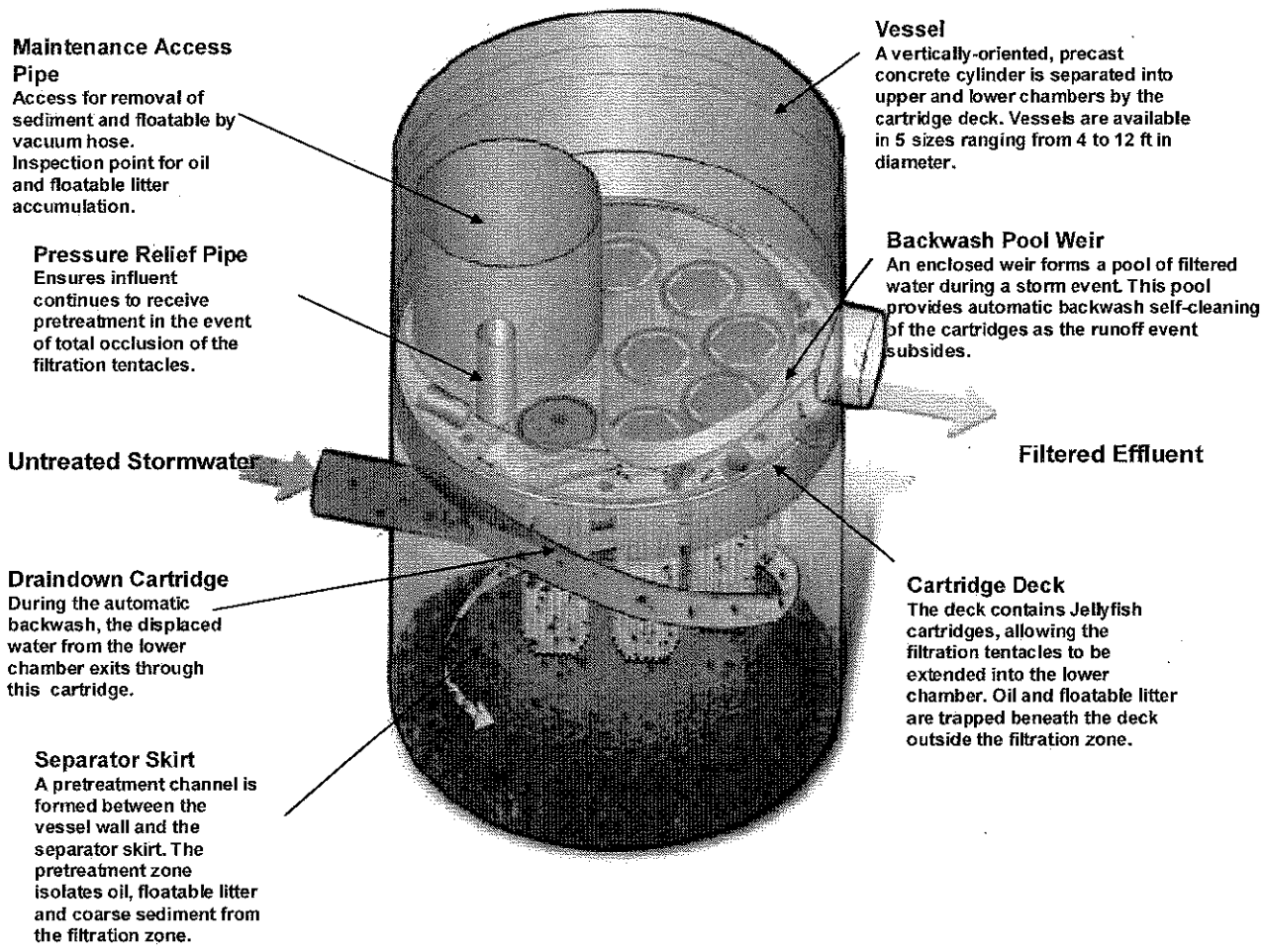
What factors affect the costs involved with inspection/maintenance?

- Inspection and maintenance costs are based on unit size, cartridge count, sediment/oil/hazardous material loads, transportation distances, tipping fees, disposal requirements and other local regulations. Maintenance costs are anticipated to be substantially lower in instances where dirty cartridges are manually cleaned and re-commissioned rather than replaced with new cartridges.

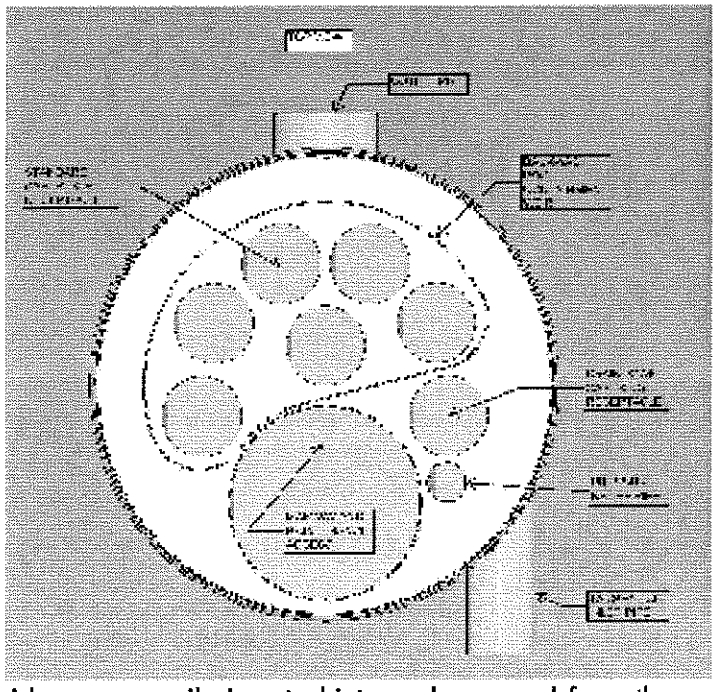
System schematic and component functions

Below is a schematic of the Jellyfish filter system with key components identified and their functions briefly described (6-ft diameter system is depicted).

Jellyfish™ Filter System

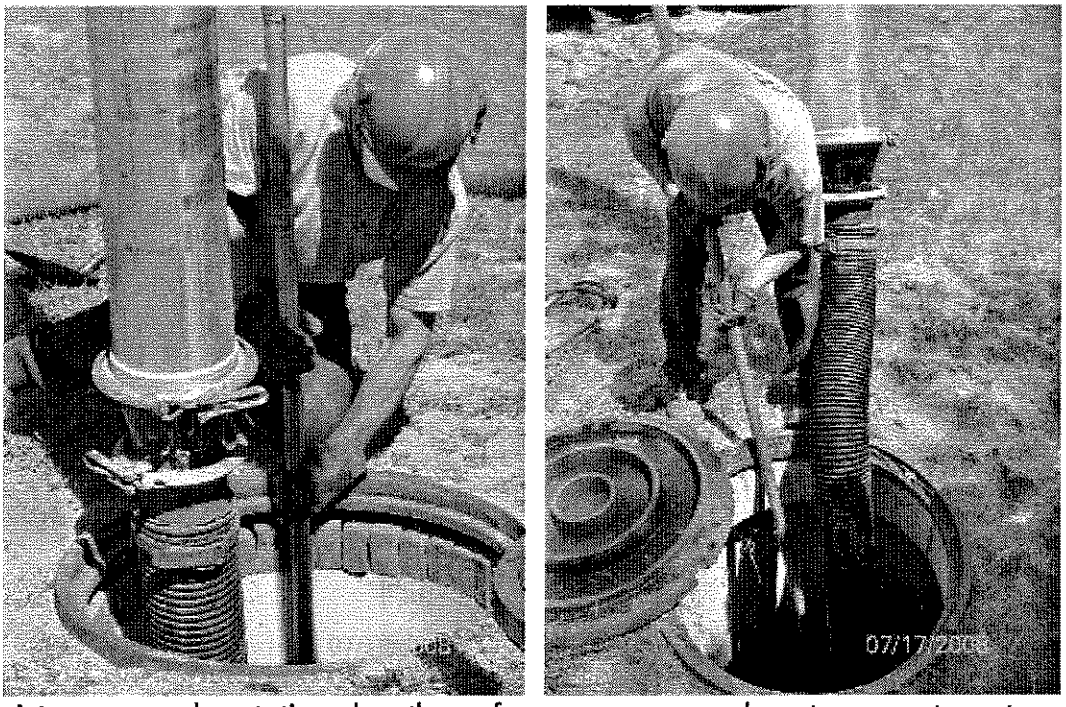


The Jellyfish filter system has no moving parts to wear out and therefore maintenance activities are generally focused on pollutant removal and filter cartridge service.



Lightweight Jellyfish filter cartridges are easily inserted into and removed from the cartridge deck by hand. The top view schematic (above right) and top view photo (below right) depict the 6-ft diameter system. Note the 6 standard cartridges enclosed by the kidney-shaped backwash pool weir. A single draindown cartridge is located outside the weir.

The depth of sediment and oil can be measured from the surface by using a sediment probe or dipstick tube equipped with a ball check valve and inserted through the 30-inch maintenance access pipe. This large port provides convenient access for inspection and vacuum removal of water and pollutants.



A maintenance worker stationed on the surface uses a vacuum hose to evacuate water, sediment, and debris from the system.

The benefits of regular inspection and maintenance are many – from ensuring maximum operation efficiency, to keeping maintenance costs low, to the continued protection of natural waterways – and provide the key to the Jellyfish filter system's long and effective service life.

Ordering Replacement Parts

Jellyfish filter cartridges, cartridge hole cover plates, Jellyfish Cartridge Backflush Pipes (for manual backflushing), and other system components can be ordered by contacting:

Imbrium Systems Corporation
1-888-279-8826
www.imbriumsystems.com

(revised 5-29-09)

State of New Jersey
DEPARTMENT OF ENVIRONMENTAL PROTECTION
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JON S. CORZINE
Governor

MARK N. MAURIELLO
Acting Commissioner

May 27, 2009

Joel Garbon
3811 S.W. Corbett Avenue
Portland, OR 97239

Re: Extension of Conditional Interim Certification for the Jellyfish Filter by Imbrium Systems

Expiration Date: May 15, 2011

Dear Mr. Garbon:

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 Jellyfish Filter by Imbrium Systems 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 February 25, 2009 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
Bureau of Nonpoint Pollution Control
Division of Water Quality
401 E. State Street, P.O. Box 029
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JON S. CORZINE
Governor

MARK N. MAURIELLO
Acting Commissioner

February 25, 2009
Joel Garbon, Product Manager
Jellyfish Filter
Imbrium Systems
3811 S.W. Corbett Avenue
Portland, OR 97239

Re: Interim Certification
Jellyfish Filter by Imbrium Systems Corporation

Issuance Date: **February 25, 2009**
Expiration Date: **February 24, 2011**

Dear Mr. Garbon:

The Stormwater Management rules at 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 (NJCAT) and have been certified by the New Jersey Department of Environmental Protection (NJDEP).

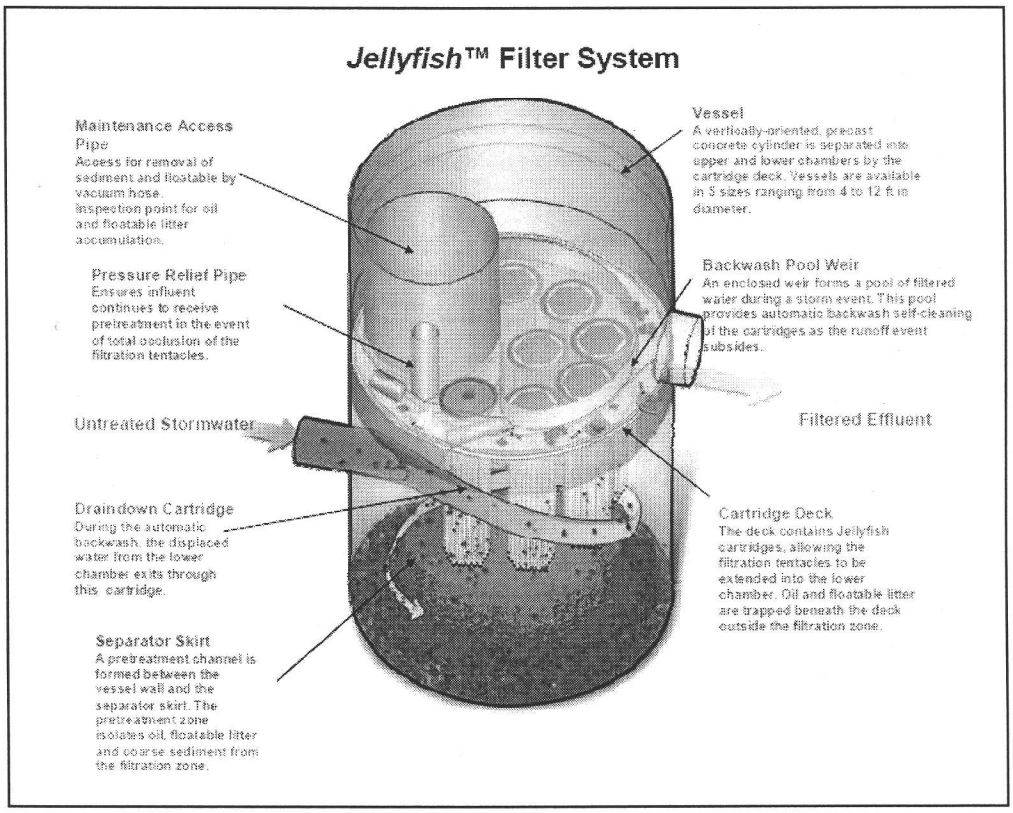
The Jellyfish filter system is configured as a subsurface manhole, rectangular vault, or catch basin structure that has been fitted with a pre-manufactured insert. The insert serves as a cartridge deck for placement of Jellyfish filter cartridges; provides a separator skirt below deck to facilitate removal of floatables and sediment; provides a large diameter pipe above deck to facilitate inspection and maintenance; and contains a backwash pool weir to facilitate self-cleaning of the filter cartridges.

The insert deck divides the structure into an upper and lower chamber. Treatment occurs in the lower chamber, which contains a permanent pool of water. Flow from the inlet pipe enters the lower chamber tangentially, with water directed around and under the separator skirt. Within the separator skirt are suspended the Jellyfish filtration tentacles. Ninety-one 54-inch long filtration tentacles are attached to each 12-inch diameter cartridge head.

Pretreated water infiltrates the filtration tentacles, flows upward, and filtered water discharges above deck into a backwash pool defined by a 6-inch high weir. During active runoff events, filtered water overflows the backwash pool onto the top of the deck and out the outlet pipe.

The invert of the outlet pipe is coincident with the top of the deck. When a runoff event subsides, water in the backwash pool drains down through the filtration tentacles to dislodge some of the accumulated sediment from the tentacles and thereby restore tentacle porosity. Water displaced from the permanent pool below deck flows to the top of the deck through the draindown cartridge(s) and out the outlet pipe. The flow rate of the standard cartridges is controlled by an orifice in each cartridge head, with the draindown cartridge(s) controlled to a much lower flow rate by an appropriately smaller orifice per site specific requirements. The system is designed to function with an 18-inch head differential from the top of the upstream diversion manhole weir to the invert of the Jellyfish filter system outlet pipe. The system will have standing water to the elevation of the outlet pipe invert at all times.

System schematic and component functions



The NJDEP certifies the use of the Imbrium Systems Corporation Jellyfish filter system at a TSS removal rate of 80%, subject to the following conditions:

1. The Jellyfish system is designed according to the NJ Water Quality Design Storm in N.J.A.C. 7:8-5.5.
2. The peak inflow of the water quality design storm is limited to 0.11 cfs and the maximum inflow area per cartridge is limited to 0.17 acres of impervious area.
3. The bottom of the Jellyfish tentacles is a minimum of 2 feet above the bottom of the vault. Each cartridge must have a minimum of 26.2 cf of wet volume.
4. The Jellyfish system is certified as an off-line system only.
5. The use of the Jellyfish System cannot be used in series with a settling chamber (such as a hydrodynamic separator) 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.
6. The maintenance plan for sites using this device shall incorporate, at a minimum, the maintenance requirements for the Jellyfish system shown in Appendix A below.

This letter issues an interim certification for two years from the date of issuance. An addition extension will be considered by the Department only after the final field testing data has been received.

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 Sandra Blick, Supervisor, Stormwater Management Unit, at (609) 633-7021

Sincerely,

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

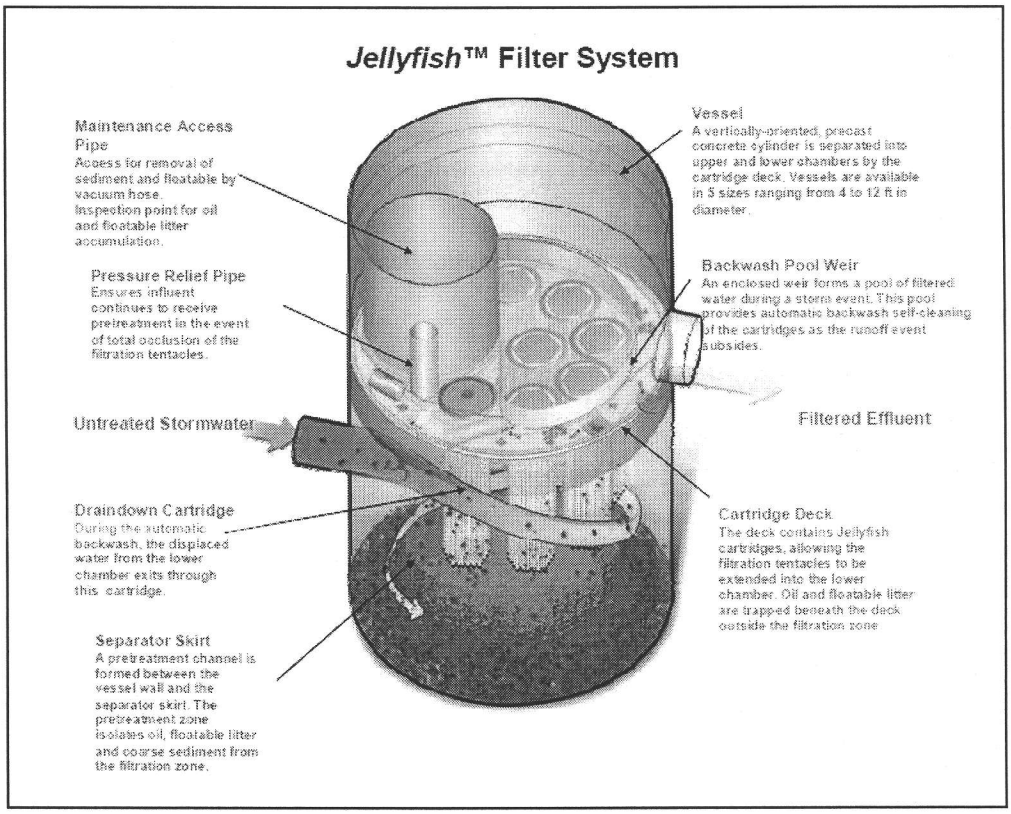
Enclosure

c: Rhea Weinberg Brekke, NJCAT
Tom Micai, NJDEP
Marybeth Brenner, NJDEP

Appendix A: Maintenance Requirements for Jellyfish Filter System by Imbrium Systems Corp.

Effective performance of stormwater management best management practices requires regular and proper maintenance. Chapter 8 of the New Jersey Stormwater Best Management Practices Manual and N.J.A.C. 7:8-5.8 of the Stormwater Management rules provides additional information and requirements for preparing a maintenance plan for stormwater management facilities. Specific maintenance requirements for the Filter treatment device by Imbrium Systems Corp. are presented below. These requirements must be included in the stormwater management system's maintenance plan in order to achieve the TSS removal rate associated with this manufactured treatment device.

System schematic and component functions



A. General Maintenance

The person responsible for maintenance must evaluate the effectiveness of the maintenance plan at least once a year. Any changes to the maintenance plan must be sent to the review agency with associated justification and revised in the deed.

Any and all stormwater management system components expected to receive and/or trap debris and sediment must be inspected for clogging and excessive debris, sediment, and oil accumulation at least four times annually as well as after every storm exceeding 1 inch of rainfall. Such components may include, but is not limited to, bottom of chamber, filters, pipes, trash racks, and cleanouts.

The sediment and debris must be removed at or before the average depth of sediment and/or trash reaches one (1) foot above the bottom of the system. Disposal of debris, trash, sediment, and other waste material must be done at suitable disposal/recycling sites and in compliance with all applicable local, state, and federal waste regulations.

The automatic backwash function will be disabled if the filter cartridges become saturated with sediment. If the backwash pool contains more than 3 inches depth of water after 12 hours of dry weather, the automatic backwash is not properly functioning. Filter cartridges must be cleaned/re-commissioned or replaced every 12 months or when the automatic backwash feature no longer functions, whichever occurs first. If a filter cartridge is re-commissioned, a test must be run using clean water to ensure that the filter performs at a flow rate of 0.11 cfs per cartridge.

Inspection of the Jellyfish filter system is performed from the surface, while proper maintenance requires a combination of procedures conducted from the surface and with worker entry into the structure. The Jellyfish Filter System may be a confined space. Enter only when necessary and with the proper equipment, following OSHA confined space entry regulations.

B. Minimum Equipment Requirements

At a minimum, a vacuum truck is necessary for the maintenance of these units.

C. Structural Components

All structural components must be inspected for cracking, subsidence, spalling, erosion, and deterioration at least annually.

D. Replacement Parts

Certain components of this device are only available through the manufacturer in order to achieve the TSS removal certified by the Department. These components include the Jellyfish filter cartridges, cartridge hole cover plates, cartridge adaptors (for manual backwashing), and other system components can be ordered by contacting:

Imbrium Systems Corporation
(888) 279-8826
www.imbriumsystems.com

In addition to the above, 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.