State of New Jersey

DEPARTMENT OF ENVIRONMENTAL PROTECTION
401-02B
Bureau of Nonpoint Pollution Control
Division of Water Quality
Post Office Box 420
Trenton, New Jersey 08625-0420
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

September 1, 2011

Mark B. Miller, P.G.
AquaShield, Inc.
2705 Kanasita Drive
Chattanooga, Tennessee 37343

Re: MTD Laboratory Test Certification for the Aqua-Filter by AquaShield, Inc.

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

Dear Mr. Miller:

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 Aqua-Filter by AquaShield, Inc. is consistent with the criteria under *A. Manufactured Treatment Devices with Interim Certifications*. Therefore, **NJDEP certifies the use of the coarse perlite media filtration cartridge of the Aqua-Filter by AquaShield, Inc. 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 0.01 cfs per square foot of filter area. The maximum inflow area per square foot of filter area is limited to 0.01 acres of impervious area. Note: One row of filter media is typically 12 ft^2.

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 Aqua-Filter is certified as an off-line system. Any flow above the New Jersey Water Quality Design Storm must be bypassed around the system.

5. A pre-treatment device, such as the Aqua-Swirl, must be used as part of the treatment train. Any manufactured treatment device utilized for pre-treatment must be certified with a minimum of 50% TSS removal rate. Sediment storage capacity shall be determined by the pre-treatment device.

6. If the Water Quality Design Storm is controlled by upstream detention / attenuation for 12 hours or more, the pre-treatment requirement of condition 5 is met.

7. The maintenance plan for the sites using this device shall incorporate at a minimum, the maintenance requirements for the Aqua-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

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

C: Richard S. Magee, NJCAT
Chron file

AquaShield
STORMWATER TREATMENT SOLUTIONS

Aqua-Filter™ Stormwater Filtration System

Inspection and Maintenance Manual

AquaShield, Inc.
2705 Kanasita Drive, Chattanooga, TN 37343
Phone: (423) 870-8888
Fax: (423) 826-2112
Email: info@aquashieldinc.com

AquaShield™, Inc. Table of Contents

Introduction / Installation / Maintenance

- **Introduction to AquaShield™ Stormwater Treatment Systems**
- **Operation of the Aqua-Filter™ Stormwater Treatment System**
- **Installation of the Aqua-Filter™ System**
- **Inspection & Maintenance of the Aqua-Filter™ System**
- **Appendix**

2705 Kanasita Drive, Hixson, Tennessee 37343
Phone (423) 870-8888 Fax (423) 870-2112
www.AquaShieldInc.com

AquaShield™, Inc
Stormwater Treatment Solutions

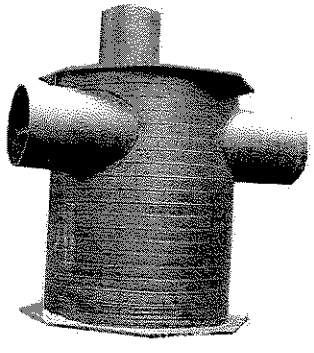
The highest priority of AquaShield™, Inc. (AquaShield™) is to protect waterways by providing stormwater treatment solutions to businesses across the world. These solutions have a reliable foundation based on over 20 years of water treatment experience.

Local regulators, engineers, and contractors have praised the AquaShield™ systems for their simple design and ease of installation. All the systems are fabricated from High-Density Polyethylene (HDPE), and contractors prefer the quick and simple installation of our structures that saves them money.

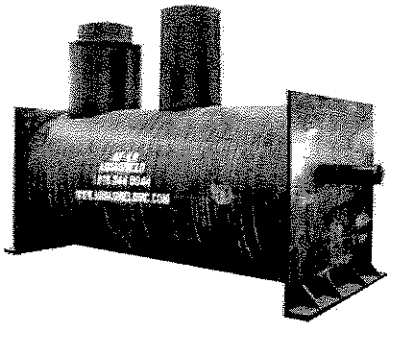
The AquaShield™ line of patented stormwater treatment products provide for high levels of stormwater treatment:

- The ***Aqua-Swirl™ Stormwater Treatment System*** is a hydrodynamic separator, which provides a highly effective means for the removal of TSS (fine to coarse sediment), floating debris and free-oil.

- The ***Aqua-Filter™ Stormwater Filtration System*** is an in-line stormwater filtration system capable of gross contaminant removal, and the removal of fine sediments, waterborne hydrocarbons, heavy metals (i.e. zinc) and nutrients such as phosphorous and nitrogen.



Aqua-Swirl™ Stormwater Treatment System

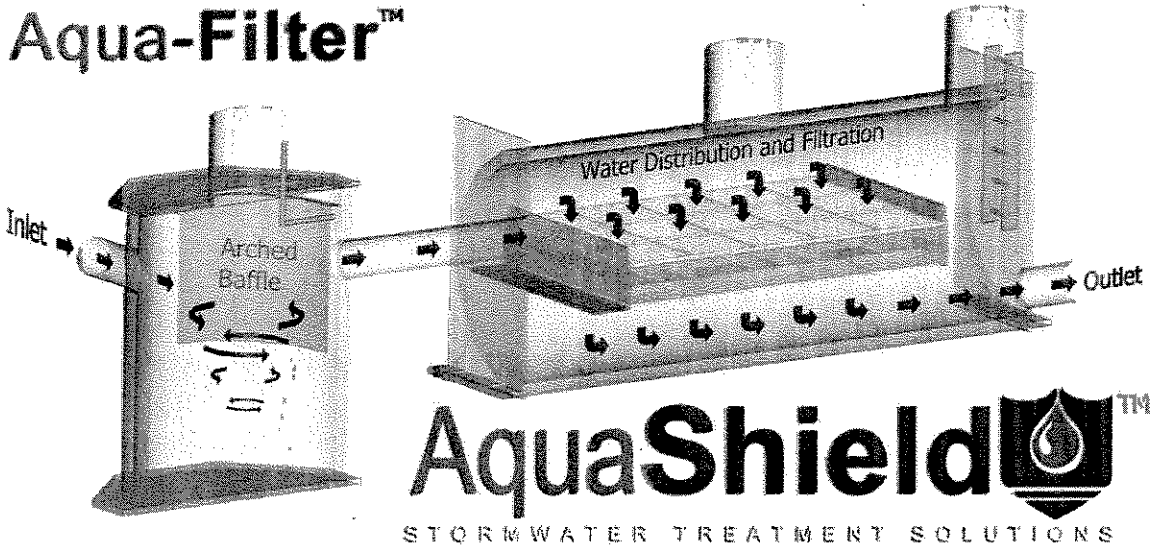


Aqua-Filter™ Stormwater Filtration System

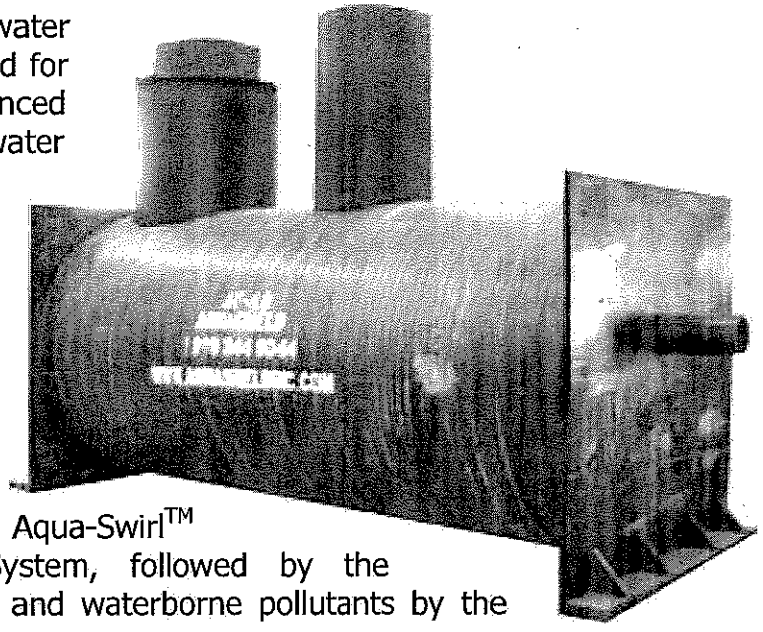
Aqua-Filter™ Stormwater Filtration System

The *Aqua-Filter™* Stormwater Filtration System is designed for projects that require advanced treatment for stormwater that discharges to sensitive receiving waters. Each system is custom engineered for site-specific needs.

The patented *Aqua-Filter™* filtration system utilizes a unique "treatment-train" approach. The system includes an *AquaSwirl™* designed for gross contaminant removal, which pre-treats stormwater before entering the filtration chamber. A variety of natural filter media are used in the filtration chamber to complete the treatment process by polishing the stormwater, and removing greater than 80% of fine-grained sediments and waterborne pollutants.



Aqua-Filter™
Stormwater Filtration Systems



The Aqua-Filter™ Stormwater Filtration System is designed for sites that require advanced treatment of runoff stormwater that may discharge into sensitive receiving waters.

Each Aqua-Filter™ system is custom engineered and utilizes a unique approach for pollutant removal. This patented configuration begins with the removal of gross pollutants by the Aqua-Swirl™ Stormwater Treatment System, followed by the removal of fine sediments and waterborne pollutants by the filtration chamber.

The Aqua-Filter™ is not only unique because of its modular design, and HDPE construction, but also because of the ease of installation. The system can be designed for new construction projects or be retrofit for existing storm drainage structures.

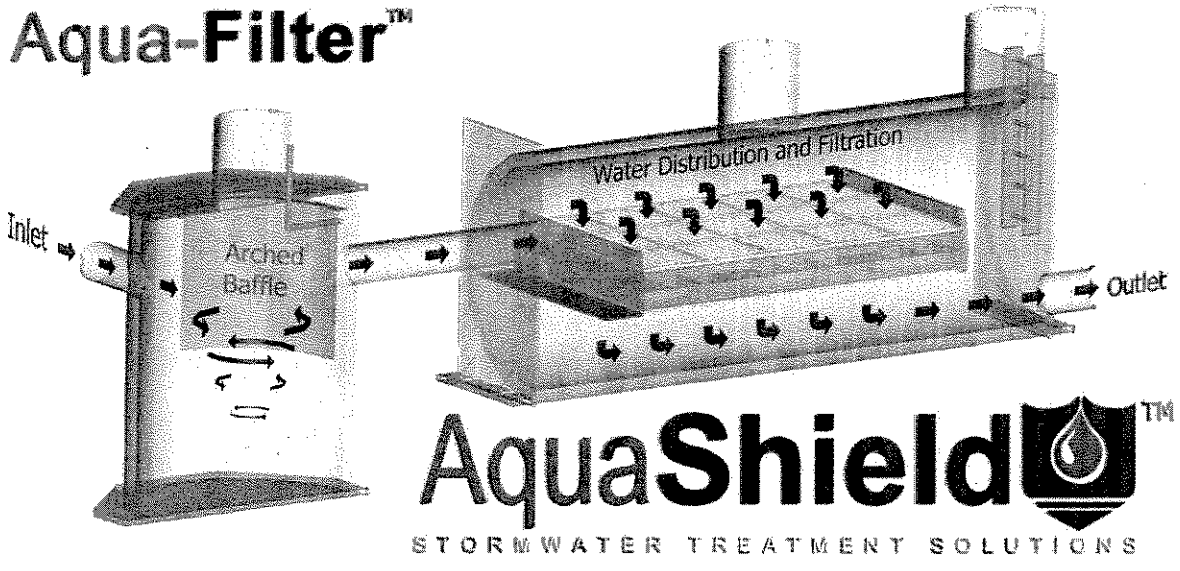
The Aqua-Filter™ system is engineered such that the filtration capacity complies with established "water quality treatment" requirements. This means that the system filters the initial movement of fine sediment pollutants that can be particularly harmful.

Performance testing is a normal part of our quality assurance program. Third party testing has demonstrated Total Suspended Solids (TSS) removals of greater than 80% and the effective removal of additional pollutants including hydrocarbons (i.e. light and heavy oils and grease), phosphorus, and various heavy metals (i.e. copper, zinc). See the "Performance and Testing" Section for details.

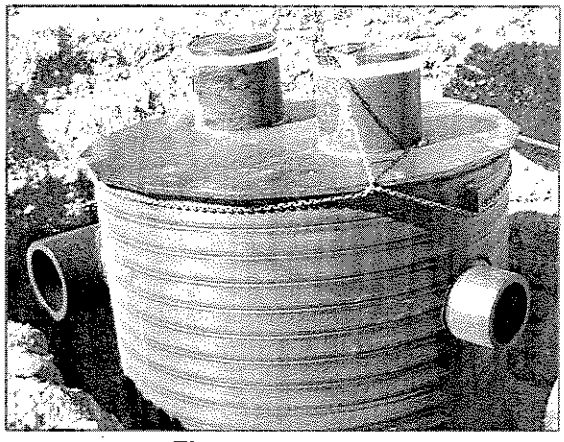
System Operation

The Aqua-Filter™ Stormwater Filtration System operates under gravitational and hydrodynamic forces with no moving parts or valves, which simplifies the treatment process. The Aqua-Filter™ system also normally operates in an off-line configuration as recommended by the Center for Watershed Protection and most municipalities; fully treating the more frequent 6-month to 1-year design storms (or roughly 90% - 95% of the annual rainfall on a given site). Larger, more intermittent storm events (i.e. 10-year or 25-year) are treated in the Aqua-Swirl™, and the peak over-flow is permitted to partially bypass the filter media internally beneath the filter bed, avoiding the need for external diversion chambers.

The unique Aqua-Filter™ treatment method is illustrated in the drawing shown below and described in the following steps.



Step 1: Pretreatment

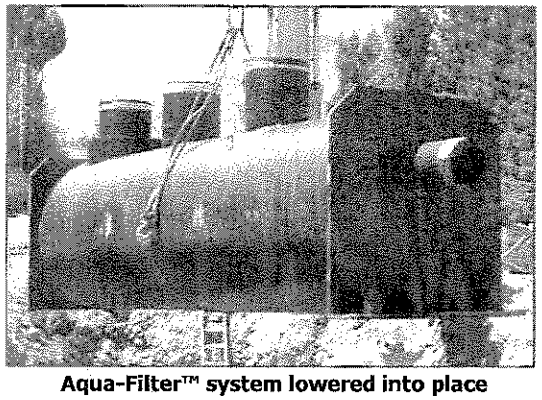


Aqua-Swirl™ to be connected to the Aqua-Filter™ Stormwater Filtration System

Peripheral pre-treatment of stormwater is not necessary when using the Aqua-Filter™ Stormwater Filtration System. In fact, each Aqua-Filter™ is custom engineered to utilize a unique treatment sequence where both the coarse- and fine- grained pollutants are removed.

This sequence begins with the Aqua-Swirl™ Stormwater Treatment System designed to target the removal of TSS and free-floating oil and debris. The addition of the Aqua-Swirl™ allows larger debris to settle before filtration and increases filtration effectiveness.

Step 2: Filtration



Aqua-Filter™ system lowered into place

The filtration chamber in the Aqua-Filter™ is designed to refine and enhance the stormwater quality prior to discharge into sensitive receiving waters. The peak filtration flow rate is based on the calculated "water quality treatment" requirements desired for the site. The Sizing Chart provided later in this Section indicates the peak filtration flow rate for the specific Aqua-Filter™ model.

As the pre-treated water enters the filtration chamber, it is evenly distributed across the filter bed and allowed to permeate through the filter media. The filter media are contained in individual sections, which are layered in a pattern to avoid short-circuiting.

Aqua-Filter™ Filter Media

The natural filter media used for filtration are capable of removing the remaining waterborne pollutants such as oils, grease, fine silts and clays, nutrients (nitrogen, phosphorus), and heavy metals (copper, lead, zinc). The most commonly used media is medium-grained perlite. Other filter media, such as zeolite, granulated activated carbon, leaf compost, and various media blends are available.

HDPE AquaShield™ Products Installation

Throughout this section and in our individual product specifications, references will be made to specific ASTM standards for the manufacturing and the installation of the AquaShield™ products. Quality control is a high priority within AquaShield™. That is why all of the patented products are fabricated, inspected and tested before leaving for the job site. The AquaShield™ systems are a modular design and constructed to facilitate the installation process. Because each system is constructed of High-Density Polyethylene (HDPE), even the largest units can be off-loaded and installed without the use of a crane or other special lifting equipment.

Lifting cable for installation

Lifting cables are provided on each Aqua-Swirl™ and Aqua-Filter™, allowing an excavator or backhoe to maneuver and position the system. Furthermore, the systems can be stored on the job site following off-loading to accommodate changing schedules.

Stub-outs for the inlet and outlet are part of the modular design of the Aqua-Swirl™ and Aqua-Filter™, which allows the contractor to attach the pipes to the inlet and outlet of the Stormwater Treatment System with couplings. Typically, an AquaShield™ representative is present on-site to assist in the installation process.

Both the Aqua-Swirl™ and the Aqua-Filter™ come with risers and custom manhole frames and covers. Delivery is typically less than four weeks from final approval of shop drawings.

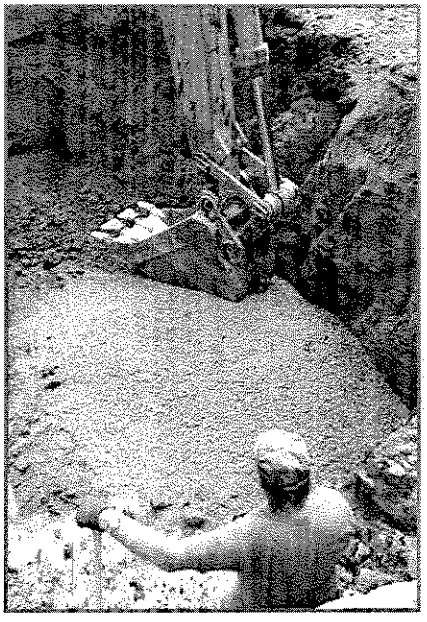
Aqua-Swirl™ Installation

Routine installation steps for the Aqua-Swirl™ units involve preparation and excavation of the area that is to contain the Aqua-Swirl™. This includes grading, leveling, and compacting the base material before lowering the unit into the excavation and connecting the Aqua-Swirl™ inlet and outlet stub-outs with appropriate pipe couplings.

Prior to shipping, the purchasing contractor provides written confirmation to install AquaShield™ products in accordance with manufacturer's specifications.

Step 1 – Excavation and Bedding

The trench and trench bottom shall be constructed in accordance with ASTM D 2321, 6, Trench Excavation, and Section 7, Installation. The excavation pit is best positioned slightly offset of the center line of the incoming drain pipe trench because of the tangential inlet pipe connecting to the Aqua-Swirl™.

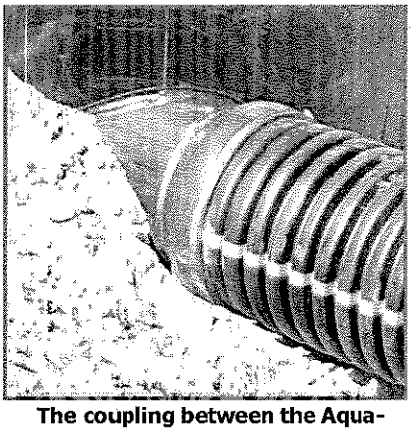


On-site excavation

The Aqua-Swirl™ shall be installed on a stable base consisting of 12 inches of Class I stone materials (angular, crushed stone or rock, crushed gravel; large void content, containing little or no fines) as defined by ASTM D 2321, Section 5, Materials; and, compacted to 95% proctor density. All required safety precautions for Aqua-Swirl™ installation are the responsibility of the contractor.

Step 2 – Pipe Connection Devices

Couplings to and from the Aqua-Swirl™ shall be supplied by the contractor and shall be Fernco®, Mission™ or equal type flexible boot with stainless steel tension bands or equal. Using a metal sheer guard will protect the flexible connector.

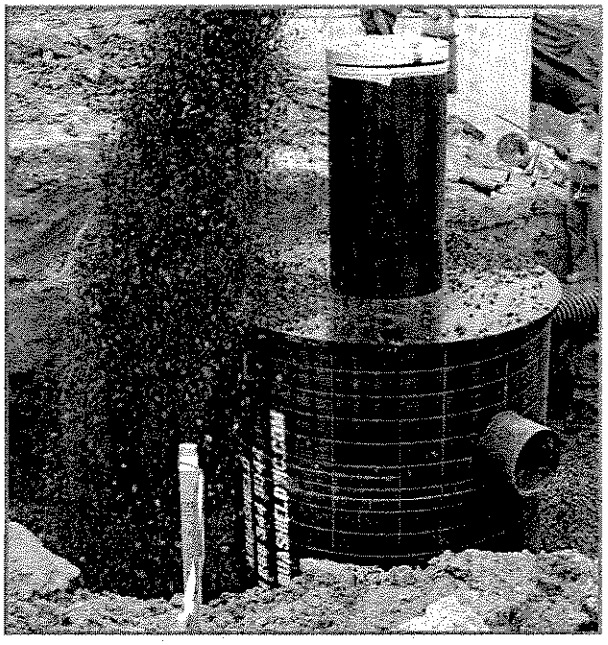


The coupling between the Aqua-Swirl™ and the pipe

Step 3 – Backfill Requirements

Backfill materials shall be Class I or II stone materials, (well graded gravels, gravelly sands; content, containing little or no fines) as defined by ASTM D 2321, Section 5, Materials; and, compacted to 90% proctor density. Class I materials are preferred. Backfill and bedding materials shall be free of debris. Backfilling shall conform to ASTM F 1759, Section 4.2, "Design Assumptions".

Backfill shall extend at least 3.5 feet beyond the edge of the Aqua-Swirl™ and for the full height to sub-grade and extend laterally to undisturbed soils.



Class I backfill material around the Aqua-Swirl™

Sufficient backfill shall be placed over components prior to using heavy compaction or construction equipment to prevent damage. Support shall be provided for vertical risers as commonly found at service connections, cleanouts, and drop manholes to preclude vertical or lateral movement.

Step 4 – Traffic Loading

A reinforced concrete pad shall be placed over the entire Aqua-Swirl™ when subject to H-20 (or greater) traffic loading. The pad shall extend no less than 12 inches beyond the outside diameter of the Aqua-Swirl™.

A professional engineer shall provide final approval of the design of the concrete pad and the calculations must be included in the submittal. Traffic rated foundry rims and covers shall be installed such that no contact is made between the HDPE access riser and cast iron frame.

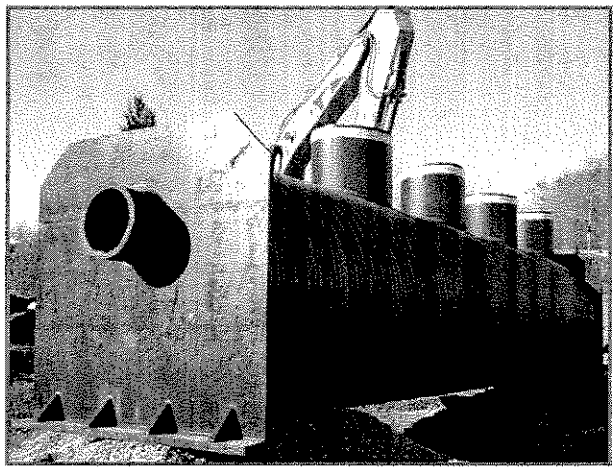
A reinforced concrete pad for H-20 traffic loading

Step 5 – Non-Traffic Loading

Bollards shall be placed around access risers in non-traffic areas to prevent inadvertent loading by maintenance vehicles.

Aqua-Filter™ Installation

Normal installation steps for the Aqua-Filter™ units involve preparation and excavation of the area that is to contain the Aqua-Filter™. This includes grading, leveling and compacting the base material before lowering the unit into the excavation and connecting the Aqua-Filter™ inlet and outlet stub-outs with appropriate pipe couplings. Prior to shipping, the purchasing contractor provides written confirmation to install AquaShield™ products in accordance with manufacturer's specifications.



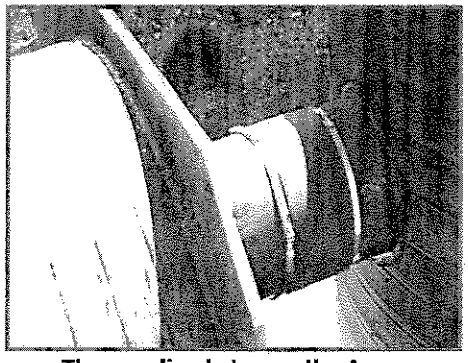
An Aqua-Filter™ system ready to be installed

Step 1 – Excavation and Bedding

The trench and trench bottom shall be constructed in accordance with ASTM D 2321, Section 6, Trench Excavation, and Section 7, Installation. The HDPE filtration system shall be installed on a stable base consisting of 12-inches of Class I stone materials (angular, crushed stone or rock, crushed gravel; large void content, containing little or no fines) as defined by ASTM D 2321, Section 5, Materials, and compacted to 95% proctor density. Additional bedding shall be tamped around the "under-center" of the filter chamber up to the springline to provide adequate support. All required safety precautions for the system installation are the responsibility of the contractor.

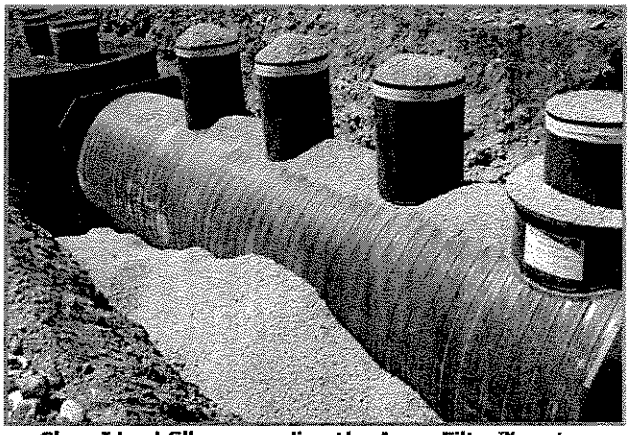
Step 2 – Pipe Connection Devices

Couplings to and from the Aqua-Filter™ shall be supplied by the contractor and shall be Fernco®, Mission™ or equal type flexible boot with stainless steel tension bands or equal. A metal sheer guard should be used when available. The manufacturer shall supply the coupling to connect the Aqua-Swirl™ to the filtration chamber.



The coupling between the Aqua-Swirl™ and the filtration chamber of the Aqua-Filter™ system

Step 3 – Backfill Requirements

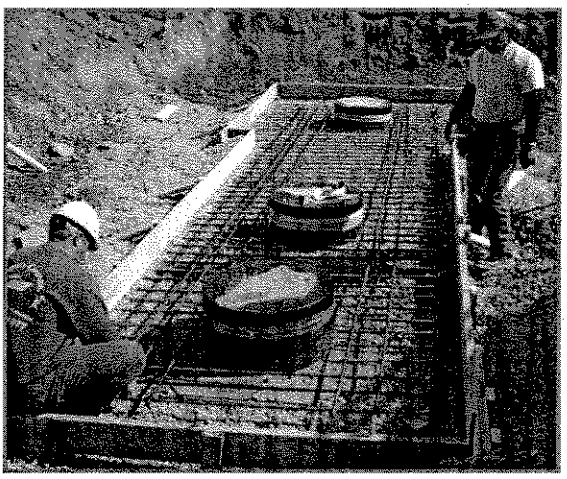


Class I backfill surrounding the Aqua-Filter™ system

Backfill materials shall be Class I or II stone materials, (well graded gravels, gravelly sands; containing little or no fines) as defined by ASTM D 2321, Section 5, Materials, and compacted to 90% proctor density. Class I materials are preferred. Backfill and bedding materials shall be free of debris. Backfilling shall conform to ASTM F 1759, Section 4.2, "Design Assumptions". Backfill shall extend at least 3.5 feet beyond the edge of the stormwater filtration system and for the full height to sub-grade and extend laterally to undisturbed soils.

Sufficient backfill shall be placed over components prior to using heavy compaction or construction equipment to prevent damage. Support shall be provided for vertical risers as commonly found at service connections, cleanouts, and drop manholes to preclude vertical or lateral movement.

Step 4 – Traffic Loading



The installation of a reinforced concrete pad for H20 traffic loading

A reinforced concrete pad shall be placed over the entire system when subject to H-20 (or greater) traffic loading. The pad shall extend no less than 12 inches beyond the outside diameter of the Aqua-Swirl™ and filtration chamber on all sides. A professional engineer shall provide final approval of the design of the concrete pad and the calculations must be included in the submittal. Traffic rated foundry rims and covers shall be installed such that no contact is made with access risers.

Step 5 – Non-Traffic Loading

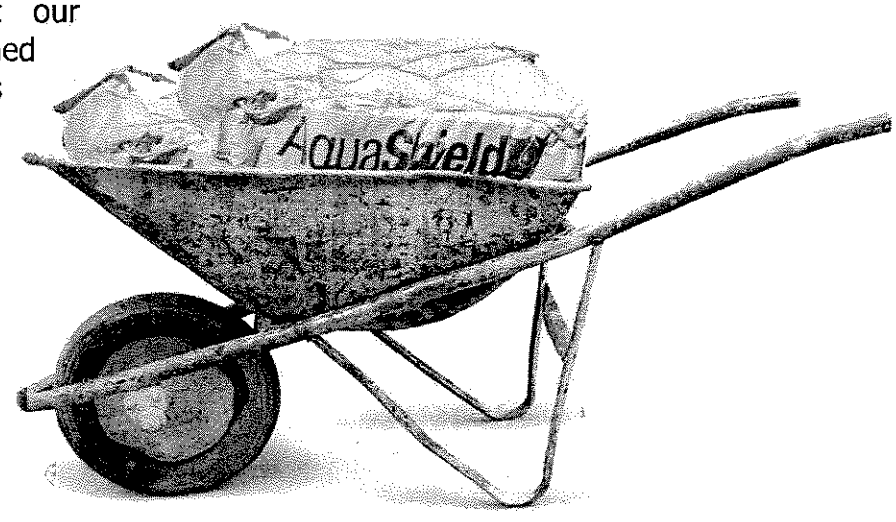
Bollards shall be placed around access risers in non-traffic areas to prevent inadvertent loading by maintenance vehicles.

AquaShield™ Product System Maintenance

The long-term performance of the stormwater treatment structures (including manufactured systems, ponds, swales, etc.), and the effective protection of receiving waters, depends on a consistent maintenance plan. Inspection and maintenance functions are simple and easy for the AquaShield™ Stormwater Treatment Systems allowing all inspections to be performed from the surface. An AquaShield™ field representative will be available as needed to assist local maintenance personnel in the field. Please contact us for a copy of a product-specific "Inspection and Maintenance Manual".

It is important that a routine inspection and maintenance program be established for each unit based on (1) the volume or load of the contaminants of concern, (2) the frequency of releases of contaminants at the facility or location, and (3) the nature of the area being drained.

In order to ensure that our systems are being maintained properly, AquaShield™ offers a maintenance solution to all of our customers. We will arrange to have maintenance performed.



Inspection

All AquaShield™ products can be inspected from the surface, eliminating the need to enter the systems to determine when cleanout should be performed.

In most cases, AquaShield™ recommends a quarterly inspection of the Stormwater Treatment Systems for the first year of operation to develop an appropriate schedule of maintenance.

Based on experience of the system's first year in operation, we recommend that the inspection schedule be revised to reflect the site-specific conditions encountered. Typically, the inspection schedule for subsequent years is reduced to semi-annual inspection.

Aqua-Swirl™ Maintenance

The Aqua-Swirl™ has been designed to minimize and simplify the inspection and maintenance process. The system can be inspected and maintained completely from the surface, thereby eliminating the need for confined space entry.

Furthermore, the entire structure (specifically, the floor) is accessible for visual inspection from the surface. There are no areas of the structure that are blocked from visual inspection or periodic cleaning.

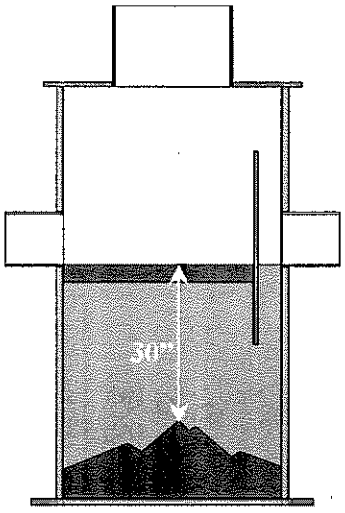
Inspection of any free-floating oil and floatable debris can be directly observed and maintained through the manhole access provided directly over the swirl chamber.

Aqua-Swirl™ Inspection Procedure

To inspect the Aqua-Swirl™, a hook is needed to remove the manhole cover. AquaShield™ provides a customized manhole cover with our logo to make it easy for maintenance crews to locate the system in the field. We also provide a permanent metal information plate attached inside the access riser, which provides our contact information, the Aqua-Swirl™ model size, and serial number.

Sediment inspection using a stadia rod

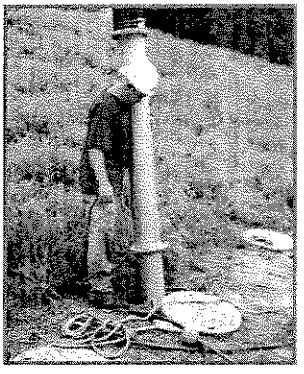
The only tools needed to inspect the Aqua-Swirl™ system are a flashlight and a measuring device such as a stadia rod or pole. Given the tremendous accessibility provided, floating oil and debris can be observed directly from the surface. Sediment depths can easily be determined by lowering a measuring device to the top of the sediment pile and to the surface of the water. When the sediment pile is within 30 to 36 inches of the water surface, the system should be maintained.



It should be noted that in order to avoid underestimating the volume of sediment in the chamber, the measuring device must be carefully lowered to the *top* of the sediment pile. The finer sediment at the top of the pile, typically offers less resistance to the measuring device than the larger particles.

Aqua-Swirl™ Cleanout Procedure

Clean out of the Aqua-Swirl™ is simple. Free-floating oil and floatable debris can be observed and removed directly through the 30-inch service access provided.



Vacuum truck cleans the Aqua-Swirl™

A vacuum truck can be used to remove the accumulated sediment and debris. It is important to note that the entire sediment storage area can be reached with a vacuum hose from the surface (reaching all the sides).

Disposal of the material is typically treated in the same fashion as catch basin cleanouts. AquaShield™ recommends that all materials removed be handled and disposed of in accordance with local and state requirements.

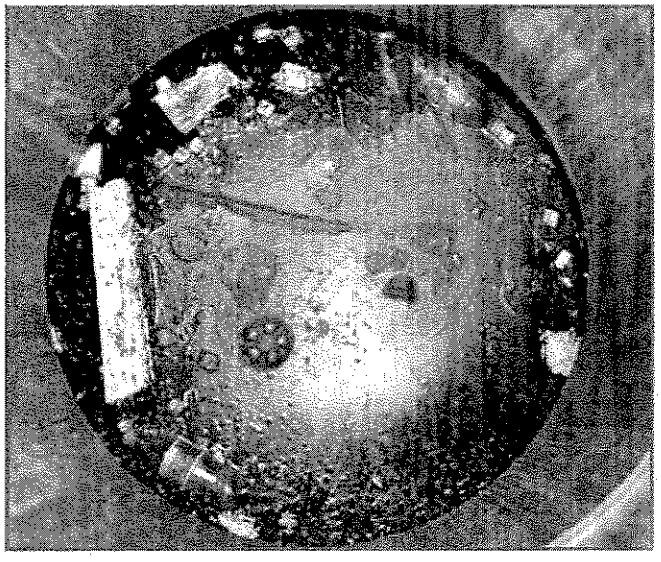
Inspection Data Sheets are provided in the Appendix of this Manual.

Aqua-Filter™ Maintenance

Proper maintenance of the Aqua-Filter™ system is needed for the unit to operate efficiently. Typically, inspection of the Aqua-Swirl™ pretreatment chamber and the filtration chamber should be performed on a quarterly basis. Information gathered during the first year of service can be used to create a maintenance plan appropriate for the site.

Aqua-Swirl™ Pretreatment Chamber

The Aqua-Swirl™ is easily inspected from the surface. Floating debris and free oil can be observed along with the captured stormwater by removing the manhole cover. Sediment depth is determined by lowering a measuring device (e.g. stadia rod) to the top of the sediment pile.



Floatable debris in the Aqua-Swirl™

When the sediment pile is within 30 to 36 inches from the water surface, cleaning is required. Typically, a vacuum truck is used to first remove the captured floating materials from the water's surface before lowering the vac-hose into the accumulated sediment pile for its removal.

For more detail regarding the inspection and maintenance of the pretreatment chamber, please see the previous Section on the Aqua-Swirl™ Inspection and Maintenance.

Aqua-Filter™ Filtration Chamber

The filter media is also easily observed from the surface. Manhole covers are spaced over the entire filtration bed to provide easy access. AquaShield™ provides a customized manhole cover with our logo to make it easy for maintenance crews to locate the system in the field.

Initially, the filter media is light tan or white in color. When the media color turns black, it has become saturated due to pollutant loading and requires replacement. Call toll free (888) 344-9044 to order replacement filters.

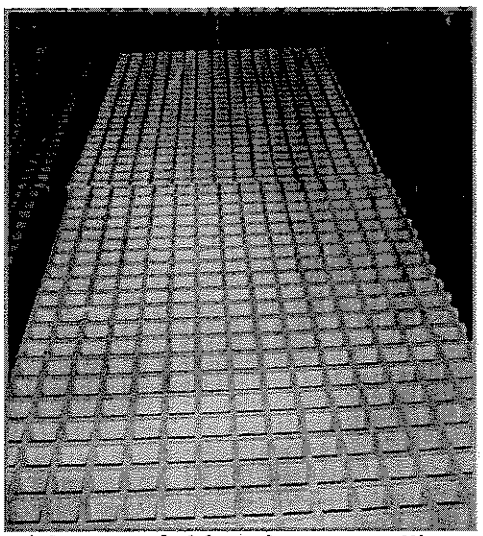
A permanent ladder provides access to filter chamber

An entry riser provides direct access into the filtration chamber with a permanent ladder welded into the downstream section of the chamber. This additional access allows for the vacuuming of any standing water and an unobstructed walkway to the downstream side of the filter bed.

Replacement of the filtration media typically requires entry into the filtration chamber by one of a two-member maintenance crew. Confined space entry precautions should be taken by the maintenance crew when removing and replacing the filters.

The spent filter containers are normally retrieved from the filter chamber by a second crewmember at the surface through the multiple 30-inch risers spaced across the top of the filter bed. In addition, the filter containers can be accessed directly from within the filtration chamber via a vertical removable panel at the rear of the filter bed.

The center row of the filtration bed has been fitted with one inch thick removable fiberglass grate panels. This allows for a six-foot tall walkway down the center of the chamber, providing easy access to the full length of the filtration chamber.



Grate panels (shown) or cargo netting cover the filter media

Rows of removable side grates are positioned on both sides of the center row. After the center grate panel has been removed, the filter media can be lifted from these side grate panels.

After the removable sides have been loaded with replacement filter containers, the removable center grates are repositioned and locked in place. New filters are installed in a criss-cross manner to prevent short-circuiting (see Appendix).

Filter Media Disposal

The filter media does not allow captured contaminants to be released once absorbed into the material. This is a unique quality of the Aqua-Filter™, allowing superior performance under extreme conditions.

The spent filters and sediment generally do not require any special treatment or handling for disposal. The filtration media can be recycled as fuel material, or sent to a subtitle D landfill. AquaShield™ recommends that all materials removed during the maintenance process be handled and disposed of in accordance with local and state requirements.

Spent filter media can be recycled or sent to a landfill

Inspection Data Sheets are provided in the Appendix of this Manual.

APPENDIX

CARGO NETTING INSTALLATION

Cargo netting is used to secure filter containers in place after containers are installed in the appropriate orientation within the filtration chamber (see filter container installation instructions).

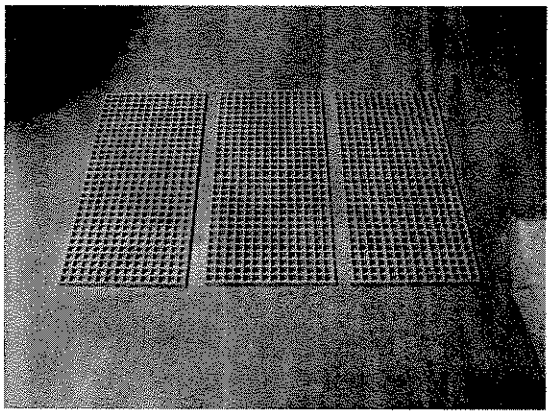
Cargo netting is placed on top of the top course of filter containers and stretched into place using heavy duty cable ties (provided). The netting is cable tied to HDPE anchor blocks and attached to the side walls of the filtration chamber (see drawing).

It is important to install the netting in such a way as to both cover the entire surface area of the containers while stretching netting snuggly to minimize the containers movement under high flow conditions.

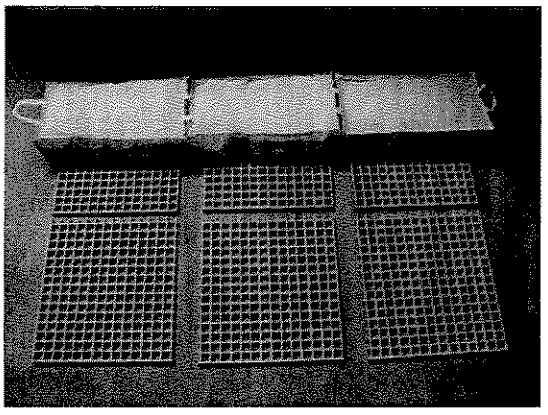
Netting installation is complete when all surface area of filter containers are covered with netting and netting is secured with cable ties to anchor blocks.

For any questions related to installing filter containers or netting, please call AquaShield, Inc. (888) 344-9044.

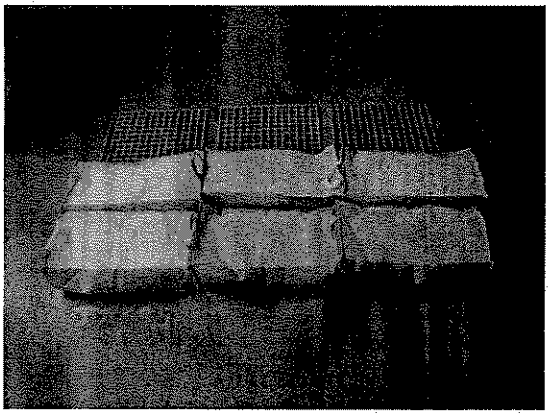
INSTALLATION INSTRUCTIONS FOR AQUASHIELD FILTER CONTAINERS



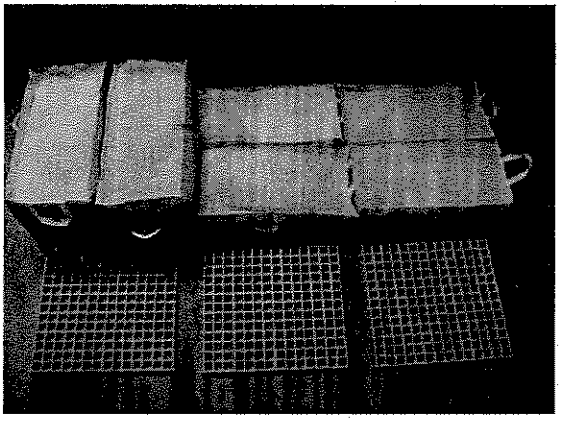
(1) Bottom Grates found in chamber



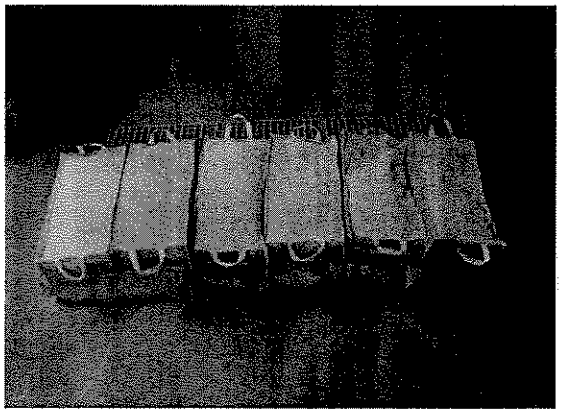
(2) First row first course



(3) Second row



(4) Second course started



(5) Second course complete

Repeat process for each additional row and course.
Cargo netting shall be stretched over top course of filter containers and secured in place with heavy duty cable ties rated at 350 lbs minimum.

Aqua-Filter™
Inspection and Maintenance Manual for BMP Owners

(Note: Attach certifications for local regulatory authority including any applicable fees.)

Site and Owner Information

Site Name: _____ Change in ownership since last inspection' Y N

Owner Name: _____

Owner Address: _____

Owner Phone Number: _____

Emergency Phone Number: _____

Location: _____

Date: _____

Time: _____

Inspector Name: _____

Maintenance Items

Inspection - Aqua-Swirl™ (pretreatment)

Floatable Debris and Oil

1. Remove manhole lid to expose liquid surface of Aqua-Swirl™.
2. Remove floatable debris with basket or net if any present.
3. If oil is present, measure its depth. Clean liquids from system if 1/2" or more oil is present (see "Cleaning" Figure 5).

Note: Water in an Aqua-Swirl™ can appear black like oil due to the dark body of the surrounding structure. Oil appears darker than water in the system and is usually accompanied by debris (e.g. Styrofoam, etc.) with obvious signs of oil stains. The depth of oil can be measured with an oil/water interface probe, a stadia rod with water phylic paste, a coliwasa, or by simply collecting a representative sample with a jar attached to a rod.

Sediment Accumulation

Make measurements as follows (see Figures 1 and 2):

1. Lower measuring device (i.e. stadia rod) into Aqua-Swirl™ throught service access provided. (See Figure 2)
2. Record distance to top fo sediment pile (in): _____
3. Record distance to top of water (in): _____
4. Calculate distance to sediment minus distance to water (in): _____
5. Schedule cleaning if value in step 4 is 30" or less. (See Figure 5).

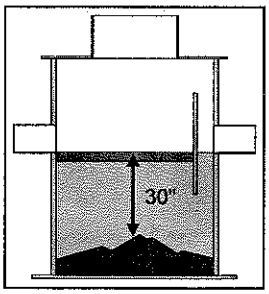


Figure 1

Figure 2

Inspection - Aqua-Filter™ (continued)

1. Remove manhole lids to expose filter bed of media and access ladder.
2. Enter filtration chamber through access riser. (note: water will be present at very minimal depths prior to cleanout during the inspection)
3. Remove bulkhead door as shown in Figure 3.
4. Remove filter grate covers/cargo nets and filters through manway risers along the chamber.
5. Visually inspect the filter medial noting the color and saturation of contaminents (TSS, oils, grease, etc.)
6. If media is dark brown to black, the media is fully spent and should be replaced. (See Figure 4).
7. Contact AquaShield™ Maintenance Department for replacement bags at 888-344-9044.
8. Schedule cleaning (See "Cleaning" Figure 5).

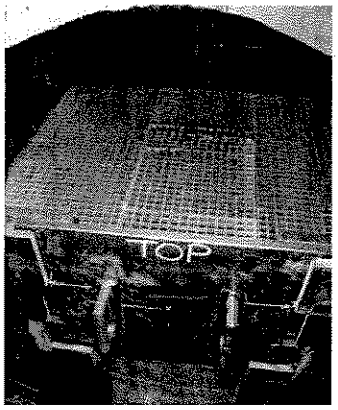


Figure 3

Figure 4

Inspection (continued)

Diversion Structures

If a diversion structure is present on the site, this should be inspected for the following items.

1. Inspect weir or other structure for structural decay or damage. Weirs are more susceptible to damage than off-set piping and should be checked to confirm that they are not crumbling, in the case of concrete or brick weirs, or decaying if a steel weir was used.
2. Inspect diversion structure and by-pass piping for signs of structural damage or blockage from debris or sediment accumulation.
3. Measure elevations on diversion weir or piping to ensure it is consistent with site plan design.
4. Inspect downstream structure in diversion system for signs of blockage or structural failure.

Cleaning

Schedule cleaning with local vactor company or AquaShield™'s Maintenance Department to remove sediments, oils, and other floatable pollutants with a vactor trailer. The spent filters and sediment generally do not require any special treatment or handling for disposal. The filter media can be recycled as fuel material, sent to a subtitle D landfill. AquaShield recommends that all materials removed during the maintenance process be handled and disposed of in accordance with local and state requirements.

Figure 5

Maintenance Schedule

During Construction

Inspect the Aqua-Filter™ every three months and clean the system as needed. The Aqua-Filter™ should be inspected and cleaned at the end of construction regardless of whether it has reached its sediment or oil storage capacity.

First Year Post-Construction

Inspect the Aqua-Filter™ every three months and clean the system as needed.
Inspect and clean the system once annually regardless of whether it has reached its sediment or floatable pollutant storage capacity.

Second and Subsequent Years Post-Construction

If the Aqua-Filter™ did not reach full sediment or floatable pollutant capacity in the First Year Post-Construction, the system can be inspected and cleaned once annually.

If the Aqua-Filter™ reached full sediment or floatable pollutant capacity in less than 12 months in the First Year Post-Construction, the system should be inspected once every six months and cleaned as needed. The Aqua-Filter™ should be cleaned annually regardless of whether it reaches its sediment or floatable pollutant capacity.

Bypass Structures

Bypass structures should be inspected whenever the Aqua-Filter™ is inspected and maintained as needed.

Maintenance Company Information

Company Name: _____

Street Address: _____

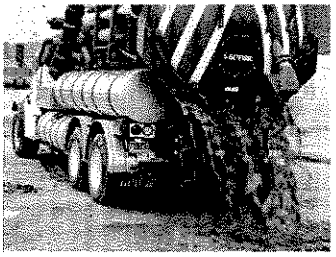
City, State, Zip: _____

Contact: _____

Office Phone: _____

Mobile Phone: _____

Pager: _____



Activity Log

Date of cleaning: _____ (Next inspection should be 3 months from this date for the first year).

Time of cleaning: _____

Date of next inspection: _____

Floatable debris present (Y/N)? _____

Oil present (Y/N)? _____ Oil depth (inches): _____

Structural Conditions and Comments

Any structural damage? Y N Where? _____

Any evidence of structural wear? Y N Where? _____

Odors present? Y N Describe: _____

Any plugging? Y N Describe: _____

NOTES

Additional Comments and/or Actions to Be Taken	Time Frame

NOTES:

1. Attach site plan showing Aqua-Filter™ location.

2. Attach detail drawing showing Aqua-Filter™ dimensions and model number.

3. If a diversion structure is used, attach details showing basic design and elevations.

Aqua-Filter™

TABULAR MAINTENANCE SCHEDULE

Date Construction Started: _____

Date Construction Ended: _____

During Construction

Activity	Month 1	2	3	4	5	6	7	8	9	10	11	12
Inspect and Clean as Needed			X			X			X			X
Inspect Bypass Structures (if applicable) and Maintain As Needed			X			X			X			X
Clean System*												X*

* The Aqua-Filter™ should be cleaned once a year regardless of whether it has reached full pollutant storage capacity. In addition, the system should be cleaned at the end of construction regardless of whether it has reach full pollutant storage capacity.

First Year Post-Construction

Activity	Month 1	2	3	4	5	6	7	8	9	10	11	12
Inspect and Clean as Needed			X			X			X			X
Inspect Bypass Structures (if applicable) and Maintain As Needed			X			X			X			X
Clean System*												X*

* The Aqua-Filter™ should be cleaned once a year regardless of whether it has reached full pollutant storage capacity.

Second and Subsequent Years Post-Construction

Activity	Month 1	2	3	4	5	6	7	8	9	10	11	12
Inspect and Clean as Needed*												X*
Inspect Bypass Structures (if applicable) and Maintain As Needed												X*
Clean System*												X*

*If the Aqua-Filter™ did not reach full sediment or floatable pollutant capacity in the First Year Post-Construction, the system can be inspected and cleaned once annually.

If the Aqua-Filter™ reached full sediment or floatable pollutant capacity in less than 12 months in the First Year Post-Construction, the system should be inspected once every six months (more frequently if past history warrants) and cleaned as needed. The Aqua-Filter™ should be cleaned annually regardless of whether it reaches its sediment or floatable pollutant capacity.