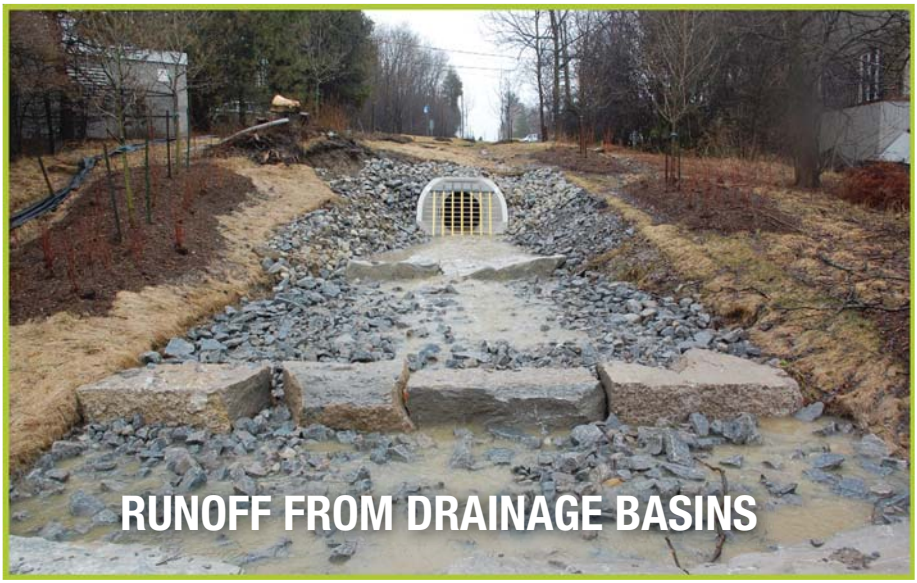

THE DIRTY
LITTLE SECRET
imbrium



# RUNOFF FROM DRAINAGE BASINS

## First, some background info

Hydrodynamic separators, also called Oil-Grit Separators, are commonly sized for the peak flows from the drainage basins they serve. But most rainfall creates flow rates that are much lower than these peak flows. In fact, these peak flow rates result from design storms with labels like 1-in-10 year or 1-in-100 events because that is how frequently they occur on average. Since these storms are as infrequent as they are intense, sizing these devices based on the peak flows leaves storm-water professionals with an inaccurate perspective of the device's true performance.

*(Analogy - why would you buy a snow-plow, when you only have to shovel the walk?)*

In order to evaluate the true effectiveness of a separator, the installed device must be tested for its ability to:

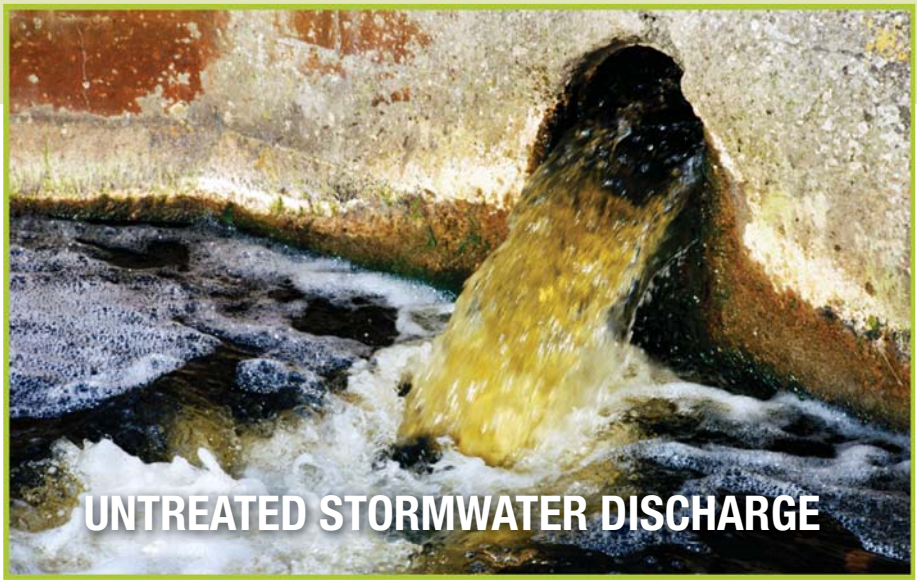
1. Capture a wide range of pollutants that are present in our urban environment.
2. Capture those pollutants over the wide range of day-to-day or week-to-week flows that occur most often.
3. Keep pollutants from being flushed away during the infrequent, but intense peak flows when they do occur.


## What is the Dirty Little Secret?

Lip-synching pop stars, juiced up athletes, restaurant cooks who do not wash their hands after using the bathroom, and stormwater treatment installations that are based on inadequate or unrealistic performance data. We all know these things exist, but no one really wants to talk about them.

So, what skeletons are hiding in the stormwater quality closet?

1. Most hydrodynamic separators are being sized for conditions that just don't occur or make sense in the real world:
    - These units are being sized for large sediments that only account for the smallest portion of pollutants transported by stormwater. Most large particles never even make it to an Oil-Grit Separator as they fall out up-stream in catch basins, street sweepers, etc.
    - Units sized to acccommodate massive flows, that may only happen infrequently, don't contribute to the overall pollution load.
    - These massive flows won't flush out a clean unit in the lab, but what about a unit that's been accumulating sediment over 6 months, 1 year, 2 years, or even 5 years?
2. The most important but often overlooked performance criteria for a stormwater treatment device is the ability not only to capture pollutants, but also retain them during high intensity storms.
3. These issues are often inadequately addressed because treatment devices with an inappropriate internal by-pass are often misused or misinterpreted because stormwater professionals:
    - Are too influenced by the peak-flow 'mentality' and continue to allow flushing flows within the unit, rendering the internal by-pass ineffective.
    - Believe that treatment ends when by-pass begins … when in fact treatment continues well beyond the point an internal by-pass should be protecting the treatment process.




- Accept manufacturers claims at face value without seeking regulatory or 3rd party checks and balances that are available to them.

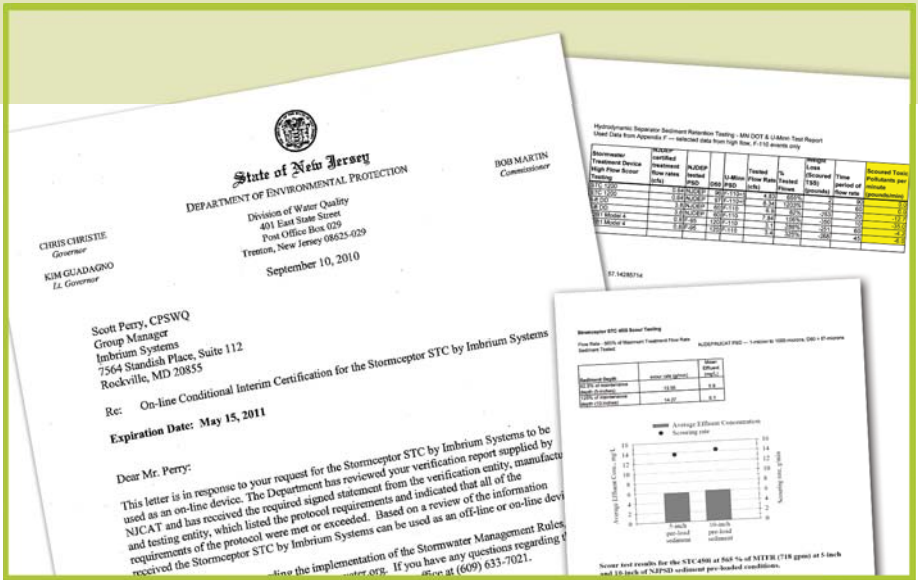
4. The performance of a stormwater treatment device can often be trumped up by creative marketing spins and exploitation of regulatory ambiguities, resulting in exaggerated treatment or flow rate claims. Marketing without good science can be as damaging to water quality as sizing and designing treatment devices on peak flows.

## The Outcome?

A heavy rainfall event, if not managed properly, can stir up the previously captured pollutants in a treatment device and send them downstream. These fine silt-sized, pollutant-laden particles, often contain brake pad dust, tire wear fragments, motor oil, PAHs, nutrients and other toxic organics. Allowing this sludge back into the environment defeats the entire purpose of these treatment applications.

It's crucial this tar-like, pollutant-laden sediment remain inside the treatment device until proper maintenance can take place.

*Typical stormwater contains: Heavy Metals - Chromium, Copper, Lead and Zinc Hydrocarbons, Hydrocarbon by-products and PAHs Nutrients, i including phosphorus and nitrogen sediment --- silts, sands*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CHRIS CHRISTIE
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KIM GUADAGNO
Lt. Governor
BOB MARTIN
Commissioner
September 10, 2010
Scott Perry, CPSWQ
Group Manager
Imbrium Systems
7564 Standish Place, Suite 112
Rockville, MD 20855
Re: On-line Conditional Interim Certification for the Stormceptor STC by Imbrium Systems
Expiration Date: May 15, 2011
Dear Mr. Perry:
This letter is in response to your request for the Stormceptor STC by Imbrium Systems to be used as an on-line device. The Department has reviewed your verification report supplied by NJCAT and has received the required signed statement from the verification entity, manufacturer and testing entity, which listed the protocol requirements and indicated that all of the requirements of the protocol were met or exceeded. Based on a review of the information received the Stormceptor STC by Imbrium Systems can be used as an off-line or on-line device
Hydrodynamic Separator Sediment Retention Testing - MN DOT & U-Minn Test Report
Used Data from Appendix F -- selected data from high flow, F-110 events only
Average Effluent Concentration
Scouring rate
5 inch pre-load sediment
10 inch pre-load sediment

# Preventing Resuspension in Your Stormwater Treatment Design

Like spilt milk, there's no use crying over resuspended sediment! There are a few key actions needed to minimize the chances of washing out previously captured pollutants:

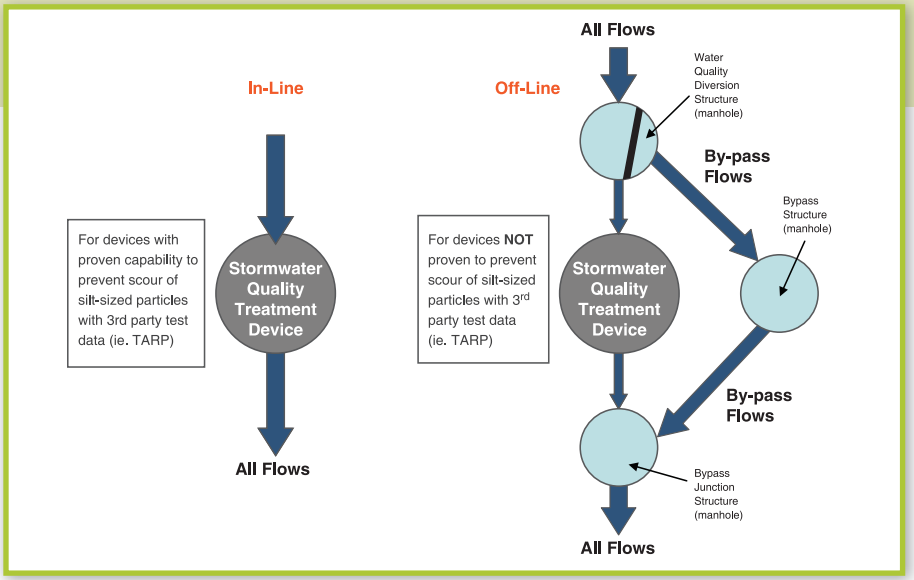
1. Select stormwater treatment devices that are backed by proven full-scale performance data that's been independently tested demonstrating the ability to both capture and retain silt-sized particles (< 50-microns) at excessive flow rates.
2. Require independent, third-party verification test data demonstrating that resuspension of silt-sized particles will not occur.
3. Allow verified treatment devices that do not resuspend to be installed in an "in-line" design configuration, allowing treated water to flow downstream without stirring up previously captured pollutants.

***Refer to page 6 for:***
***Hydrodynamic Separator Sediment Retention Testing***

*David A. Saddoris, Kurtis D. McIntire, Omid Mohseni, John S. Gulliver*

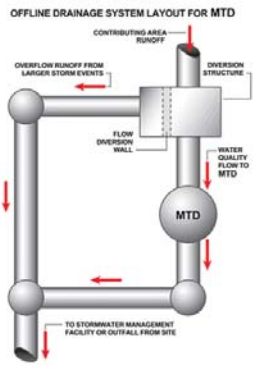
*March 2010 Report no. Mn/DOT 2010-10*

*Projects: Assessment of Underground Stormwater Management Devices under High Flow Conditions (E08PS05)*

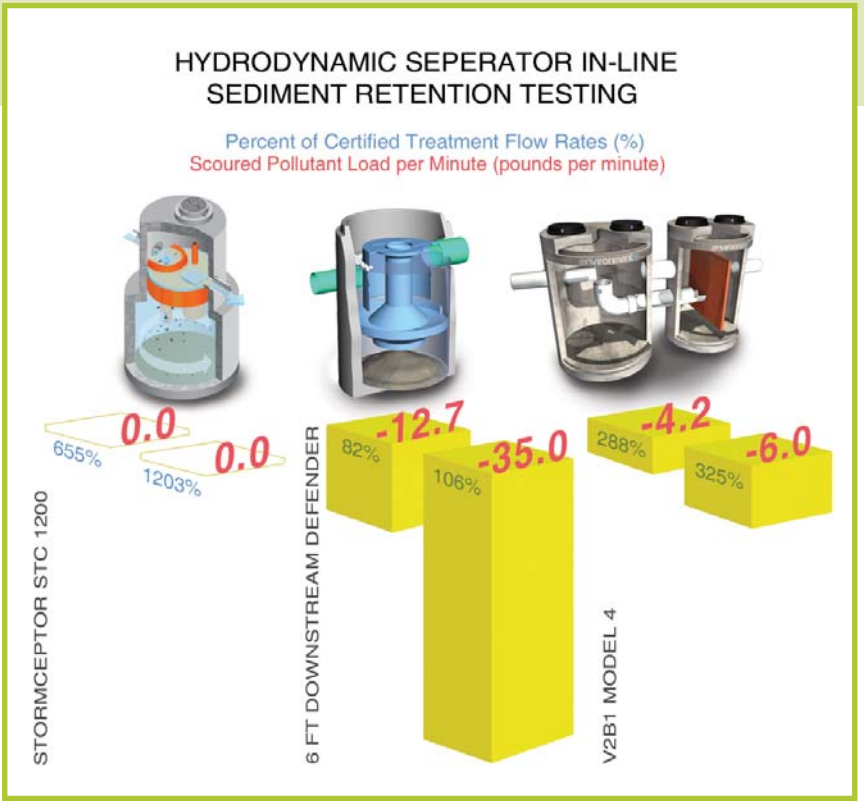



4. Non-verified treatment device (without data to review) should require alternative system design options to mitigate the potential for resuspension and washout from occurring, by:

   - Placing the device in an off-line configuration. An off-line application would typically include an external by-pass (upstream water quality diversion structure placed within the conveyance system), sending the water quality flows to the device placed off line, and the return flow from the device back to a return junction manhole placed within the conveyance system.
   - Reducing the device's accepted treatment flow rates

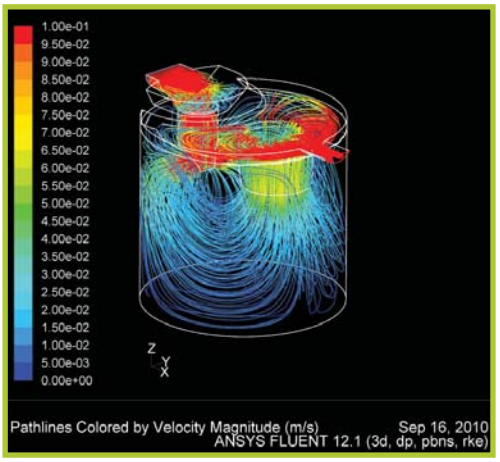




OFF-LINE METHOD




*Refer to page 4 reference*

# STORMCEPTOR COMPUTATIONAL FLUID DYNAMICS MODELING AND PERFORMANCE VALIDATION




Independent sediment testing conducted on the Stormceptor® STC 900 was utilized to create and then validate a state-of-the art computational fluid dynamics (CFD) model.

This model is validated with experimental results to ensure congruence with reality and provide performance confidence. The CFD pathline analysis clearly illustrates that a significant volume of the Stormceptor's lower separation chamber is well utilized to prevent re-suspension and scour of the captured sediment, especially under high flow rate conditions.


# #1 CHOICE IN STORMWATER TREATMENT

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