

ANALYSIS OF SEDIMENTS RETAINED IN FABCO INDUSTRIES CATCH-BASIN INSERT FILTERS



Executive Summary

In cooperation with a local County DPW department, Fabco Industries evaluated typical sediments collected in StormBasins and/ or StormSacks located in two Long Island, NY communities. The test samples were taken from 3 units installed at two sites identified as 349 and 350. The sediments loads were analyzed for total weight, over all composition, particle size and nutrient concentrations.

The analysis confirmed:

1. Estimated year reductions of nearly 900 pounds from site 349 and 525 pounds at site 350
2. StormBasins and StormSacks retain a full range of sediment particle sizes with more than 40% falling in the all important sub-30 micron range.
3. The captured sediments showed average nutrients concentrations of 690 mg/Kg of Nitrogen compounds and 190 mg/Kg of phosphates
4. Both units captured quantities of organic and inorganic debris. Retaining organic debris, keeping it dry and available for easy cleanout before decomposition reduces potential subsequent release of stored nutrients.

The test information reported here is also presented in a companion report "Fabco Industries, Inc, Stormwater Nutrients: P & N Test Program. This second report confirms reductions of soluble P & N using Fabco's filter cartridges.

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The primary purpose of the study was to determine the weight of the material collected in StormBasins and/or StormSacks during a 4 month period. However the scope of the test was expanded to include a particle size analysis and determination of P & N constituents attached to the sediment load. This P & N evaluation of solid materials was also utilized in a companion report: Fabco Industries Inc, Stormwater Nutrients: P & N Test Program that reported on the StormBasin effectiveness on soluble nutrients.

The sediment loads collected from both sites were pre-screened with a coarse sieve to remove trash and debris before the sediment sample was collected. The P and N concentrations were evaluated using a 300G sample size. All analytical work was performed by Ecotest Laboratories, Inc, 7 Sheffield Ave, Babylon, NY 11703

Locations:

Site 349 was located in the parking lot of a small shopping center across the street from a public beach. The Site had two units installed in close proximity to each other: A StormBasin and a StormSack. A composite sample was acquired from the combined load. Site 350 had 1 StormSack installed. The site was located in front of a weed covered lot on a very busy, 4 lane urban road.

Data:

Chart 1:

Site	Sediments	Particle size >12.7mm	Particle size <12.7 mm	Percent 43-85 um	Percent <.08-30 um	Tot. K. Nitrogen	Nitrate as N	Total Nitrogen	Total Phos.
349	127.9 Kg	7.3 Kg	120.7 Kg	43.6%	48.8%	590 mg/Kg	8.2 mg/Kg	600 mg/Kg	200 mg/Kg
350	79.4 Kg	9.1 Kg	70.3 Kg	53.5%	41.0%	780 mg/Kg	<1.0 mg/Kg	780 mg/Kg	180 mg/Kg

Sediment: Captured weight & Particle size

Assuming consistent sediment collection rates over a 12 month period over 384 Kg in sediments would be captured at site 349 and more than 240 Kg at site 350. In terms of particle size removal efficiency you could expect more than 40% of the sediments collected at both sites would be less than 30 microns. (Addendum A & B)

Nutrients: estimated removal

Using the total weights and concentrations indicated in Chart 1, the total amounts of nitrogen and phosphorous retained in the captured sediment is shown below. The chart assumes a consistent sediment load size during the 3 cleanouts per year per site.

Chart 2:

Location	Tot N / Tot. P per cleanout	N & P yearly (3 cleanout)
1	2.55 / 0.85oz	7.65 / 2.55oz
2	1.93 / 0.45oz	5.79 / 1.35oz

Using the average P & N values for these two sites (6.72 TN / 1.95 TP) if we had 100 StormBasins/StormSacks the amount of nutrients stored in the captured sediments (yearly) would be equal to 42 pounds of nitrogen and 12 pounds of phosphorous. The State Environmental Resource center (www.serconline.org) suggests that one pound of phosphorous can result in the growth of 350-700 pounds of green algae. 12 pounds would grow 2 ½ to 4 ½ tons of algae.

Captured Debris and Trash

A coarse analysis of the debris captured at the two sites showed approximately 16.4 Kg of trash and debris along with the sediments.

The trash component contained mostly leaves, twigs and grass. In his Nov 2007 article (Stormwater, Nov/Dec 2007, Vol. 8, No. 8, Stormwater pollution: Getting at the Source) L.A. Baker estimates a single Maple leaf would contribute 0.3 kilograms of phosphorous per year and that a tree lined road could have greater input (of nutrients) than lawns. Capturing and retaining this organic material relatively dry in the StormBasin/StormSack will significantly reduce the availability of these stored nutrients to the environment. To further aid effectiveness, maintenance activities should be coordinated to clean out the units in the fall months.

Summary:

As part of a series of simple Best Management Practices the StormBasin/StormSack can assist the stormwater manager in complying with State and Federal water quality goals.

Earlier Fabco Industries reports have focused mainly on the StormBasin filter cartridges and there ability to treat soluble pollutants namely: pathogens, hydrocarbons, metals and nutrients. This report focuses on collected sediment.

Findings

1. StormBasins/StormSacks will collect and hold a significant quantity of sediment during the course of a year contributing to over all TSS reductions.
2. StormBasins and StormSacks retain a full range of sediment particle sizes with more than 40% falling in the all important sub-30 micron range.
3. Investigation of the sediments for evidence of attached nutrients showed significant concentrations of both P & N. Although other tests were not performed it would be reasonable to expect that other pollutant types such as heavy metals, hydrocarbons and even pathogens would also exist in the sediments collected by the units.
4. Both units captured quantities of organic and inorganic debris. Retaining organic debris, keeping it dry and available for easy cleanout before decomposition reduces subsequent release of stored nutrients.

Conclusion:

When combined with other simple stormwater programs such as spill prevention and existing street sweeping programs Fabco inserts, would help keep the paved areas cleaner, minimize the pollutants loads available to first flush action, and reduce the pollutants entering waterways either through the drains or directly from sheet flow off surrounding surfaces. Furthermore, street sweeping program would keep the StormBasin cleaner, maintaining effectiveness and reducing the maintenance frequency. And many new sweepers are equipped with catch basin cleaning attachments that can quickly service the units eliminating additional staffing and equipment.