

# Delaware's Pollution Control Strategy Tributary Times

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## Evaluation of the Performance Of Catch Basin Inserts

by Marianne Walch, Environmental Scientist  
Delaware Department of Transportation NPDES Program

Catch basin insert filters are becoming more widely used across the country as stormwater best management practices (BMPs). A variety of commercial devices are available. Most are designed to remove trash, sediments and hydrocarbons from stormwater runoff that enters the catch basins. They are a relatively easy and inexpensive retrofit, particularly for older, existing drainage systems where end-of-pipe treatment technologies may be impractical or prohibitively expensive. However, until recently, few catch basin insert filters have had performance data collected under actual field conditions.



Lifting a grate to show the DrainPac in place

Delaware's **Department of Transportation** (DelDOT) is investigating the performance of five different types of inlet protection devices in urbanized areas in northern Delaware. We are evaluating and comparing the performance of these inserts with respect to their ability to remove sediment and hydrocarbons from stormwater runoff, as well as their maintenance requirements in different applications. Monitoring will continue year-round over a two to three-year period, in order to incorporate data from varying seasonal and rainfall conditions. The study will provide information not only on the effectiveness of various inlet protection devices in removing runoff pollutants, but also on their practicality in terms of maintenance issues and cost. Results will help DelDOT in its efforts to select BMPs that are appropriate for particular sites, land uses or stormwater quality problems in the state.

The catch basin inserts being tested are:

1. **UltraDrainguard® Oil and Sediment Model (UltraTech International, Inc.)** – a geotextile sock and skirt that fits the size of the inlet opening.

2. **HydroKleen® (Hydro Compliance Management, Inc.)** – a two-chambered system consisting of a presettling sediment chamber and a filtration chamber containing one activated carbon and two cellulose filters.
3. **DrainPac® (United Stormwater, Inc.)** – a plastic support basket and polypropylene filter liner custom-sized to fit the inlet.
4. **Flo-Gard+Plus® (Kristar Enterprises, Inc.)** – a support basket and removable polypropylene filter liner, plus a silicate oil-adsorbent filter medium in floatable bags.
5. **Grate Inlet Skimmer® (Suntree Technologies, Inc.)** – a fiberglass and steel mesh basket custom-sized to the inlet opening, with an oil-absorbent boom around the collar.

The devices were installed in various locations, with different land use types and varying pollutant loads. These include the service station drainage areas of a rest area on Interstate Route 95 near Newark, the residential subdivision of Drummond North in Newark, and a commercial parking area on the Wilmington Riverfront. In addition, Suntree Technologies Grate Inlet Skimmers have been installed in catch basins at all of the DeIDOT maintenance facilities throughout the state.



Installing the UltraDrainguard catch basin filter

To determine the effectiveness of the catch basin inserts, we are comparing data from wet-weather samples collected at the outfalls of both protected and nearby unprotected (control) runs of inlets. In addition, we inspect all of the inserts on a regular basis. When cleaning or replacement occurs, the sediment and other solids collected in the filters are weighed, characterized as to content, and samples are taken for chemical analysis. This allows us to estimate the total sediment and nutrient load removed by the filters.

Preliminary data are highly variable, but so far only marginal overall protective effect on water quality at the outfalls has been observed. Most of the filters do indeed collect trash, leaves, dirt and other solids from the stormwater that passes through them. However, the inserts must be inspected and cleaned frequently to prevent resuspension and washout of the solids they have collected. The units fill up very rapidly in the tree-lined subdivisions, particularly during the autumn. Much of the stormwater flow is bypassed once the filters have accumulated debris.

We have also observed that much of the water flowing into certain catch basins appears to bypass the filters because of the design of the inlet itself. Many of the catch basins in Delaware are designed as grated curb inlets. Because in our trial the filter units do not extend under the curb opening, water that flows into the curb opening does not get treated. For this type of inlet it is clearly desirable to have a BMP that extends under this opening in order that most of the water is not bypassed.



Lifting a Suntree Technologies insert into place

Like ours, other studies of catch basin inserts have also demonstrated considerable variability in field results. A Navy study found a 17-95% range of removal efficiencies for DrainPac inserts. Another study performed by the Interagency Catch Basin Insert Committee found that a variety of catch basin inserts showed little removal of suspended solids, partially due to scouring from relatively small storms. A recent [CalTrans](#) study of highway BMP retrofits included several types of drain inlet inserts. The inserts performed poorly compared to other BMP types, generally providing less than 10% reduction in the

concentration of most constituents. This study concluded that drain inlet inserts are best suited for gross solids removal.

Catch basin inserts are attractive retrofits because of the relative ease and low cost of installation. Ultimately, however, their cost effectiveness is determined by their water quality benefit and the frequency with which they must be maintained. Our study and others have demonstrated that for many applications a very high frequency of cleaning is necessary to keep the inserts from clogging and bypassing stormwater flows, as well as resuspending captured material. Inserts may not be practical for large drainage areas or for areas with high levels of leaves or debris that can plug them.