

# Treatment of Shipyard Storm Water



## Objective

To evaluate a low-cost treatment option that consists of passive filtration of storm water in underground vaults to remove metals and suspended solids.

## Performing Activities

General Dynamics NASSCO, Hart Crowser, Stormwater Management

## Key Deliverables

- Final Report: provides the testing results through April 2002 and overall project conclusions.
- Final Report Addendum: Includes the third-year monitoring results, a summary of performance data for the filtration test units and a re-evaluation of Final Report conclusions in light of the latest results.

## Accomplishments

- Demonstrated effective treatment of shipyard stormwater using a passive filtration system
- ROI of \$3.7M over a 10 year period for a 40-acre shipyard

## Point of Contact

Mike Chee  
General Dynamics NASSCO  
(619) 522-7778  
mchee@nassco.com

**DURATION:** April 2000 - June 2003

**INDUSTRY INVESTMENT:** \$530K

**NSRP ASE INVESTMENT:** \$507K

## Produces savings of over \$1 million over a 10 year time period

A demonstration filtration system being used in a General Dynamics NASSCO-led, NSRP-sponsored project was able to reduce stormwater toxicity to challenging standards of the National Pollutant Discharge Elimination System (NPDES).

The filtration system removes metals and suspended solids from stormwater using compost media. It is being tested for future implementation by shipyards as a cost-effective way to comply with increasingly stringent NPDES discharge permits. The filtration system is not sensitive to flow rate or influent chemical concentrations and can be implemented in a simple passive flow configuration.

The research project team tested three grain-size distributions of compost media during multiple storms. For monitoring events in 2001-2002, one treatment train (TT1) contained fine-grained filter media only, a second treatment train (TT2) contained coarse-grained filter media, and a third treatment train (TT3) contained a hybrid combination of the fine-grained filter media and the coarse grained filter media. TT2 had a standard hydraulic loading rate of 15 gpm/filter cartridge, while TT1 and TT3 had reduced hydraulic loading rates of 7.5 gpm/ filter cartridge. During the third season (2003), the poorest performing treatment train configuration during the first two seasons, TT1, was replaced with a modified version of the best-performing treatment train using the same hybrid media configuration of TT3 and the hydraulic loading was increased to 15 gpm/unit. The following enhanced filtration design criteria are recommended based on testing:

- Media: leaf compost
- Grain size: hybrid of fine- and coarse-grained media
- Hydraulic loading rate: 7.5 gpm/cartridge unit

Passive enhanced filtration, which relies on gravity flow and does not have pumping or other mechanical needs, is the preferred process option for this technology.

Preliminary testing of the system showed total copper reductions ranged from 56 to 77 percent. Total zinc reductions ranged from 60 to 86 percent. Monitoring of additional real-time storm events during the third year of operations (2003) generally confirmed the results and conclusions of previous filtration testing.

Project researchers estimated that the demonstration filtration system can be constructed on a unit cost basis of approximately \$40,000 to \$60,000 per acre of drainage area. Annual operations and maintenance cost would be approximately \$17 per 1,000 gallons treated.

Based on an ROI analysis, the savings realized by the baseline system would be \$1 million over a 10 year period for the drainage area tested at General Dynamics NASSCO and \$3.7 million over a 10 year period for a 40-acre shipyard.

