



Sediment discharge to waters of the State



Sediment discharge to adjacent property



Incorrect installation of silt fence....



creates a channel effect during a rain event....



allowing soil erosion and sedimentation to occur....



and a discharge of sediment into the storm sewer....



and an eventual “mud slide”, closing the road... ..



the storm sewer then discharges to the onsite sedimentation basin....



which quickly became full....



and utilized its emergency over flow....



which discharged from its outlet....



.....sediment laden water into the adjoining wetland /
water of the state.

Site Level BMPs

Waste / Materials Management

- Combine materials management with other BMPs
 - Dust suppressants (water)
 - Catch basin inserts
 - Settling Ponds



Waste / Materials Management

- Limit exposure
 - Cover piles
 - Do not store materials near surface waters or storm drains



Surface Water Regulations & Dust Suppressants

- Discharge of materials such as dust suppressants to surface waters requires a surface water discharge permit
- No specific dust suppressant regulations related to surface water
- Must comply with the Natural Resources and Environmental Protection Act (NREPA), described earlier
- Prevent runoff of dust suppressants into surface waters or storm sewers
- Do not apply near surface waters or storm sewers



Groundwater Regulations & Dust Suppressants

- The following are authorized without groundwater permit:
 - (A) Water.
 - (B) Calcium chloride.
 - (C) Lignosulfate products.
 - (D) Emulsified asphalt or resin stabilizers.
 - (E) Vegetable by products.
- Substances not included on this list require a groundwater discharge permit before they can be used for dust suppression in MI.



Settling / Sedimentation Ponds

- Utilize to prevent discharges from site



Site Entrance/ Exit

- Defined entrance
- Hard surface
- Washed gravel
- Wheel wash
- Sweep entrance if possible
- Sweep track out



Silt Fence

- Commonly used and misused
- Requires proper installation and maintenance



Failing silt fence

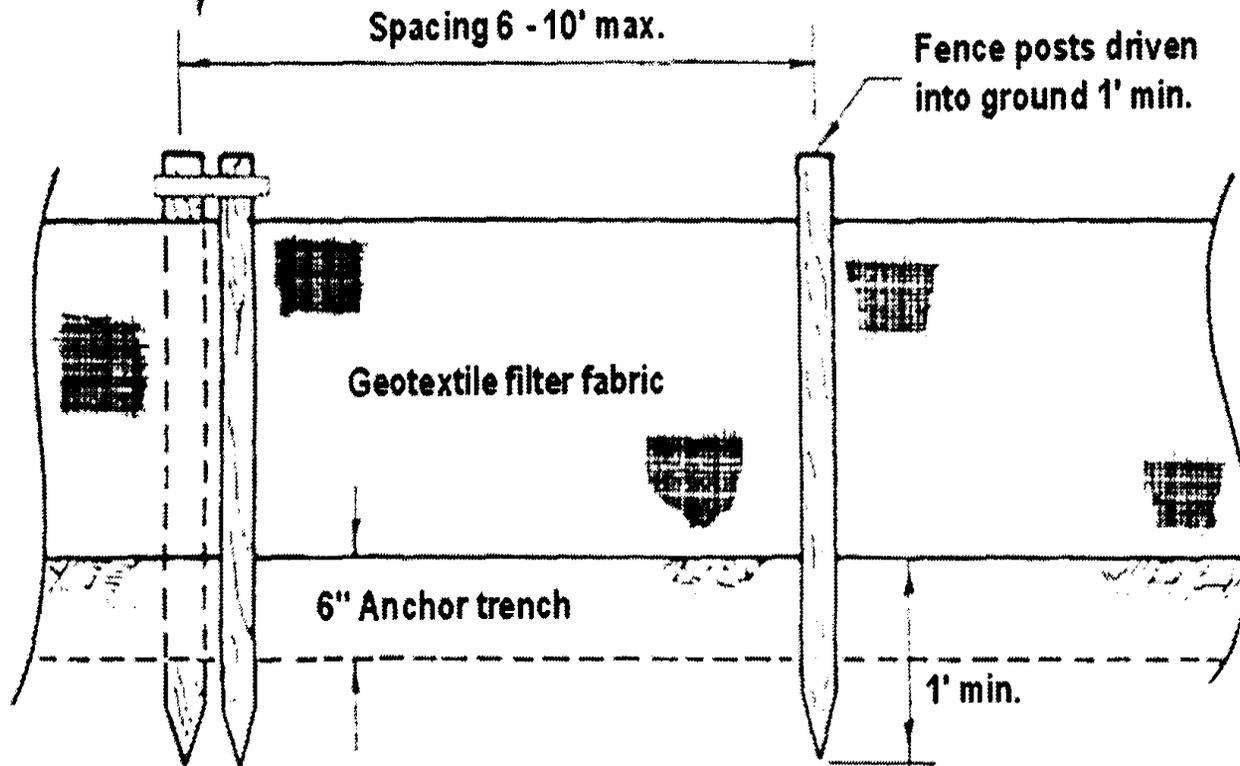


“Decorative” silt fence

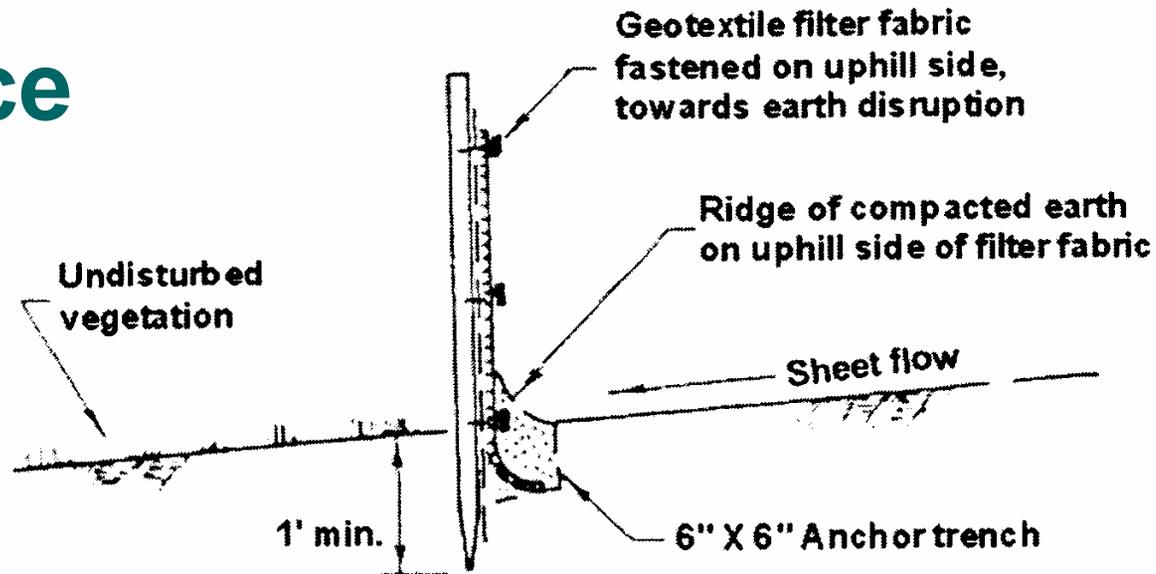


More silt fence...a lot more.





Silt Fence





Compost Socks



EPA.gov: Installation of filter socks in a road ditch by Earth Corps for Indiana Department of Transportation. The filter socks will be staked through the center. Source: Filtrex International, LLC.

Storm sewer inlet protection

- Requires proper installation and maintenance
- Use in conjunction with other practices



A person works to prevent a spill from entering a storm sewer (DAWG, 2000)



Storm sewer inlet protection

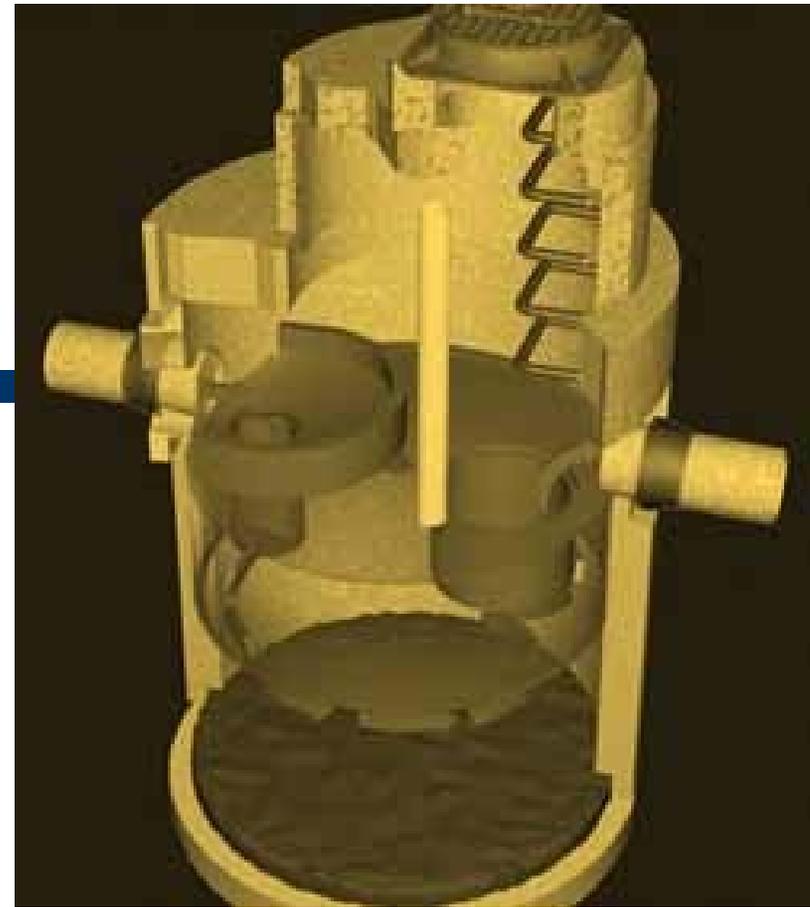
- Proprietary storm water treatment devices

- remove heavy metals and oils
 - need to be protected from heavy sediment loads
- Inserts designed to remove sediment
- Inspect regularly
- Remove sediment before they are full



Manhole inserts

- Inspection and Maintenance
 - Regular inspection
 - Follow design specifications for removal of solids and oils





Unprotected catch basin

Site Stabilization



Vegetative Practices

- Requires proper timing, installation and maintenance
- Use in conjunction with other practices
- Best for sheet flow





Banks not stabilized, stream not protected, and check dam is blown out.....



....stream becomes sediment laden.

Erosion Control Blankets



Compost Blanket



EPA.gov: Application of a 2 inch-thick compost blanket to a 1:1 rock slope using a pneumatic blower (Austin, Texas, 2002). Source: McCoy, Texas Commission on Environmental Quality (TECQ), 2005

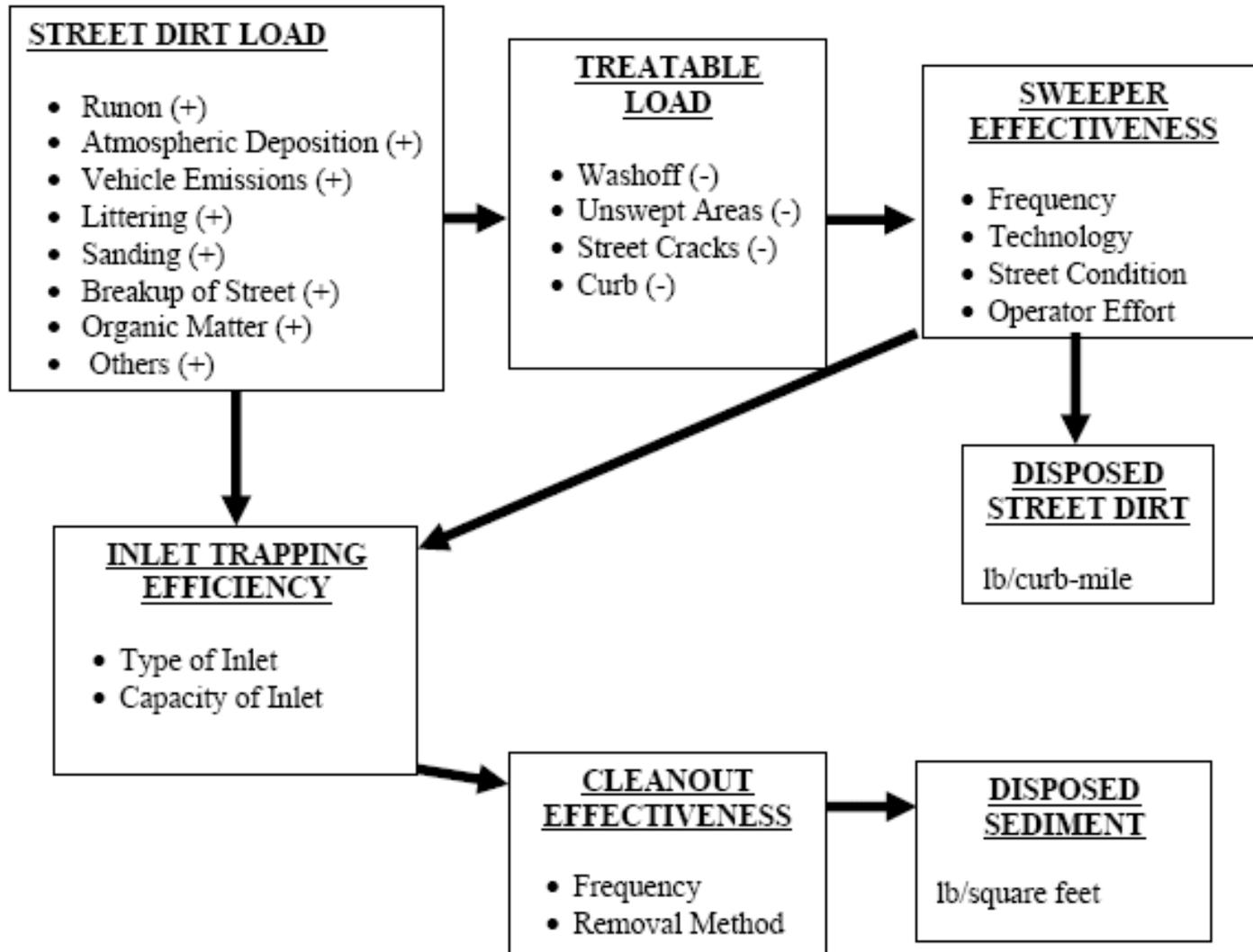
Check Dams

- Require proper design, installation and maintenance
- Use in conjunction with other practices



Road and Parking Lot BMPs

Street Dirt Load



Street Sweeping

- Streets accumulate significant amounts of pollutants that contribute to stormwater pollutant runoff to surface waters.
- Street sweeping can be an effective measure in reducing pollutants in stormwater runoff.



Types of Sweepers

- Efficiency varies with sweeper type

Table 9.8 Washoff Reductions for Weekly Street Sweeping(%)
(Claytor, 1999a; Sutherland and Jelen, 1997; Kurahashi and Associates, 1997)

| Street Type/Sweeper Type | TSS Removal | N/P Removal |
|--|-------------|-------------|
| <i>Residential Street</i> | | |
| •• Mechanical | 30% | 24% |
| •• Regenerative Air | 64% | 51% |
| •• Vacuum Assisted | 78% | 62% |
| <i>Major Road</i> (<i>applied to all but residential</i>) | | |
| • Mechanical | 5% | 4% |
| • Regenerative Air | 22% | 18% |
| • Vacuum Assisted | 79% | 63% |

Sweeping Frequency

- Efficiency varies with frequency

| Interim pollutant removal rates from street sweeping for TSS, TP and TN. | | | |
|--|-----|-----|-----|
| Frequency | TSS | TP | TN |
| Monthly | 16% | 4 % | 4 % |
| Twice a month | 24% | 5 % | 6 % |
| Weekly | 24% | 5 % | 6 % |
| Twice a Week | 32% | 8 % | 9 % |

Source: CWP Tech Memo 1- Literature Review

Street Sweeping

- Schedule sweeping
 - Traffic volume
 - land use
 - field observations of sediment and trash accumulation
 - proximity to surface waters
- Sweep a minimum of once per year





- Sweeper that removes fine sediments
- Routine equipment maintenance
- Removal of sediment from curb gutters
- Sweeping before spring runoff
- Street Sweepings Storage and Disposal

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- To evaluate the effectiveness, municipalities should maintain accurate logs of the number of curb-miles swept and the amount of waste collected (CASQA, 2003).

Pipe, Culvert and Ditch Maint.

- Clean regularly.
- Remove sediment deposits
- Routine cleaning reduces the amount of pollutants, trash, and debris both in the storm drain system and in receiving waters.
- Clogged drains and storm drain inlets can cause the drains to overflow, leading to increased erosion (Livingston et al., 1997).



Catch Basin Cleaning

- Cleanouts have been shown to reduce pollutants by varying amounts
 - may reduce pollutants by 5 to ~30% depending on catchment conditions, cleaning frequency and type of pollutant (Law 2006).
- Pollutant removal capability of catch basins is constrained by their design

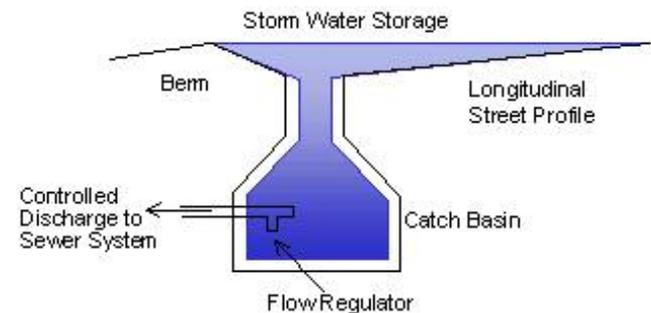
Interim pollutant removal rates (%) from catch basin cleanouts for TSS, TP and TN.

| Frequency | TSS | TP | TN |
|-------------|-----|----|----|
| Annual | 29 | 1 | 5 |
| Semi-annual | 56 | 2 | 10 |

Source: CWP Tech Memo 1- Literature Review

Catch Basin Cleaning

- Sumps help remove heavier sediment particles and the attached pollutants
- Sumps need to be inspected and cleaned routinely
- Establish a schedule for inspection/cleaning
- Streets and Storm Drain (SSD) survey can be used to measure pollutant accumulation
- GPS the system
- Target problem catch basins for intensive cleaning (2 to 4X/year)



Note: Not to scale and great vertical exaggeration

Catch basins can be equipped with flow restrictors to temporarily detain storm water in the conveyance system

O & M Waste Disposal

- In accordance with
 - Part 111 (hazardous waste),
 - Part 115 (solid waste), and
 - Part 121 (liquid industrial waste).
- Guidance Available



Truck Washout

- Review procedures
- Designate washout area
- Prevent discharge to storm sewer or surface waters
- Direct washout to sanitary if possible with approval
- Line washout pit and properly dispose of waste



Road Salt



- Proper application of road salt or other deicers reduces stormwater pollution.
- Application
 - Proximity to surface waters and other sensitive areas
 - Frequency and amount reflect site-specific conditions
 - Use of less harmful alternatives in sensitive areas
 - Use of devices that control spread rate
 - Use devices that measure road temperature
 - Calibrate spreaders



Salt Storage

- Limit exposure
- Cover piles of salt
- Comply with Part 5 Rules
- Clean up spills



Unprotected stock pile



Snow Removal

- Do not dispose directly into surface waters
- Pile snow where there is less potential for contamination of surface and ground waters
 - Away from catch basins and surface waters
 - Consider catch basin inserts for removal of pollutants



Gravel Road Maintenance

- **Divert runoff through stabilized areas**
- **Avoid direct runoff to surface waters**
- **Reduce runoff velocities**
- **Minimize areas of disturbance (stabilize bare areas)**



Roadway and Bridge Maintenance

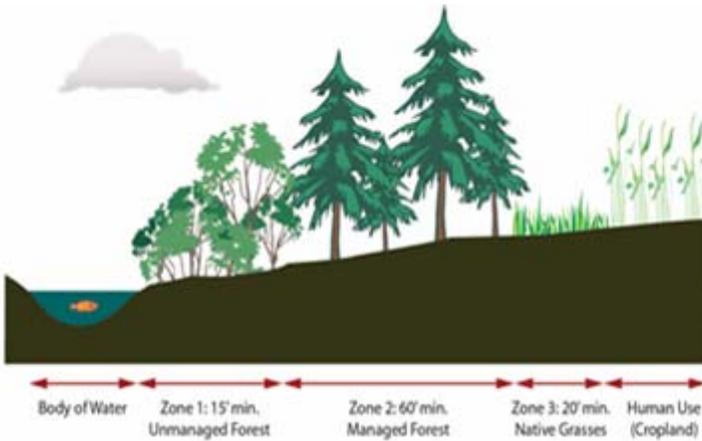
- Pave only during dry weather
- Protect catch basin inlets and manholes during paving and grinding operations
- Avoid using equipment that leak fluids
- Keep sawcut slurry out of storm drain



Roadside Vegetation

- Maintenance practices for roadside vegetation also help determine the stormwater quality of road runoff.
- Use vegetation with higher salt tolerances
- Minimize roadside spraying of vegetation (mow when appropriate)
- Select deep rooted vegetation that promotes infiltration

Riparian Buffers



PA Sea Grant



Native Plantings



Curb Cuts



IA NRCS



IA NRCS

Bioretention



Bioswales



Porous Pavement



Monitoring

- Monitor and Maintain BMPs



Poor housekeeping

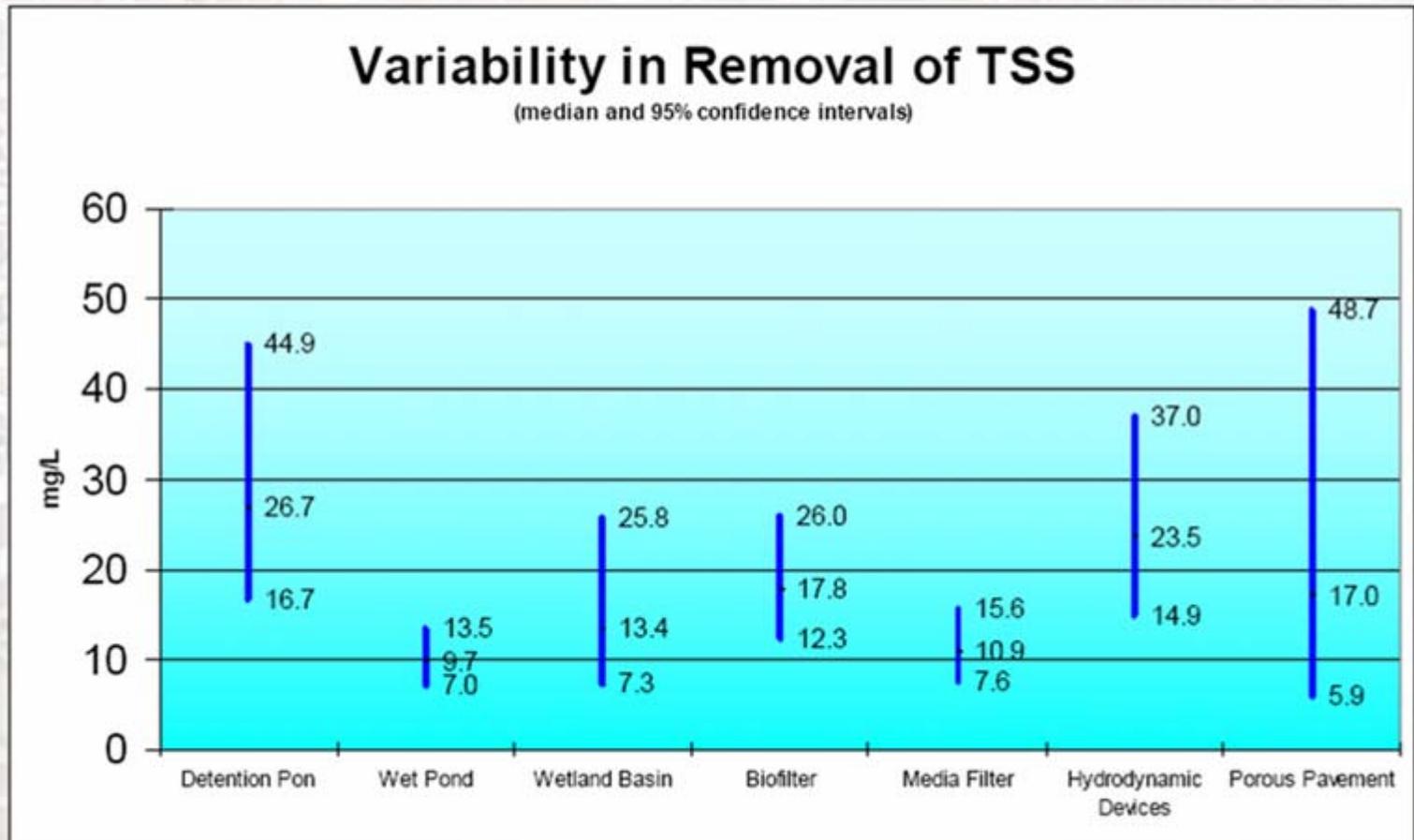
Training

- Staff and contractors
- Can help prevent storm water pollution
- Teach employees that their actions have an impact on water quality and they are examples for the community

BMP Performance

- **National Pollutant Removal Database (CWP)**
 - www.cwp.org
- **International BMP Database (WERF)**
 - www.bmpdatabase.org
- **EPA Urban BMP Performance Tool**

BMP Performance is Variable



Source: International BMP Database

Resources

- National Management Measures to Control Nonpoint Source Pollution from Urban Areas
 - <http://www.epa.gov/owow/nps/urbanmm/index.html>
- Pollution Prevention and Good Housekeeping Menu of BMPs
 - <http://cfpub.epa.gov/npdes/stormwater/menuofbmps/poll.cfm>
- Techniques for Tracking, Evaluating and Reporting the Implementation of Non Point Source Control Measures
<http://www.epa.gov/owow/nps/urban2.html>
- MI Low Impact Development Manual
 - <http://www.semcog.org/LowImpactDevelopment.aspx>



Questions?