Good Housekeeping for Municipal Operations

Training for Municipal Employees
Storm Water Pollution Prevention

NPDES Regulatory Text

- You must develop and implement an operation and maintenance program that includes a training component and has the ultimate goal of preventing or reducing pollutant runoff from municipal operations. Using training materials that are available from EPA, your State, Tribe, or other organizations, your program must include employee training to prevent and reduce storm water pollution from activities such as park and open space maintenance, fleet and building maintenance, new construction and land disturbances, and storm water system maintenance.

EPA recommends that, at a minimum, you consider the following in developing your program:

- maintenance activities
- maintenance schedules
- long-term inspection procedures for structural and nonstructural storm water controls to reduce floatables and other pollutants discharged from your separate storm sewers

Operation and maintenance should be an integral component of all storm water management programs.

Good Housekeeping Controls for reducing or eliminating the discharge of pollutants from:

Streets, roads, highways, municipal parking lots, maintenance and storage yards, fleet or maintenance shops with outdoor storage areas, salt/sand storage locations and snow disposal areas operated by you,

Source controls

Pet waste collection

Illegal dumping control

Landscaping and lawn care

Vehicle washing

Parking lot and street cleaning

Storm drain system cleaning

Roadway and bridge maintenance

Pet Waste Collection

Animal waste dispensers can increase waste collection by providing an convenient method for disposal

Pet ownership is not limited by factors such as region of the country, climate, or topography.

It was found that about 40 percent of households own a dog. Just about half of these dog owners actually walked their dog in public areas.

Of the half that did walk their dog, about 60 percent claimed to pick up after their dog, which is generally consistent with other studies.

Men were found to be less prone to pick up after their dog than women were.

EDUCATIONAL OUTREACH

Often pet waste messages are incorporated into a larger non-point source message relaying the effects of pollution on local water quality.

Signs in public parks and the provision of receptacles for pet waste will also encourage cleanup.

Another option for pet waste management could be the use of specially designated dog parks where pets are allowed off-leash.

These parks typically include signs reminding pet owners to remove waste, as well as other disposal options for pet owners.

Limitations

The reluctance of many residents to handle dog waste is the biggest limitation to controlling pet waste.

Forty four (44) percent of dog walkers who do not pick up indicated they would still refuse to pick up, even if confronted by complaints from neighbors, threatened with fines, or provided with more sanitary and convenient options for retrieving and disposing of dog waste.

This strong resistance to handling dog wastes suggests that an alternative message may be necessary. One such example might be to encourage the practice of rudimentary manure management by training dogs to use areas that are not hydraulically connected to the stream or close to a buffer.

Effectiveness

There is plenty of evidence that pets and urban wildlife can be significant bacterial sources.
A single gram of dog feces can contain 23 million fecal coliform bacteria. Dogs can also be significant hosts of both *Giardia* and *Salmonella*.
A 1982 study reported that dog feces were the single greatest contributor of fecal coliform and fecal strep bacteria.
This evidence points to a need for enforcement and education to raise resident awareness regarding the water quality impacts of this urban pollutant source.

Illegal Dumping Control

Signs can be used to discourage dumping in sensitive areas (Source: NCDENR, 2000)

Illegal dumping control as a management practice involves using public education to familiarize residents and businesses with how illegal dumping can affect storm water.

For storm water managers, illegal dumping control is important to preventing contaminated runoff from entering wells and surface water, as well as averting flooding due to blockages of drainage channels for runoff.

Illegal dumping can occur in both urban and rural settings and can happen in all geographic regions.

Some of the issues that need to be examined when creating a program include the following:

1) The locations of persistent illegal dumping activity

2) Types of waste dumped and the profile of dumper

3) Possible driving forces behind illegal dumping, such as excessive user fees, restrictive curbside trash pickup, or ineffective recycling programs

4) Previous education and cleanup efforts

5) Current control programs and local laws or ordinances addressing the problem

6) Sources of funding and additional resources that may be required.

Effective illegal dumping control programs

1. **Cleanup efforts:**
   Once a site has been cleaned, landscaping & beautification efforts might discourage future dumping.

2. **Community Outreach and Involvement:**
   Incorporate messages relating to the cost to the local taxes. Having a hotline to report illegal activities. Educating public on the connection between storm water and drinking water.

3. **Targeted Enforcement:**
   Use of ordinances to regulate waste management and eliminate illegal dumping. Fines and penalties can be used to fund prevention programs or provide rewards to citizens.

4. **Tracking and Evaluation:**
   Mapping techniques and computer databases allows officials to identify areas where dumping most often occurs.

Limitations

The cost of fees for dumping at a proper waste disposal facility are often more than the fine for an illegal dumping offense, thereby discouraging people from complying with the law.

The absence of routine or affordable pickup service for trash and recyclables in some communities also encourages illegal dumping.

Effectiveness

- The City/County of Spokane, Washington, Litter Control program is responsible for removing indiscriminate dumping on publicly owned properties and road right-of-ways. The program is estimated to remove 350 tons of illegally dumped material each year.
- Project HALT in Phoenix, Arizona, cleaned up a reported 15,000 tons of waste in 1996 and 1997 and issued more than 165 citations.
- The "Tire Roundup" program sponsored by the Southwest Detroit Environmental Visions community organization pays local residents to bring in illegally dumped tires. In 1995, residents were paid 25 cents per tire, and more than 8,000 tires were collected.

Cost Considerations

Possible sources of labor for dumping site cleanups can include community and youth groups, county or state corrections programs, or corporations.

Equipment for cleanup may be available through either public works or transportation agencies or through donations by private companies.

Landscaping and Lawn Care

Applying too much lawn fertilizer can significantly contribute to water quality problems

This management measure seeks to control the storm water impacts of landscaping and lawn care practices through education and outreach on methods that reduce nutrient loadings and the amount of storm water runoff generated from lawns.

Lawn fertilization is one of the most widespread watershed practices conducted by homeowners.

Because lawn care, landscaping, and grounds maintenance are such common practices, education programs for residents, municipalities, and lawn care professionals on reducing the storm water impacts of these practices are an excellent way to improve local water quality.

Tips for creating more effective resident lawn care outreach programs

Tip 1: *Develop a stronger connection between the yard, the street, the storm, and the stream.*

Outreach techniques should continually stress the link between lawn care and the undesirable water quality it helps to create (e.g., algae blooms and sedimentation).

Tip 2: *Form regional media campaigns.*

Since most communities operate on small budgets, they should consider pooling their resources to develop regional media campaigns that can use the outreach techniques that are proven to reach and influence residents. In particular, regional campaigns allow communities to hire the professionals needed to create and deliver a strong message through the media. Also, the campaign approach allows a community to employ a combination of media, such as radio, television, and print, to reach a wider segment of the population. It is important to keep in mind that since no single outreach technique will be recalled by more than 30 percent of the population at large, several different outreach techniques will be needed in an effective media campaign.

Tip 3: *Keep messages simple and funny.*

Watershed education should not be preachy, complex, or depressing.

Indeed, the most effective outreach techniques combine a simple and direct message with a dash of humor.

Tip 4: *Make information packets small, slick, and durable.*

Avoid creating a ponderous and boring handbook.

One solution is to create small, colorful and durable packets that contain the key essentials about lawn care behaviors, and direct contact information to get better advice.

These packets can be stuck on the refrigerator, the kitchen drawer or the workbench for handy reference when the impulse for better lawn care behavior strikes.

Limitations

The overriding public desire for green lawns is probably the biggest impediment to limiting pollution from this source.

Convincing residents that a nice, green lawn can be achieved without using large amounts of chemicals and fertilizers is difficult when conventional lawn care techniques are often seen as more effective, less time-consuming, and more convenient.

Effectiveness

The effectiveness of pollution prevention programs designed to educate residents on lawn care and landscaping practices has not been well documented to date.

A critical step in crafting an education program is to select the right outreach techniques to send the lawn care message.

From evaluations of several market surveys, it appears that media campaigns and intensive training can each produce up to a 10- to 20-percent improvement in selected watershed behaviors among their respective target populations.

Cost Considerations

The cost of creating and maintaining a program that addresses lawn care and landscaping practices and water quality varies depending on the intensity of the effort and what outreach techniques are selected.

Media campaigns often require a greater amount of money to create, but are also most likely to reach the largest proportion of the community.

Intensive training campaigns may not require as large a creation cost, but often require more staff time.

Vehicle Washing

Using commercial car wash facilities can reduce storm water impacts caused by car washing because such facilities must treat their wash water discharges before release

This management measure involves educating the general public, businesses, and municipal fleets (public works, school buses, fire, police, and parks) on the water quality impacts of the outdoor washing of automobiles and how to avoid allowing polluted runoff to enter the storm drain system.

Implementation

management practices to reduce discharges to storm drains.

- Using a commercial car wash.
- Washing cars on gravel, grass, or other permeable surfaces.
- Blocking off the storm drain during charity carwash events or using a insert to catch wash water.
- Pumping soapy water from car washes into a sanitary sewer drain.
- If pumping into a drain is not feasible, pumping car wash water onto grass or landscaping to provide filtration.
- Using hoses with nozzles that automatically turn off when left unattended.
- Using only biodegradable soaps.

Limitations

Education & Public Awareness

The biggest limitation to implementing residential car wash best management practices may be the lack of knowledge regarding the impacts of polluted runoff.

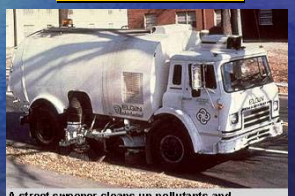
Many people do not associate the effects of their vehicle washing activities with local water quality and may be unaware that the discharges that enter storm drains are not treated at plants before being discharged into local waters.

Effectiveness

Car wash outreach programs are relatively inexpensive to staff and often require only a limited outlay for materials (brochures, training videos, etc.), and staff time devoted specifically to car wash education can be less than 5 percent of an employee's time.

- The purchase of wash water containment equipment is often a one-time expense, and this equipment is often used for a number of years.
- For the catch-basin insert, the approximate cost of installation is $65.
- In some cases, locations where charity car washes are frequently held have constructed their own catch basin inserts using plywood.
- For the Bubble Buster, the cost ranges from $2,000 to $2,500.

Parking Lot and Street Cleaning



A street sweeper cleans up pollutants and sediments on the street to reduce the amount of pollutants entering receiving waters

This management measure involves employing pavement cleaning practices such as street sweeping on a regular basis to minimize pollutant export to receiving waters.

These cleaning practices are designed to remove from road and parking lot surfaces sediment debris and other pollutants that are a potential source of pollution impacting urban waterways

Applicability

Street sweeping is practiced in most urban areas, often as an aesthetic practice to remove sediment buildup and large debris from curb gutters.

In colder climates, street sweeping is used during the spring snowmelt to reduce pollutant loads from road salt and to reduce sand export to receiving waters. Seventy percent of cold climate storm water experts recommend street sweeping during the spring snowmelt as a pollution prevention measure

Design Considerations

One factor considered most essential to the success of street sweeping as a pollutant removal practice is use of the most sophisticated sweepers available. Innovations in sweeper technology have improved the performance of these machines at removing finer sediment particles, especially for machines that use vacuum-assisted dry sweeping to remove particulate matter. By using the most sophisticated sweepers in areas with the highest pollutant loads, greater reductions in sediment and accompanied pollutants can be realized.

Limitations

For street sweeping, the high cost of current sweeper technologies is a large limitation to using this management practice. With costs approaching $200,000 for some of the newer sweeper technologies, storm water managers with limited budgets must consider the high equipment cost together with the uncertainty about pollutant removal efficiency to decide whether a sweeping program is an attractive management option.

Effectiveness

- Street sweeping programs had largely fallen out of favor as a pollutant removal practice following the 1983 NURP report, but improvements in sweeper technology have caused a recent reevaluation of their effectiveness.
- New studies show that conventional mechanical broom and vacuum-assisted wet sweepers reduce nonpoint pollution by 5 to 30 percent and nutrient content by 0 to 15 percent. However, newer dry vacuum sweepers can reduce nonpoint pollution by 35 to 80 percent and nutrients by 15 to 40 percent for those areas that can be swept.
- While actual reductions in storm water pollutants have not yet been established, information on the reductions in finer sediment particles that carry a significant portion of the storm water pollutant load is available. Recent estimates are that the new vacuum assisted dry sweeper might achieve a 50–88 percent overall reduction in the annual sediment loading for a residential street, depending on sweeping frequency.

•A benefit of high-efficiency street sweeping is that by capturing pollutants before they are made soluble by rainwater, the need for structural storm water control measures might be reduced.

• Structural controls often require costly added measures, such as adding filters to remove some of these pollutants and requiring regular manpower to change-out filters.

• Street sweepers that can show a significant level of sediment removal efficiency may prove to be more cost-effective than certain structural controls, especially in more urbanized areas with greater areas of pavement.

The Center for Watershed protection is well underway in its collaborative two-year **study evaluating street sweeping effectiveness**. The first two parts of the project, an extensive literature review and a survey of existing municipal programs, are nearing completion. The team is currently working on comparing data collected from increased street sweeping in Catchment O against data from decreased street sweeping in Catchment F to determine the effect of street sweeping on pollutant removal. The next part of the study will determine the effect of increased catch basin cleanouts in Baltimore County to determine its effect on pollutant removal. We'll keep you updated as we progress!

Storm Drain System Cleaning

Municipalities can hire professional plumbing services to remove trapped sediment and debris from storm drains with periodical flushing (Source: Drain Patrol, no date)

•Storm drain systems need to be cleaned regularly.

•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

•This measure is applicable to all storm drain systems.

• The same principles can be applied to material and waste handling areas, paved and vegetated areas, waterways, and new development projects

Maintenance Considerations

Ferguson et al. (1997) report removal of 55 to 65 percent for nonorganic materials and grits and 65 to 75 percent for organics.

Cost Considerations

The cost of a vactor truck can range from $175,000 to $200,000, and labor rates range from $125 to $175 per hour (Ferguson et al., 1997). Ferguson et al. (1997) also cited costs of $1.00 to $2.00 per foot for storm drain system cleaning.

Roadway and Bridge Maintenance

Pollutants generated from road and bridge maintenance can be minimized with good housekeeping practices (Source: VDOT, 2000)

Substantial amounts of sediment and pollutants are generated during daily roadway and bridge use and scheduled repair operations.

These pollutant loadings can threaten local water quality by contributing heavy metals, hydrocarbons, sediment, and debris to storm water runoff.

Highway Runoff	Primary Sources
Particulates	Pavement wear, vehicles, atmosphere
Nitrogen, Phosphorus	Atmosphere, roadside fertilizer application
Lead	Tire wear, auto exhaust
Zinc	Tire wear, motor oil, grease
Iron	Auto body rust, steel highway structures, moving engine parts
Copper	Metal plating, brake lining wear, moving engine parts, bearing and bushing wear, fungicides and insecticides
Cadmium	Tire wear, insecticides
Chromium	Metal plating, moving engine parts, brake lining wear
Nickel	Diesel fuel and gasoline, lubricating oil, metal plating, brake lining wear, asphalt paving
Manganese	Moving engine parts
Sodium, Calcium,Chloride	Deicing salts
Petroleum	Spills, leaks or blow-by of motor lubricants, antifreeze and hydraulic fluids, asphalt surface leachate
Sulphate	Roadway beds, fuel, deicing salts

Design Considerations

Road and bridge maintenance programs have a number of options for reducing the level of pollutants generated during the maintenance of existing road surfaces.

First, paving operations should be performed using concrete, asphalt, or other sealers only in dry weather situations to prevent contamination of runoff.

Second, proper staging techniques should be used to reduce the spillage of paving materials during the repair of potholes and worn pavement. These techniques can include covering storm drain inlets and manholes during paving operations; using erosion and sediment control measures to decrease runoff from repair sites; and utilizing pollution prevention materials such as drip pans and absorbent material for all paving machines to limit leaks and spills of paving materials and fluids.

Finally, resurfacing operations could employ porous asphalt for pothole repair and for shoulder areas to reduce the level of storm water runoff from road systems.

Good cleaning practices can help diminish impacts to storm water runoff. Sweeping and vacuuming of heavily traveled roadways to remove sediment and debris can reduce the amount of pollutants in runoff.

Proper application of road salt or other deicers also reduces storm water pollution. By routinely calibrating spreaders, a program manager can prevent over-application of deicing materials. In addition to reducing the effects of these materials on the aquatic environment, cost savings may be realized due to reductions in the purchase of deicing materials.

Limitations

Generally, limitations to instituting pollution prevention practices for road and bridge maintenance involve the cost for additional equipment and training.
Since maintenance of roadways and bridges is already required in all communities, staffing is usually in place and alteration of current practices should not require additional staffing or administrative labor.

Effectiveness

Limited data are available on the actual effectiveness of road and bridge maintenance practices at removing pollutants from storm water runoff.

	Effectiveness (% Removal)[a]		Cost
Maintaining Roadside Vegetation	Sediment Control: 90% average P and N: 40% average COD, Lead, and Zinc: 50% average TSS: 60% average		Natural succession allowed to occur Average: $100/acre/year Range: $50-$200/acre/year
Street Sweeping	Smooth Street Frequent Cleaning: TSS: 20% COD: 5% Lead: 25%	Smooth Street Infrequent Cleaning: TSS: N/A COD: N/A Lead: 5%	Average: $20/curb mile Range: $10–$30/curb mile
Litter Control	N/A		All are accepted as economical practices to control or prevent storm water impacts.
General Maintenance	N/A		
Minimizing Deicer Application	N/A		

Although data may be limited on cost and effectiveness, preventative maintenance and strategic planning are time-proven and cost-effective methods to limit contamination of storm water runoff.

It can be assumed that the management practices recommended will have a positive affect on storm water quality by working to reduce pollutant loads and the quantity of runoff.

Protecting and restoring roadside vegetation, removal of debris and sediment from roads and bridges, and directing runoff to vegetated areas are all effective ways to treat storm water runoff.

Questions and Comments