Pollution Prevention/Good Housekeeping for Municipal Operations

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.

Guidance

EPA recommends that, at a minimum, you consider the following in developing your program: maintenance activities, maintenance schedules, and long-term inspection procedures for structural and nonstructural storm water controls to reduce floatables and other pollutants discharged from your separate storm sewers; 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, and waste transfer stations; procedures for properly disposing of waste removed from the separate storm sewers and areas listed above (such as dredge spoil, accumulated sediments, floatables, and other debris); and ways to ensure that new flood management projects assess the impacts on water quality and examine existing projects for incorporating additional water quality protection devices or practices. Operation and maintenance should be an integral component of all storm water management programs. This measure is intended to improve the efficiency of these programs and require new programs where necessary. Properly developed and implemented operation and maintenance programs reduce the risk of water quality problems.

BMP Fact Sheets

Source controls

Pet waste collection

Automobile maintenance

Vehicle washing

Illegal dumping control

Landscaping and lawn care

Pest control

Parking lot and street cleaning

Roadway and bridge maintenance

Septic system controls

Storm drain system cleaning

Alternative discharge options for chlorinated water

Materials management

Alternative products

Hazardous materials storage

Road salt application and storage

Spill response and prevention

Used oil recycling

Materials management

Additional Fact Sheets

Airplane Deicing Fluid Recovery System

Catch Basin Cleaning

Coverings

Employee Training

Flow Diversion

Handling and Disposal of Residuals

Environmental Effects from Highway Ice and Snow Removal Operations

Internal Reporting

Materals Inventory

Preventative Maintenance

Record Keeping

Spill Prevention Planning

Storm Water Contamination Assessment

Visual Inspections

Source controls

Pet Waste Collection

Pollution Prevention/Good Housekeeping for Municipal Operations

Description

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

Pet waste collection as a source control involves using a combination of educational outreach and enforcement to encourage residents to clean up after their pets. The presence of pet waste in storm water runoff has a number of implications for urban stream water quality, with perhaps the greatest impact from fecal bacteria. According to recent research, nonhuman waste represents a significant source of bacterial contamination in urban watersheds. Genetic studies by Alderiso et al. (1996) and Trial et al. (1993) both concluded that 95 percent of fecal coliform found in urban storm water were of nonhuman origin. Bacterial source-tracking studies in a watershed in the Seattle, Washington, area also found that nearly 20 percent of the bacteria isolates that could be matched with host animals were matched with dogs. These bacteria can pose health risks to humans and other animals and result in the spread of disease. It has been estimated that for watersheds of up to 20 square miles draining to small coastal bays, 2 or 3 days of droppings from a population of about 100 dogs would contribute enough bacteria and nutrients to temporarily close a bay to swimming and shellfishing (USEPA, 1993).

Pet waste may also be a factor in the eutrophication of lakes. The release of nutrients from the decay of pet waste promotes weed and algae growth, limiting light penetration and the growth of aquatic vegetation. This situation, in turn, can reduce oxygen levels in the water, affecting fish and other aquatic organisms.

Pet waste collection programs use pet awareness and education, signs, and pet waste control ordinances to alert residents to the proper disposal techniques for pet droppings. In some parts of the country, the concept of parks or portions of parks established specifically for urban dog owners has gained in popularity. With provisions for proper disposal of dog feces and siting and design to address storm water runoff, these parks may represent another option for protecting local water quality.

Applicability

Pet ownership is not limited by factors such as region of the country, climate, or topography. For this reason, educational outreach regarding pet waste is appropriate throughout the country. In a survey of Chesapeake Bay residents, 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 (Swann, 1999), which is generally consistent with other studies (Table 1). Men were found to be less prone to pick up after their dog than women were (Swann, 1999).

Residents seem to be of two minds when it comes to dog waste. While a strong majority agree that dog waste can be a water quality problem (Hardwick, 1997; Swann, 1999), they generally rank it as the least important local water quality problem (Syferd, 1995 and MSRC, 1997). This finding strongly suggests the need to dramatically improve watershed education efforts to increase public recognition about the water quality and health consequences of dog waste.

Table 1. A comparison of three resident surveys about cleaning up after dogs

Study	Survey Results
Maryland (HGIC, 1996)	• 62% always cleaned up after the dog, 23% sometimes, 15% never • Disposal method: trash can (66%), toilet (12%), other 22%
Washington (Hardwick, 1997)	• Pet ownership: 58% • 51% of dog owners do not walk dogs • 69% claimed that they cleaned up after the dog • 31% do not pick up • Disposal methods: trash can 54%, toilet 20%, compost pile 4% • 4% train pet to poop in own yard • 85% agreed that pet wastes contribute to water quality problems
Chesapeake Bay (Swann, 1999)	• Dog ownership: 41% • 44% of dog owners do not walk dogs • Dog walkers who clean up most/all of the time 59% • Dog walkers who never or rarely cleanup 41% • Of those who never or rarely clean up, 44% would not cleanup even with fine, complaints, or improved sanitary collection or disposal methods • 63% agreed that pet wastes contribute to water quality problems

Design Considerations

Programs to control pet waste typically use "pooper-scooper" ordinances to regulate pet waste cleanup. These ordinances require the removal and proper disposal of pet waste from public areas and other people's property before the dog owner leaves the immediate area. Often a fine is associated with failure to perform this act as a way to encourage compliance. Some ordinances also include a requirement that pet owners remove pet waste from their own property within a prescribed time frame.

Public education programs are another way to encourage pet waste removal. Often pet waste messages are incorporated into a larger non-point source message relaying the effects of pollution on local water quality. Brochures and public service announcements describe proper pet waste disposal techniques and try to create a storm drain-water quality link between pet waste and runoff. 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. The following management options have been used in Australian dog parks and could be incorporated for dog parks in the United States (Harlock Jackson et al., 1995):

- *Doggy loos*. These disposal units are installed in the ground and decomposition occurs within the unit. Minimal maintenance is required (no refuse collection).
- *Pooch patch*. A pole is placed in the park surrounded by a light scattering of sand. Owners are encouraged to introduce their dog to the pole on entry to the park. Dogs then return to the patch to defecate and special bins are provided in which owners then place the deposit.
- *The "Long Grass Principle."* Dogs are attracted to long grass for defecating and areas that are mowed less frequently can be provided for feces to disintegrate naturally. A height of around 10 cm (about 4 inches) is appropriate.

The design of these dog parks should be done to mitigate storm water impacts. The use of vegetated buffers, pooper-scooper stations, and the siting of parks out of drainageways, streams, and steep slopes will help control the impacts of dog waste on receiving waters.

Limitations

The reluctance of many residents to handle dog waste is the biggest limitation to controlling pet waste. According to a Chesapeake Bay survey, 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. Table 2 provides factors that compel residents to pick up after their dog, along with some rationalizations for not doing so.

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.

Table 2. Dog owners rationale for picking up or not picking up after their dog (Source: HGIC, 1996)

Reasons for not picking it up	Reasons for picking up
• because it eventually goes away • just because • too much work • on edge of my property • it's in my yard • it's in the woods • not prepared • no reason • small dog, small waste • use as fertilizer • sanitary reasons • own a cat or other kind of pet	• it's the law • environmental reasons • hygiene/health reasons • neighborhood courtesy • it should be done • keep the yard clean

Effectiveness

The pollutant removal abilities of pet waste collection programs has never been quantified. There is ample evidence that programs such as these are required in urban areas. For example, in the Four Mile Run watershed in Northern Virginia, a dog population of 11,400 is estimated to contribute about 5,000 pounds of solid waste every day and has been identified as a major contributor of bacteria to the stream. Approximately 500 fecal coliform samples have been taken from Four Mile Run and its tributaries since 1990, and about 50 percent of these samples have exceeded the Virginia State water quality standard for fecal coliform bacteria (NVRC, 2001). A project is currently underway to pinpoint the source of bacterial contamination through DNA fingerprinting.

There is plenty of evidence that pets and urban wildlife can be significant bacterial sources. According to van der Wel (1995) a single gram of dog feces can contain 23 million fecal coliform bacteria. Dogs can also be significant hosts of both *Giardia* and *Salmonella* (Pitt, 1998). A 1982 study of Baltimore, Maryland, catchments reported that dog feces were the single greatest contributor of fecal coliform and fecal strep bacteria (Lim and Olivieri, 1982). This evidence points to a need for enforcement and education to raise resident awareness regarding the water quality impacts of this urban pollutant source.

Cost Considerations

The cost of pet waste collection programs will vary depending on the intensity of the effort and the paths chosen to control pet waste. The most popular way is through an ordinance, but managers must consider the cost of enforcement, including staff and equipment requirements. Public education program costs are determined by the type of materials produced and the method of distribution selected. Signs in parks may initially have a higher cost than printed materials, but can last for many years. Signs may also be more effective because they act as on-site reminders to dog owners to clean up in parks.

References

Alderserio, K., D. Wait, and M. Sobsey. 1996. Detection and characterization of male-specific RNA coliphages in a New York City reservoir to distinguish between human and non-human sources of contamination. In *Proceedings of a Symposium on New York City Water Supply Studies*, ed. McDonnell et al. TPS-96-2. American Water Resources Association. Herndon, VA.

Hardwick, N. 1997. *Lake Sammamish Watershed Water Quality Survey*. King County Water and Land Resources Division, Seattle, WA. 122 pp.

Harlock Jackson PTY. 1995. *Public Open Space and Dogs: a Design and Management Guide for Open Space Professionals and Local Government* . Harlock Jackson. Victoria, Australia.

Home and Garden Information Center (HGIC). 1996. *Residential Fertilizer Use Survey*. University of Maryland Cooperative Extension. College Park, MD. Unpublished surveys.

Lim, S. and V. Olivieri. 1982. *Sources of Microorganisms in Urban Runoff*. John Hopkins School of Public Health and Hygiene. Jones Falls Urban Runoff Project. Baltimore, MD. 140 pp

Minnesota Center for Survey Research (MCSR). 1997. *Lawn Care Survey Results and Technical Report.* Technical Report 97-9. University of Minnesota. Minneapolis, MN. 60 pp

Northen Virginia Regional Commission (NVRC). 2001. *Welcome to NVRC'S Four Mile Run Program.* [http://www.novaregion.org/4MileRun/4mr.htm]. Last updated April 19, 2001. Accessed June 4, 2001.

Pitt, R. 1998. Epidemiology and stormwater management. In *Stormwater Quality Management.* CRC/Lewis Publishers, New York, NY.

Swann, C. 1999. A *survey of residential nutrient behaviors in the Chesapeake Bay*. Widener-Burrows, Inc. Chesapeake Research Consortium. Center for Watershed Protection. Ellicott City, MD. 112 pp.

Syferd, E. 1995. *Water Quality Consortium. Research Summary Report*. Seattle, WA.

Trial, W. et al. 1993. Bacterial source tracking: studies in an urban Seattle watershed. *Puget Sound Notes* 30:1–3.

USEPA. 1993. *Guidance Specifying Management Measures for Sources of Nonpoint Pollution in Coastal Waters*. U.S. Environmental Protection Agency, Office of Water, Washington, DC.

van der Wel, B. 1995. Dog pollution. The Magazine of the Hydrological Society of South Australia 2(1).

Automobile Maintenance

Pollution Prevention/Good Housekeeping for Municipal Operations

Description

This pollution prevention measure involves creating a program of targeted outreach and training for businesses and municipal fleets (public works, school buses, fire, police, and parks) involved in automobile maintenance about practices that control pollutants and reduce storm water impacts. Automotive maintenance facilities are considered to be storm water "hot spots" where significant loads of hydrocarbons, trace metals, and other pollutants can be produced that can affect the quality of storm water runoff. Some of the waste types generated at automobile maintenance facilities and at homes of residents performing their own car maintenance include the following:

Improper disposal of pollutants from automobile maintenance can be prevented by taking used antifreeze to designated waste collection facilities

- Solvents (paints and paint thinners)
- Antifreeze
- Brake fluid and brake lining
- Batteries
- Motor oils
- Fuels (gasoline, diesel, kerosene)
- Lubricating grease.

Estimates show that each year over 180 million gallons of used oil is disposed of improperly (Alameda CCWP, 1992) and that a single quart of motor oil can pollute 250,000 gallons of drinking water (DNREC, 1994). For this reason, automotive maintenance facilities' discharges to storm and sanitary sewer systems are highly regulated. Fluid spills and improper disposal of materials result in pollutants, heavy metals, and toxic materials entering ground and surface water supplies, creating public health and environmental risks. Alteration of practices involving the cleanup and storage of automotive fluids and cleaning of vehicle parts can help reduce the influence of automotive maintenance practices on storm water runoff and local water supplies.

Applicability

The automotive repair industry is the leader in number of generators and amount of total waste produced for small quantity generators of hazardous waste in the United States (USEPA, 1985). Common activities at maintenance shops that generate this waste include the cleaning of parts, changing of vehicle fluids, and replacement and repair of equipment. These activities are also performed by residents at home in their driveway in the course of normal vehicle care. Since the use of automobiles is not limited by geographic or climatic conditions, maintenance facilities are present nationwide and the concerns involving waste created during vehicle repair are similar across the country. In ultra-urban areas, the impacts of automotive maintenance practices are more pronounced due to the greater concentrations of vehicles and higher levels of impervious surface.

Design Considerations

The most effective way to minimize the impacts of automotive maintenance generated waste is by preventing its production. Pollution prevention programs seeking to reduce liquid discharges to sewer and storm drains from automotive maintenance should stress techniques that allow facilities to run a dry shop. Among the suggestions for creating a dry operation are the following:

- Spills should be cleaned up immediately, and water should not be used for clean up whenever possible.
- Floor drains that are connected to the sanitary sewer should be sealed off.
- A solvent service might be hired to supply parts and cleaning materials, and to collect the spent solvent.

Those facilities that are not able to eliminate discharges to the sanitary sewer system may be required to treat their wastewater prior to release from the site. There are several methods for preventing untreated wastewater from entering storm water runoff. Some municipalities require the use of structural treatment devices to pretreat wastes before they are discharged for treatment at sewage treatment plants. These devices prevent oils and grease from entering the sewer system, often by separating the oil and solids from the water through settling or filtration.

Other methods are also available to help prevent or reduce the discharge of pollutants from vehicle maintenance. Table 1 lists some of the common suggestions found regarding practices that can reduce vehicle maintenance and repair impacts. Many of these practices apply both to business owners and to residents who maintain their own vehicles. Additionally, these practices also apply to maintaining municipal fleets, including school buses, public works, fire, police, parks, and other types of municipal fleets. This list is not comprehensive, and many other suggestions for reducing impacts are available to those responsible for managing storm water runoff from maintenance facilities.

Table 1. Recommendations for reducing the storm water impacts of automotive maintenance

Pollution Prevention Method	Suggested Activities
Waste Reduction	• The number of solvents used should be kept to a minimum to make recycling easier and to reduce hazardous waste management cost. • Do all liquid cleaning at a centralized station to ensure that solvents and residues stay in one area. • Locate drip pans and draining boards to direct solvents back into solvent sink or holding tank for reuse.
Using Safer Alternatives	• Use non-hazardous cleaners when possible. • Replace chlorinated organic solvents with nonchlorinated ones like kerosene or mineral spirits. • Recycled products such as engines, oil, transmission fluid, antifreeze, and hydraulic fluid can be purchased to support the market of recycled products.
Spill Clean Up	• Use as little water as possible to clean spills leaks, and drips. • Rags should be used to clean small spills, dry absorbent material for larger spills, and a mop for general cleanup. Mop water can be disposed of via the sink or toilet to the sanitary sewer.
Good Housekeeping	• Employee training and public outreach are necessary to reinforce proper disposal practices. • Conduct maintenance work such as fluid changes indoors. • Update facility schematics to accurately reflect all plumbing connections. • Parked vehicles should be monitored closely for leaks and pans placed under any leaks to collect the fluids for proper disposal or recycling. • Promptly transfer used fluids to recycling drums or hazardous waste containers. • Do not pour liquid waste down floor drains, sinks, or outdoor storm drain inlets. • Obtain and use drain mats to cover drains in the event of a spill. • Store cracked batteries in leakproof secondary containers.
Parts Cleaning	• Use detergent-based or water-based cleaning systems instead of organic solvent degreasers. • Steam cleaning and pressure washing may be used instead of solvent parts cleaning. The wastewater generated from steam cleaning can be discharged to the on-site oil/water separator.

Limitations

There are a number of limitations to implementing recommendations for automotive maintenance facilities. Space and time constraints may make performing work indoors unfeasible. Containment of spills from vehicles brought on-site after working hours may not be possible. Proper disposal education for employees must continually be updated. Installation of structural BMPs for pretreatment of wastewater discharges can be expensive. Prices for recycled materials and fluids may be higher than those of non-recycled materials. Some facilities can be limited by a lack of providers of recycled materials and by the absence of businesses to provide services such as hazardous waste removal, structural BMP maintenance, or solvent recycling equipment.

Maintenance Considerations

For facilities responsible for pretreating their wastewater prior to discharging, the proper functioning of structural BMPs is an important maintenance consideration. Routine cleanout of oil and grease is required for the devices to maintain their effectiveness, usually at least once a month. During periods of heavy rainfall, cleanout is required more often to ensure that pollutants are not washed through the trap. Sediment removal is also required on a regular basis to keep the device working efficiently.

Effectiveness

The effectiveness of automotive maintenance best management practices at removing pollutants is difficult to quantify. However, there are studies that demonstrate the effect pollution prevention practices can have in reducing impacts from automotive fluids. A 1994 study of auto recycling facilities demonstrates the effect that using best management practices can have on reducing storm water toxicity and pollutant loads. Through the use of structural and nonstructural BMPs, the study facility was able to reduce concentrations of lead, oil, and grease to levels approaching USEPA benchmarks.

A program that has had great success in controlling contaminated flows from vehicle maintenance facilities is the Clean Bay Business Program in Palo Alto, California. In exchange for allowing inspectors to visit a facility once a year and implementing recommended management practices, the facility is designated as a Clean Bay Business. This entitles the facility to promotional tools like listings twice a year in full-page newspaper ads, decals for shop windows, and other Clean Bay Business materials. Other promotions involving prize drawings and discount coupon giveaways help generate business for the facilities in the program. The effectiveness of the program at creating behavioral changes is evident in the increase in the number of facilities that have received the Clean Bay Business designation. In 1992 when the program began, only 4 percent of businesses used all of the recommended management practices. By 1998, 94 percent of businesses had instituted the practices suggested (NRDC, 1999).

The effectiveness of those programs aimed at altering behaviors detrimental to storm water is impressive. After participation in the program, the changes facilities made had the following impacts:

- 78 direct discharges to storm drains were eliminated by ceasing or modifying the practices used for activities such as parking lot cleaning, vehicle washing, and wet sanding.
- Violations of storm drain protection requirements fell by 90 percent from 1992 through 1995.
- The number of shops conducting outdoor removal of vehicle fluids without secondary containment fell from 43 to 4.

Cost Considerations

The initial per-facility cost for the program was approximately $300, with a cost of $150 for each subsequent year. This cost includes inspector visits and follow-up work, outreach materials, mailing lists, and database management. The program has been expanded to include auto parts stores and outreach to local high schools and adult education repair classes.

References

Camp Dresser & McKee et al. 1993. *California Storm Water Industrial/Commercial Best Management Practice Handbook*. Stormwater Quality Task Force, Sacramento, CA.

Alameda Countywide Clean Water Program. 1992. *Keeping it all in tune: Car repair and pollution prevention*. Alameda Countywide Clean Water Program, Hayward, CA.

Natural Resources Defense Council. 1999. *Stormwater Strategies: Community Responses to Runoff Pollution*. Natural Resources Defense Council, Inc, New York, NY.

USEPA. 1991. *Guides to Pollution Prevention: The Automotive Repair Industry*. U.S. Environmental Protection Agency, Office of Research and Development, Cincinnati, OH.

Santa Clara Valley Nonpoint Source Pollution Control Program. 1992. *Best Management Practices for Automotive-Related Industries: Practices for Sanitary Sewer Discharges and Storm Water Pollution Control*. Santa Clara Valley Nonpoint Source Pollution Control Program, San Jose, CA.

USEPA. July 1992. *Storm Water Management for Industrial Activities: Developing Pollution Prevention Plans and Best Management Practices*. United States Environmental Protection Agency, Office of Wastewater Compliance, Washington, DC.

Center for Watershed Protection. 1995. Auto Recyclers-Onsite BMPs Mitigate Urban Runoff Hotspots. *Watershed Protection Techniques*, Vol 1, No. 4.

Vehicle Washing

Pollution Prevention/Good Housekeeping for Municipal Operations

Description

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. Outdoor car washing has the potential to result in a high loads of nutrients, metals, and hydrocarbons during dry weather conditions in many watersheds, as the detergent-rich water used to wash the grime off our cars flows down the street and into the storm drain. Commercial car wash facilities often recycle their water or are required to treat their wash water discharge prior to release to the sanitary sewer system, so most storm water impacts from car washing are from residents, businesses, and charity car wash fundraisers that discharge polluted wash water to the storm drain system. According to the surveys, 55 to 70 percent of households wash their own cars, with the remainder going to a commercial car wash. Sixty percent of residents could be classified as "chronic car-washers" who wash their cars at least once a month (Smith, 1996, and Hardwick, 1997). Between 70 and 90 percent of residents reported that their car wash water drained directly to the street and, presumably, to the nearest stream. It has been estimated that 25 percent of the population of the United States may be classified as chronic car washers, which translates into about 27 million potential residential car wash polluters (Center for Watershed Protection, 1999).

Applicability

Car washing is a common routine for residents and a popular way for organizations such as scout troops, schools, and sports teams to raise funds. This activity is not limited by geographic region, but its impact on water quality is greatest in more urbanized areas with higher concentrations of automobiles. Currently, only a few pollution prevention programs incorporate proper car washing practices as part of an overall message to residents on ways to reduce nonpoint source pollution. Other programs have extended this message to include charity car washes and provide these charity groups with equipment and training to alleviate the problems associated with polluted wash water entering the storm drain system.

Implementation

The development of a prevention program to reduce the impact of car wash runoff includes outreach on management practices to reduce discharges to storm drains. Some of these management practices include the following:

- 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.

Storm drain stenciling programs (see the Storm Drain Stenciling fact sheet) emphasizing the connection between the storm drain system and runoff can also help reinforce the idea that car washing activities can affect local water quality.

In the Pacific Northwest, outreach programs provide materials to charity carwash organizers to prevent car wash water from entering storm drains. These "water friendly "carwash kits are provided free of charge to charity organizers, along with training and educational videos on planning an environmentally friendly carwash. Two types of equipment are available for charity organizations to borrow: a catch-basin insert with a sump pump, or a vacuum/boom device known as a Bubble Buster (Kitsap County, 1999). Both devices capture wash water runoff, allowing it to be pumped to either a sanitary sewer or a vegetated area for treatment.

For businesses, good housekeeping practices can minimize the risk of contamination from wash water discharges. The following are some general best management practices that those businesses with their own vehicle washing facilities can incorporate to control the water quality impacts of wash water discharges:

- All vehicle washing should be done in areas designed to collect and hold the wash and rinse water or effluent generated. Wash water effluent should be recycled, collected, or treated prior to discharge to the sanitary sewer system.
- Pressure cleaning and steam cleaning should be done off-site to avoid generating runoff with high pollutant concentrations. If done on-site, no pressure cleaning and steam cleaning should be done in areas designated as wellhead protection areas for public water supply.
- On-site storm drain locations should be mapped to avoid discharges to the storm drain system.
- Spills should be immediately contained and treated.

Limitations

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. Surveys indicate that the average citizen does not fully understand the hydrologic connection between their yard, the street, the storm sewer, and the streams. For example, a recent Roper survey found that just 22 percent of Americans know that storm water runoff is the most common source of pollution of streams, rivers, and oceans (NEETF, 1999).

Most car washing best management practices are inexpensive and rely more on good housekeeping practices than on expensive technology. However, the construction of a specialized area for vehicle washing can be expensive for businesses. Also, for facilities that cannot recycle their wash water, the cost of pretreating wash water, through either structural practices or planning for collection and hauling of contaminated water to sewage treatment plants, can represent a cost limitation.

Effectiveness

The effectiveness of car washing management practices at reducing nonpoint source pollutant loads has yet to be measured accurately. Due to the diffuse nature of nonpoint source pollution, it is often difficult to determine the exact impact of a particular pollution prevention measure at reducing pollutant loading. While not much is known about the water quality of car wash water, it is clear that car washing is a common watershed behavior. Three recent surveys have asked residents where and how frequently they wash their cars (Table 2).

Table 2. A comparison of three surveys about car washing.

Study	Car Washing Behavior
Smith, 1996 Maryland	60% washed car more than once a month
Pellegrin, 1998 California	73% washed their own cars 73% report that wash-water drains to pavement
Hardwick, 1997 Washington	56% washed their own cars 44% used a commercial car wash 91% report that wash-water drains to pavement 56% washed car more than once a month 50% would shift if given discounts or free commercial car washes

Residents are typically not aware of the water quality consequences of car washing and do not understand the chemical content of the soaps and detergents they use. Car washing is a very difficult watershed behavior to change since it is often hard to define a better alternative. However, as with all pollution prevention measures, the reduction of pollutant loads from outdoor car washing activities are bound to have a positive effect on storm water quality.

Cost Considerations

Staffing and materials represent the largest expenditure for local governments seeking to administer a nonpoint source education program. 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. For Kitsap County, Washington, the Sound Car Wash program requires roughly 10 to 15 hours a week of staff time over a 25-week period from April to September. Cost for materials and equipment replacement is estimated to be between $1,500 and $3,000 for the same 25-week period (Kitsap County, 1999). The Clean Bay Car Wash kits program in Tacoma, Washington, uses only the catch basin insert option and estimates that it spends no more than $2,000 per year and less than 2 weeks of staff time per year to handle requests for its program (Tacoma Stormwater Utility, 1999).

The purchase of wash water containment equipment is often a one-time expense, and this equipment is often used for a number of years. Two pieces of equipment used in car wash programs developed in the Pacific Northwest provide an example of the potential equipment cost. 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.

References

Center for Watershed Protection. 1999. On Watershed Behavior. *Watershed Protection Techniques* 3(3): 671-679.

Camp Dresser & McKee et al. 1993. *California Storm Water Industrial/Commercial Best Management Practice Handbook*. Stormwater Quality Task Force, Sacramento, CA.

City of Tacoma Stormwater Utility. 1999. Personal Communication. Tacoma, WA.

Hardwick, N. 1997. *Lake Sammamish watershed water quality survey*. King County Water and Land Resources Division, Seattle, WA. 122 pp.

Kitsap County Sound Car Wash Program. 1999. Personal communication and web site. Kitsap County Government, Port Orchard, WA. [http://www.wa.gov/kitsap/departments/pubworks/carwash.html].

Lance Winslow III. 1999. *How to Run a Successful Car Wash Fundraiser*. Car Wash Guys International, Inc, Tempe, AZ.

Natural Resources Defense Council. 1999. *Stormwater Strategies: Community Responses to Runoff Pollution*. Natural Resources Defense Council, Inc, New York, NY

Smith, J. 1996. Public survey used to estimate pollutant loads in Maryland. Technical Note 73. *Watershed Protection Techniques* 2(2): 361–363.

Pellegrin Research Group. 1998. *Stormwater/urban runoff public education program.* Interim evaluation. Resident population. Los Angeles County Department of Public Works, Los Angeles, CA.

Illegal Dumping Control

Pollution Prevention/Good Housekeeping for Municipal Operations

Description

Illegal dumping control as a management practice involves using public education to familiarize residents and businesses with how illegal dumping can affect storm water. By locating and correcting illegal dumping practices through education and enforcement measures, the many risks to public safety and water quality associated with illegal disposal actions can be prevented. 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.

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

Several types of illegal dumping can occur. The first is the illegal dumping (also known as "open dumping," "fly dumping," or "midnight dumping") of litter that occurs at abandoned industrial, commercial, or residential buildings, vacant lots, and poorly lit areas such as rural roads and railway lines. This dumping primarily happens to avoid disposal fees or the time and effort required for proper disposal at landfills or recycling facilities. A second type of illegal dumping involves disposal of water that has been exposed to industrial activities and then released to the storm drainage system, introducing pollutants into storm water runoff.

Applicability

Illegal dumping can occur in both urban and rural settings and can happen in all geographic regions. The effects of illegal dumping may be more pronounced in areas with heavier rainfall, due to the greater volume of runoff. In more urbanized areas, illegal dumping may occur due to inaccessibility of recycling or solid waste disposal centers, which are often located on the suburban-rural fringe.

Design Considerations

Illegal dumping control programs focus on community involvement and targeted enforcement to eliminate or reduce illegal dumping practices. The key to successfully using this BMP is increasing public awareness of the problem and its implications. Illegal dumping control programs use a combination of public education, citizen participation, site maintenance, and authorized enforcement measures to address illegal waste disposal. Some of the issues that need to be examined when creating a program include the following:

- The locations of persistent illegal dumping activity
- Types of waste dumped and the profile of dumpers
- Possible driving forces behind illegal dumping, such as excessive user fees, restrictive curbside trash pickup, or ineffective recycling programs

- Previous education and cleanup efforts
- Current control programs and local laws or ordinances addressing the problem
- Sources of funding and additional resources that may be required.

Effective illegal dumping control programs use practices that educate and involve the community, local industries, and elected officials in an effort to eliminate the illegal discarding of wastes. An EPA toolkit for preventing illegal dumping focuses on four programmatic areas (USEPA 1998):

1. Cleanup efforts

Cleanup projects will require a coordinated planning effort to ensure that adequate resources and funding are available. Once a site has been cleaned, signs, lighting, or barriers may be required to discourage future dumping. Signs should indicate the fines and penalties for illegal dumping, and a phone number for reporting incidents. Landscaping and beautification efforts might also discourage future dumping, as well as providing open space and increasing property values.

2. Community Outreach and Involvement

This might be the most important tool in ensuring that this best management practice is effective. The organization of special cleanup events where communities are provided with the resources to properly dispose of illegally dumped materials increases the understanding among residents of illegal dumping impacts and supplies opportunities to correctly dispose of materials which may otherwise be illegally dumped. Integration of illegal dumping prevention into community policing programs or use of programs such as Crimestoppers may also be an effective way to increase enforcement opportunities without the additional cost of hiring new staff. Producing simple messages relating the cost of illegal dumping on local taxes, and directions to proper disposal sites will aid in eliminating the problem. Having a hotline where citizens can report illegal activities and educating the public on the connection between the storm drain and water quality will decrease disposal of waste into storm drain inlets.

3. Targeted Enforcement

This tool involves the use of ordinances to regulate waste management and eliminate illegal dumping through methods such as fines, cost recovery penalties for cleanup, and permit requirements for waste management activities. These fines and penalties can be used to help fund the prevention program or to provide rewards to citizens who report illegal dumping activities. Other recommendations for this tool include training of staff from all municipal departments in recognizing and reporting illegal dumping incidents, and dedicating staff who have the authority to conduct surveillance and inspections and write citations for those caught illegally dumping.

4. Tracking and Evaluation

This tool measures the impact of prevention efforts and determines if goals are being met. Using mapping techniques and computer databases allows officials to identify areas where dumping most often occurs, record patterns of dumping occurrence (time of day, day of week, etc.), and calculate the number of citations issued to the responsible parties. This allows for better allocation of resources and more specific targeting of outreach and education efforts for offenders.

Limitations

Illegal dumping is often spurred by cost and convenience considerations, and a number of factors encourage this practice. 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. A lack of understanding regarding applicable laws or the inadequacy of existing laws may also contribute to the problem.

Municipalities can coordinate with state and federal agencies to help enforce illegal dumping control measures when resources such as funding and staff for enforcement activities are scarse.

Effectiveness

While the effectiveness of illegal dumping control measures at removing pollutant loads to local waters is hard to quantify, there are numbers to demonstrate the preventative effects these programs have in keeping waste from illegal dump sites and ultimately from storm water runoff. Some examples follow:

- 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.

Illegal dumping of household and commercial waste has a variety of impacts on water quality. Hazardous chemicals generated from household, commercial, and industrial sources can contaminate ground and surface water supplies, affecting drinking water and public health as well as aquatic habitat. Reduced drainage of runoff due to blockage of streams, culverts and drainage basins can result in flooding and channel modification. Open burning associated with some illegal sites can cause forest fires that create severe erosion and cause sediment loading in streams. Economically, property values decrease as a result of illegal dumping and affect the local tax base and the ability to maintain pollution prevention programs.

Cost Considerations

The cost of illegal dumping control program activities can vary due to economic and social factors, but with creative thinking potential costs may be reduced. 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. Training municipal staff to report incidents of illegal dumping witnessed during the performance of other duties reduces the need for full-time staff for the program.

References

Camp Dresser & McKee et al. 1993. *California Storm Water Municipal Best Management Practice Handbook*. Blue Print Service, Oakland, CA.

City of Spokane. 1999. *Waste to Energy Plant-Litter Control/Indiscriminate Dumping*. Spokane, WA. [http://www.spokanesolidwaste.org/wtelittr.htm].

National Center for Environmental Decision Making Research. 1997. *Decision Makers Guide to Controlling Litter and Illegal Dumping*. NCEDR, Knoxville, TN.

NCDENR. 2000. *Illegal Dumping in North Carolina*. North Carolina Department of Environment and Natural Resources. Raleigh, NC. [http://wastenot.ehnr.state.nc.us/swhome/illdump.htm]. Last updated January 12, 2000. Accessed January 2001.

USEPA. 1998. *Illegal Dumping Prevention Guidebook*. U.S. Environmental Protection Agency Region 5, Waste, Pesticides, and Toxics Division, Chicago, IL.