Pollution Prevention / Good Housekeeping References and Documentation

APPENDIX F

U.S. ENVIRONMENTAL PROTECTION AGENCY

National Pollutant Discharge Elimination System (NPDES)

Materials Management

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Minimum Measure: Pollution Prevention/Good Housekeeping for Municipal Operations

Subcategory: Municipal Facilities

Description

Secondary containment should be used to prevent materials from contaminating stormwater

Responsible management of common chemicals, such as fertilizers, solvents, paints, cleaners, and automotive products, can significantly reduce polluted runoff (WEF and ASCE, 1998). Such products must be handled properly in all stages of development, use, and disposal. Materials management entails the selection of the individual product, the correct use and storage of the product, and the responsible disposal of associated waste(s).

Applicability

In many cases, industries can implement simple housekeeping practices in order to manage materials more effectively. Proper management reduces the likelihood of accidental spills or releases of hazardous materials during storm events. In addition, health and safety conditions at the facility will improve.

Some simple practices for managing materials are improving maintenance of industrial machinery, establishing material storage and inventory controls, improving routine cleaning and inspection of facilities where materials are stored or processed, maintaining organized workplaces, and educating employees about the benefits of the above practices (USEPA, 1992).

Maintenance Considerations

Maintenance associated with materials management should be designed to minimize the amounts of materials used and the wastes generated by industrial processes. Procedures for operation and maintenance can be easily integrated into an industry's management plan. Simple processes, such as routine cleaning of work spaces, proper collection and disposal of wastes, maintenance of machinery, regular inspections of equipment and facilities, and training employees to respond to spills or leaks, have significant effects on reducing the potential to pollute stormwater runoff.

Another consideration is regular material inventories [PDF - 109 KB - 4 pp]. Such inventories reduce the occurrence of overstocking hazardous materials, increase knowledge about what hazardous materials are present and how they are stored, and provide documentation of proper handling of hazardous materials. An inventory of hazardous materials present at a particular facility consists of three major steps (USEPA, 1992):

- Identify all hazardous and nonhazardous substances present at a facility. This can be accomplished by reviewing all purchase orders for the facility and walking through the facility itself. Compile a list of all chemicals present at a facility and obtain a Material Safety Data Sheet (MSDS) for each one.
- Label all containers with the name of the chemical, unit number, expiration date, handling instructions, and health or environmental hazards. Much of this information will be found on the MSDS. Often, insufficient labeling leads to improper handling or disposal of hazardous substances.
- Make special note on the inventory of hazardous chemicals that require special handling, storage, or disposal.

Cost Considerations

The major costs of these BMPs can be attributed to additional labor. Depending on the extent of the program, varying amounts of staff hours will be required for the necessary education of municipal employees, local businesses, and the public. In addition, posters and bulletin boards that encourage the proper management of materials should be displayed throughout the facility.

References

WEF and the ASCE. 1998. *Urban Runoff Quality Management*. WEF Manual of Practice No. 23 and ASCE Manual and Report on Engineering Practice No. 87. Water Environment Federation, Technical Practice Committee, Water Quality and Ecology Subcommittee, Alexandria, VA, and American Society of Civil Engineers, Urban Water Resources Research Council, Reston, VA.

USEPA. 1992. *Stormwater Management for Industrial Activities*. U.S. Environmental Protection Agency, Office of Water, Washington, DC.

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U.S. ENVIRONMENTAL PROTECTION AGENCY

National Pollutant Discharge Elimination System (NPDES)

Municipal Facilities Management

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Minimum Measure: Pollution Prevention/Good Housekeeping for Municipal Operations

Subcategory: Municipal Facilities

Description

Municipalities own and operate numerous facilities, including maintenance yards, parks, office buildings, schools, and other city-owned properties. The objective of managing stormwater at municipal facilities is to prevent pollutants released during city activities from entering storm drain systems or receiving waters. Activities associated with municipal facilities that are a potential threat to water quality include, but are not limited to, Automobile Maintenance, Residential Car Washing, Hazardous Materials Storage, Materials Management, sign painting, Pest Control, Parking Lot and Street Cleaning, and waste storage and disposal. To effectively prevent or reduce stormwater pollution, a municipality should inventory its facilities and associated activities to assess potential impacts on stormwater quality and revise activities or implement new measures as needed. These activities and control measures should be described in a stormwater pollution prevention plan (SWPPP) or a similar document that describes management actions that will be taken to reduce pollution from the site or activity. Training on stormwater best management practices (BMPs) and principles should be provided to all municipal facilities maintenance staff, and they should have clear guidance on how to use appropriate stormwater practices during typical maintenance operations and facility management activities.

Applicability

The Phase II rule specifies that municipalities develop a program to prevent and reduce pollutant runoff from municipal operations, using training and controls for reducing or eliminating the discharge of pollutants from municipal parking lots, maintenance and storage yards, fleet maintenance shops, salt/sand storage locations, snow disposal areas, and waste transfer stations. The rule also includes development of 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). Other municipal facilities that should be evaluated for pollution potential and BMP implementation include those where chemicals are stored, those with outdoor trash storage areas, and areas where potentially hazardous materials are stored or disposed of (e.g., animal shelters, hospitals, clinics).

Some municipalities are required to have coverage under an industrial stormwater permit for municipal facilities they own and manage. If a municipal facility, such as a landfill or

transportation facility, has activities included in one of the 11 categories of industrial activity described in 40 CFR 122.26(b)(14)(i)-(xi), the operator must obtain coverage under an NPDES industrial stormwater permit, unless they are conditionally excluded. For those areas where EPA is the permitting authority (in some states, on Indian Country lands, and at some federal facilities), the Multi-Sector General Permit (MSGP) provides facility-specific requirements for many types of industrial facilities in one permit. Most states, however, are authorized to implement the NPDES stormwater program (click here for a list of authorized states) and have their own industrial stormwater permits.

Implementation

Each facility will have different activities and pollutants of concern. Facility managers should consider the housekeeping and pollution prevention BMPs outlined in the Menu of BMPs and develop a SWPPP that outlines how the BMPs will be implemented. If the facility is covered by an industrial stormwater permit, the development and implementation of a SWPPP is one of the permit requirements.

SWPPP development includes a step-by-step process to ensure that pollutants do not enter the storm drain system or receiving waters. BMPs include scheduling activities to reduce the potential for offsite migration of pollutants, such as not scheduling activities immediately before or during rainstorms; prohibiting certain practices, such as the outside storage and use of chemicals; requiring specific maintenance procedures; and other management practices to prevent or reduce pollution. A set of worksheets and a model plan are available in EPA's (1992) Stormwater Management for Industrial Facilities: Development Pollution Prevention Plans and Best Management Practices Summary Document [PDF - 2.59 MB - 52 pp] to assist municipal operators. This document describes the five major phases of developing a pollution prevention plan: (1) planning and organization, (2) assessment, (3) BMP selection and plan design, (4) implementation, and (5) evaluation and site inspection.

Planning and Organization: An individual should be designated who will be responsible for developing and implementing the municipal facility SWPPP and other existing environmental facility plans, such as plans governing pesticide use or hazardous materials storage, to ensure consistency and overlap. The municipality should build on relevant portions of other environmental plans as appropriate, although it is important that the SWPPP be a comprehensive, stand-alone document.

Assessment: Municipal facilities that have been identified as having potential to contribute pollutants to the storm drain system should be inspected to identify possible pollution sources and BMP implementation opportunities. It is helpful to create a map of the facility site that identifies pollutant sources, storm drains, drainage ditches, BMPs requiring periodic maintenance, and areas suitable for new BMP implementation or retrofit. The municipality should also conduct an inventory of potentially polluting materials, evaluate past spills and leaks, identify and eliminate sources of nonstormwater discharges and illicit connections, collect and evaluate any existing stormwater quality data, and summarize the findings of the assessment.

Identify BMPs: BMPs should be selected with special consideration given to areas where materials are handled or stored, outdoor processing areas, loading and unloading areas, and onsite waste management and disposal areas. At a minimum, the plan should address appropriate good housekeeping, preventive maintenance [PDF - 49.5 KB - 3 pp], spill prevention and response [PDF - 55 KB - 5 pp], erosion and sediment control, and structural stormwater management controls. Employee training, visual inspections [PDF - 55 KB - 6 pp], recordkeeping [PDF - 53 KB - 4 pp], and reporting should be addressed and included in the SWPPP as well. Additional activity- or site-specific BMPs might also be appropriate.

Implementation: The selected stormwater BMPs should be implemented according to a schedule that reflects the priority level and funding/labor constraints. Also, all municipal employees should receive training [link to the Municipal Employee Training and Education fact sheet] to understand and carry out the goals of the SWPPP.

Evaluation: Periodic site evaluations should be conducted and records should be kept of BMP implementation, illicit discharge or spill incidents, employee training, inspections, and monitoring, if any is being conducted. The plan should be revised if parts are shown to be ineffective or if activities or conditions at the facility change.

Limitations

Developing and implementing an effective SWPPP at a municipal facility requires time and commitment, not only from managers, but also from staff and laborers. After development of the SWPPP, facilities should be self-inspected annually, with regular inspections conducted more often to detect leaks, spills, or other pollution issues as soon as possible. Also, without the proper training, municipal employees can be unable or unwilling to implement and maintain the BMPs included in the SWPPP.

Case Studies

The following are examples of municipalities that have successfully implemented municipal facility BMPs. Links are provided for more information.

- The City of Gresham, Oregon, conducted an internal audit of a local maintenance yard where materials such as paint, gasoline, oil, grease, pesticides, and herbicides are stored to identify problems and recommend changes that would improve stormwater quality (see Municipal Stormwater Toolbox for Maintenance Practices EXIT Disclaimer). Municipal staff studied stormwater drainage on the site, inventoried equipment and materials, determined the potential for polluting stormwater, inspected the outfalls to a local creek, and interviewed facility operators to learn about existing practices. By participating in the audit, all the facility operators were educated about stormwater drainage and quality and are now actively involved in implementing solutions (Oregon Association of Clean Water Agencies, 1998).

- The City of Santa Monica, California, has implemented numerous practices to control dry and wet weather discharges from municipal areas and activities and has conducted urban runoff training for city employees (USEPA, 2004).

Cost Considerations

The costs of formalizing stormwater management at municipal facilities will vary by facility and by municipality. The majority of the costs are associated with the staff time necessary to develop a SWPPP, train staff, and inspect the facilities to ensure that selected BMPs are applicable and effective.

References

Oregon Association of Clean Water Agencies. 1998. *Oregon Municipal Stormwater Toolbox for Maintenance Practices*. [http://www.oracwa.org/Pages/toolbox.htm EXIT Disclaimer]. Last updated June 1998. Accessed July 6, 2005.

U.S. Environmental Protection Agency. 1992. *Stormwater Management for Industrial Facilities: Development Pollution Prevention Plans and Best Management Practices Summary Document.* EPA 833-R-92-002. [http://www.epa.gov/npdes/pubs/owm0236a.pdf [PDF - 2.59 MB - 52 pp]]. Last updated October 1992. Accessed July 6, 2005.

U.S. Environmental Protection Agency. 2004. Stormwater Case Studies Search Results, Case Study Location: California: Santa Monica. [http://cfpub.epa.gov/npdes/stormwater/casestudies_specific.cfm?case_id=2&CFID=2785611&CFTOKEN=65295474]. Last updated November 12, 2004. Accessed July 6, 2005.

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URL:http://cfpub.epa.gov/npdes/stormwater/menuofbmps/index.cfm

U.S. ENVIRONMENTAL PROTECTION AGENCY

National Pollutant Discharge Elimination System (NPDES)

Road Salt Application and Storage

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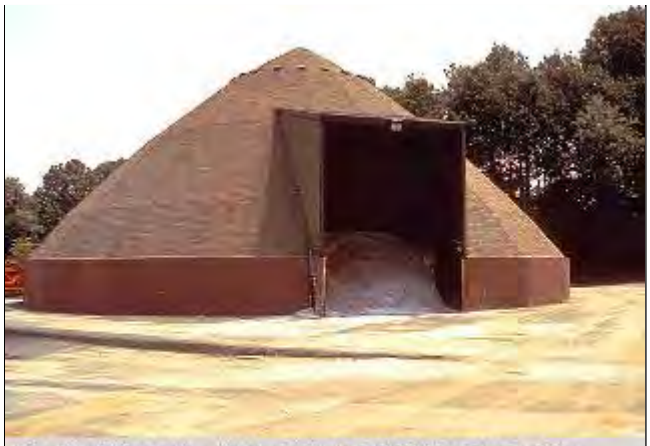
Minimum Measure: Pollution Prevention/Good Housekeeping for Municipal Operations

Subcategory: Municipal Activities

Description

The application and storage of deicing materials, most commonly salts such as sodium chloride, can lead to water quality problems for surrounding areas (Koppelman et al., 1984). Salts, gravel, sand, and other materials are applied to highways and roads to reduce the amount of ice during winter storm events. Salts lower the melting point of ice, allowing roadways to stay free of ice buildup during cold winters. Sand and gravel increase traction on the road, making travel safer.



During storage, road salt should be covered to prevent salt from lumping together or being lost with storm water runoff

Applicability

This practice occurs in areas that receive snowfall in winter months and require deicing materials. Municipalities in these areas must ensure proper storage and application for equipment and materials.

Siting and Design Considerations

Many of the problems associated with contamination of local waterways stem from the improper storage of deicing materials (Koppelman et al., 1984). Salts are very soluble when they come into contact with stormwater. They can migrate into ground water used for public water supplies and also contaminate surface waters.

More information about road deicing materials can be found at the American Association of State Highway and Transportation Officials EXIT Disclaimer website.

Limitations

Road salt is the least expensive material for deicing operations; however, once the full social costs are taken into account, alternative products and better management and application of salts become increasingly attractive options.

Table 1. Deicing Alternatives (Keating, 2004)

Substance	Cost	Characteristics
Calcium Chloride ($CaCl_2$)	Flake $290/ton, pellet $340/ton	• Melts ice at temperatures of -25 ° F • If used as recommended, will not harm vegetation
Magnesium Chloride ($MgCl_2$)	Flake $260/ton, pellet $300/ton	• Lowest practical temperature: 5 ° F • If used as recommended, will not harm vegetation; however, $MgCl_2$, on a percentage basis, contains 17-56% more chloride ion than other salt-type deicers
Potassium Chloride (KCl)	$240/ton	• Lowest practical temperature: 12 ° F • Will not harm vegetation
Urea	$280/ton	• Lowest practical temperature: 15 ° F • Will not harm vegetation
Calcium Magnesium Acetate (CMA)	$2,000/ton	• Will work below 0 ° F • Low toxicity and biodegradable

Maintenance Considerations

Covering stored road salts may be costly; however, the benefits are greater than the perceived costs. Properly storing road salts prevents the salt from lumping together, which makes it easier to load and apply. In addition, covering salt storage piles reduces salt loss from stormwater runoff and potential contamination to streams, aquifers, and estuarine areas. Salt storage piles should be located outside the 100-year floodplain for further protection against surface water contamination.

If used during road salt application, certain best management practices can produce significant environmental benefits. The amount of road salt applied should be regulated to prevent oversalting of roadways and increasing runoff concentrations. The amount of salt applied should be varied to reflect site-specific characteristics, such as road width and design, traffic concentration, and proximity to surface waters. Calibration devices mounted in the cabs of spreader-trucks help maintenance workers apply the proper amount of road salt. Alternative materials, such as sand or gravel, should be used in especially sensitive areas.

Cost Considerations See Table 1 for the costs of different deicing alternative

substances.

References

American Association of State Highway and Transportation Officials. 2000. *AASHTO: Transportation Center of Excellence.* [www.transportation.org EXIT Disclaimer]. Accessed September 15, 2005.

Keating, Janis. 2004. Stormwater. *Deicing Salt: Still on the Table* [www.forester.net/sw_0106_deicing.html EXIT Disclaimer]. Accessed October 17, 2005.

Koppelman, L.E., E. Tanenbaum, and C. Swick. 1984. *Nonpoint Source Management Handbook*. Long Island Regional Planning Board, Hauppauge, NY.

USEPA. 1995. *Planning Considerations for Roads, Highways and Bridges*. U.S. Environmental Protection Agency, Office of Water, Washington, DC. [www.epa.gov/OWOW/NPS/education/planroad.html].

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U.S. ENVIRONMENTAL PROTECTION AGENCY

National Pollutant Discharge Elimination System (NPDES)

Spill Response and Prevention

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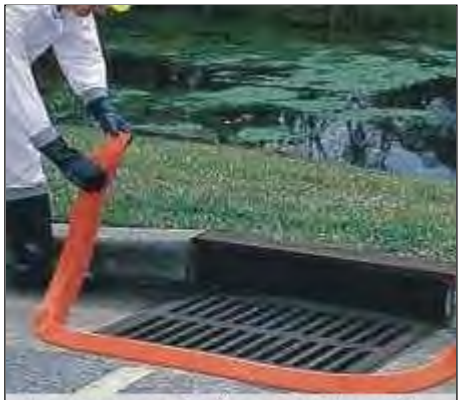
Minimum Measure: Pollution Prevention/Good Housekeeping for Municipal Operations

Subcategory: Municipal Facilities

Description



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

Spill response and prevention plans should clearly state how to stop the source of the spill, how to contain and clean up the spill, how to dispose of contaminated materials, and how to train personnel to prevent and control future spills.

Applicability

Construction sites that use or store hazardous materials should have a spill prevention and control plan. Hazardous materials include pesticides, paints, cleaners, petroleum products, fertilizers, and solvents. See the Hazardous Materials Storage fact sheet for more information on storing these materials.

Siting and Design Considerations

Identify potential spill or source areas, such as loading and unloading, storage and processing areas, places that generate dust or particulate matter, and areas designated for waste disposal. Also, spill potential should be evaluated for stationary facilities, including manufacturing areas, warehouses, service stations, parking lots, and access roads.

Material handling procedures and storage requirements should be defined and actions should be taken to reduce spill potential and impacts on stormwater quality. This can be achieved by:

- Recycling, reclaiming, or reusing process materials, thereby reducing the amount of process materials that are brought into the facility.
- Installing leak detection devices, overflow controls, and diversion berms.
- Disconnecting drains from processing areas that lead to the storm sewer.
- Performing preventative maintenance on storm tanks, valves, pumps, pipes, and other equipment.

- Using material transfer or filling procedures that minimize spills from tanks and other equipment.
- Replacing toxic materials with less or non-toxic products.

Provide documentation of spill response equipment and procedures to be used, ensuring that procedures are clear and concise. Give step-by-step instructions for spill response at a particular facility. This spill response plan can be presented as a procedural handbook or a sign.

The spill response plan should:

- Identify individuals responsible for implementing the plan.
- Describe safety measures to take with each kind of waste.
- Specify how to notify appropriate authorities, such as police and fire departments, hospitals, or publicly-owned treatment works for assistance.
- State procedures for containing, diverting, isolating, and cleaning up the spill.
- Describe spill response equipment to be used, including safety and cleanup equipment.

Education is essential for reducing spills. By informing people of actions they can take to reduce spill potential, spills will be reduced or prevented. Some municipalities have set up 1-800 numbers for citizens to call in the event of spills. This helps ensure that spills are cleaned up in a safe, proper, and timely manner.

Limitations

A spill prevention and control plan must be well planned and clearly defined. A well conceived plan reduces the likelihood of accidental spills and helps speed an effective response if they occur. Training might be necessary to ensure that all workers can follow procedures. Equipment and materials for cleanup must be readily accessible and clearly marked for workers to be able to follow procedures.

Maintenance Considerations

Update the spill prevention and control plan to accommodate any changes in the site or procedures. Regularly inspect areas where spills might occur to ensure that procedures are posted and cleanup equipment is readily available.

Effectiveness

A spill prevention and control plan effectively reduces the risk of surface and ground water contamination. However, to be effective, workers must be trained, materials and cleanup equipment available, and procedures followed.

Cost Considerations

Spill prevention and control plans are inexpensive to implement. However, extra time is needed to properly handle and dispose of spills, which increases labor costs.

References

DAWG. 2000. *Flexible Spill Berm For Quick Spill Containment*. [http://www.dawginc.com/secondary-spill-containment/secondary-spill-containment.php EXIT Disclaimer]. Accessed September 15, 2005.

USEPA. 1992. *Stormwater Management for Construction Activities: Developing Pollution Prevention Plans and Best Management Practices.* EPA 832-R-92-005. U.S. Environmental Protection Agency, Office of Water, Washington, DC.

USEPA. 1992. *Stormwater Management for Industrial Activities: Developing Pollution Prevention Plans and Best Management Practices.* EPA 832-R-92-006. U.S. Environmental Protection Agency, Office of Water, Washington, DC.

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U.S. ENVIRONMENTAL PROTECTION AGENCY

National Pollutant Discharge Elimination System (NPDES)

Municipal Vehicle and Equipment Washing

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Minimum Measure: Pollution Prevention/Good Housekeeping for Municipal Operations

Subcategory: Municipal Activities

Description

Municipal vehicle washing can generate dry weather runoff contaminated with detergents, oils, grease, and heavy metals. Vehicle washing BMPs can eliminate contaminated wash water discharges to the sanitary sewer system. Such BMPs include installing wash racks that discharge wash water to the sanitary sewer, and contracting the services of commercial car washes, which are permitted to discharge wash water to the sanitary sewer system. Finally, employees and subcontractors should be trained in the municipality's vehicle washing procedures to avoid illicit discharges.

Applicability

Municipalities typically operate a fleet of vehicles, including public works trucks, fire trucks, ambulances, police cars, school buses, and other types of vehicles. Municipalities with a large fleet of vehicles might consider building municipal-operated vehicle washing facilities. Municipalities with small fleets might consider contracting with a commercial car wash. Municipalities that own and operate concrete trucks should look at the Concrete Washout fact sheet for proper washing procedures. For information on how to educate the public about reducing pollution while washing personal vehicles, see the Residential Car Washing and Stormwater Outreach for Commercial Businesses fact sheets.

Siting & Design Considerations

Wash Racks

When installing a wash rack at a municipal facility, several design features should be considered. A designated wash area should be paved and bermed or sloped to contain and direct wash water to a sump connected to the sanitary sewer or to a holding tank, process treatment system, or enclosed recycling system. Note that you must seek the permission of the sewer authority before discharging wastewater to the sanitary sewer, and that special treatment requirements may be placed on such discharges. Alternately, the wash rack could be designed to recycle wash water, thereby eliminating the pretreatment costs of discharging to the sanitary sewer.

The following good housekeeping practices can minimize the risk of contamination from vehicle wash water discharges at municipal facilities (adapted from CASQA, 2003):

- Wash all vehicles in areas designed to collect and hold wash water before its

discharge to the sanitary sewer system. Normally, wastewater treatment regulations require wash water to be pretreated prior to its discharge to the treatment plant. Contact your sewer authority to ensure that all requirements are met before designing, building, and operating the wash rack.
- Avoid detergents whenever possible. If detergents are necessary, a phosphate-free, non-toxic, biodegradable soap is recommended. Detergents should be avoided if an oil/water separator is used for pretreatment prior to discharge to the sanitary sewer.
- Municipal facilities that store vehicles should stencil their storm drains to remind employees to wash vehicles within the designated wash area. Signage can also be posted with this message.
- Mount spill kits with absorbent containment materials and instructions near wash racks. Immediately contain and treat all spills.

Commercial Car Washes

Municipalities can negotiate with commercial car washes and steam cleaning businesses to handle their fleet vehicle washing. This option eliminates the cost of building and the liability of operating a wash facility. This option may be limited to smaller sized vehicles, however, since many car washes do not have bays large enough to handle buses, fire trucks, ambulances, and other large vehicles.

Other BMPs

If a vehicle must be washed outside of a facility plumbed to the sanitary sewer, take precautions to avoid wash water discharges to the storm drain system. For small jobs, berm the area surrounding the vehicle and use a wet/dry vacuum to capture the wash water for discharge to the sanitary sewer. For larger jobs, use a combination of berms and a vacuum truck, such as those used to clean storm and sanitary sewer systems, to capture and safely dispose of wash water. If detergents are used, clean the pavement to prevent this material from being carried to the storm drain during the next rainstorm.

Maintenance Considerations

A wash rack's paved surfaces and sump should be inspected and cleaned periodically to remove buildups of particulate matter or other pollutants. Plumbing, recycling, and pretreatment systems also require periodic inspection and maintenance. The area surrounding the wash rack should be visually inspected for leaks, overspray, or other signs of ineffective containment due to faulty design or physical damage to berms. Any defects should be corrected.

Limitations

Building a new wash rack can be expensive. Also, for facilities that cannot recycle their wash water, the cost of pretreating wash water prior to discharge to the sanitary sewer can represent a cost limitation. If the appropriate facilities are available, vehicle washing BMPs are relatively inexpensive housekeeping measures.

Effectiveness

Studies have yet to demonstrate the effectiveness of car washing management practices at reducing stormwater pollutant loads.

Cost Considerations

Municipal wash racks plumbed to the sanitary sewer can be expensive to build. They need to be pursued as a capital improvement project or through other measures based on your local policies for such projects. Costs for contracting with commercial car washes can vary depending on the size of the fleet. Rates are subject to negotiation, but they would constitute an annual operating cost that could be included as part of the municipal budget. Other measures to control discharge of incidental washing to the storm drain system (berms, wet/dry vacuums, etc.) are relatively inexpensive.

References

California Stormwater Quality Association (CASQA). 2004. California Stormwater Industrial/Commercial Best Management Practice Handbook. Stormwater Quality Task Force, Sacramento, CA.

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

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