GOOD HOUSEKEEPING AND POLLUTION PREVENTION FOR MUNICIPAL ACTIVITIES

GREATER LANSING
REGIONAL COMMITTEE
FOR STORMWATER MANAGEMENT
www.mywatersheds.org

PREPARED BY
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Tri-County Regional Planning Commission

TRI-COUNTY REGIONAL
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Section 1

1.1 Introduction

Stormwater runoff is part of a natural hydrologic process. Human activities particularly urbanization and agriculture, can alter natural drainage patterns and add pollutants to rivers, lakes, and streams as well as coastal bays, estuaries, and ultimately, the ocean. Numerous studies have shown urban runoff to be a significant source of water pollution, causing declines in fisheries, restricting swimming, and limiting our ability to enjoy many of the other benefits that water resources provide (USEPA, 1992). Urban runoff in this context includes all flows discharged from urban land uses into stormwater conveyance systems and receiving waters and includes both dry weather non-stormwater sources (e.g., runoff from landscape irrigation, water line and hydrant flushing) and wet weather stormwater runoff. In this handbook, urban runoff and stormwater runoff are used interchangeably.

For many years, the effort to control the discharge of stormwater focused mainly on the quantity (e.g. drainage, flood control) and, only to a limited extent, on the quality of the stormwater (e.g. sediment and erosion control). In recent years, however, awareness of the need to improve water quality has increased. With this awareness, federal, state, and local programs have been established to reduce pollutants contained in stormwater discharges to our waterways. The emphasis of these programs is to promote the concept and the practice of preventing pollution at the source, before it can cause environmental problems (USEPA, 1992). Where further controls are needed, treatment of polluted runoff may be required.

1.2 Handbook Purpose and Scope

The Greater Lansing Regional Committee (GLRC) for Stormwater Management has developed this manual to provide general guidance for selecting and implementing Best Management Practices (BMPs) to reduce pollutants in runoff from municipal operations. Federal and state programs require selected municipalities to reduce the discharge of pollutants in their stormwater discharges to the maximum extent practicable (MEP) using an array of control measures including BMPs. It is not the intent of this handbook to dictate the actual selection of BMPs (this will be done by the municipality), but rather to provide the framework for an informed selection of BMPs for the program.

Although MEP has not been defined by the federal regulations, the use of this handbook and the selection process presented herein should assist municipalities in achieving MEP. In selecting BMPs that will achieve MEP, it is important to remember that municipalities will be responsible to reduce the discharge of pollutants in stormwater to the maximum extent practicable. The following factors should be considered in deciding if a BMP is practicable:

Pollutant Removal - Will the BMP remove (or control) the pollutant(s) of concern?

Regulatory Compliance - Is the BMP compatible with stormwater regulations as well as other regulations for air, hazardous wastes, solid waste disposal, groundwater protection, etc.?
Public Acceptance - Does the BMP have public support?
Implementation - Is the BMP compatible with land uses, facilities, or activities in question?
Cost - Will the cost for implementing the BMP significantly exceed the pollution control benefits? Does a revenue stream exist for ongoing maintenance?
Technical Feasibility - Is the BMP technically feasible considering soils, geography, water resources, etc.?

Ultimately, the municipality must implement and maintain the selected BMPs and prepare and adhere to a schedule for implementation and maintenance.

1.3 Users of the Handbook

This handbook is primarily designed to assist municipal staff with incorporating pollution prevention controls into their overall stormwater management program and specifically publicly owned/operated facilities (fixed facilities) and field activities (field programs). Users include public and private sector engineers, planners, environmental specialists, and stormwater program managers. Managers and employees of the various municipal facilities and municipal field programs may find this handbook especially helpful when implementing and evaluating the effectiveness of these stormwater management efforts.

1.4 Organization of the Handbook

The handbook is organized to assist the user in selecting and implementing best management practices to reduce impacts of stormwater discharges on receiving waters. The handbook consists of the following sections:

Section 1
Introduction
This section provides a general review of the sources and impacts of municipal stormwater discharges and provides an overview of the federal and state programs regulating stormwater discharges.

Section 2
Stormwater Pollution Prevention Planning for Municipal Operations
This section describes a process to follow in identifying and selecting BMPs for pollutant generating activities.

Section 3
Source Control BMPs
BMP fact sheets presented in this section address BMPs (or procedures) to control or eliminate sources of stormwater pollutants. These BMPs should be considered in all efforts to reduce pollutants from municipal operations.

Section 4
Glossary and List of Acronyms
This section identifies terms and abbreviations used in the handbooks.

Section 5
Implementation and Evaluation of BMPs
This section describes implementation and evaluation techniques for BMPs.

Appendix A Inventory of Municipal Operations
This appendix provides an example of an inventory of municipal operations that may be sources of pollutants in stormwater runoff.

Appendix B
Assessment of Municipal Operations
This appendix provides an example worksheet for assessing fixed facilities to determine the level of BMP

Appendix C
BMP Selection Process
This appendix provides an example of BMP selection for a fixed facility.

Appendix D
Contract/Lease Agreement
This appendix provides example lease language for fixed facilities.

1.5 Stormwater Pollutants and Impacts on Water Quality

Stormwater runoff naturally contains numerous constituents; however, urbanization and urban activities (including municipal activities) typically increase constituent concentrations to levels that may impact water quality. Pollutants associated with stormwater include sediment, nutrients, bacteria and viruses, oil and grease, metals, organics, pesticides, and gross pollutants (floatables). In addition, nutrient-rich stormwater runoff is an attractive medium for vector production when it accumulates and stands for more than 72 hours.

Municipal Activities Generating Pollutants

Municipalities conduct various activities that are sources of pollutants in stormwater runoff. For the purpose of this handbook, these activities are categorized according to whether they occur at a specific location (fixed facility) or across a broader and non-specific area (field programs). Some of these activities are summarized in the list below. All activities are discussed in more detail in Section 2. These activities must be addressed through the implementation of BMPs to minimize or eliminate the pollutants from entering the local water bodies or drainage system.

Typical Municipal Operations that Generate Pollutants

Fixed Facilities Activities

Building Maintenance & Repair
Parking Lot Maintenance
Landscape Maintenance
Salt Storage
Waste Handling and Disposal
Vehicle Fueling and Storage Tank Filling
Equipment Maintenance & Repair
Vehicle and Equipment Storage
Vehicle and Equipment Cleaning
Material Handling & Storage
Material Loading & Unloading
Minor Construction
Over Water Activities

Field Program Activities

Salt application
Street Sweeping and Cleaning
Street Repair and Maintenance Bridge and Structure Maintenance
Sidewalk Surface Cleaning
Storm Drain System Cleaning
Sidewalk Repair
Controlling Litter
Fountain Maintenance
Landscape Mowing/Trimming/Planting
Fertilizer & Pesticide Management
Controlling Illicit Connections
Controlling Illegal Dumping
Solid Waste Collection and Recycling

1.6 Pollutant Impacts on Water Quality

Sediment is a common component of stormwater, and can be a pollutant. Sediment can be detrimental to aquatic life (primary producers, benthic invertebrates, and fish) by interfering with photosynthesis, respiration, growth, reproduction, and oxygen exchange in water bodies. Sediment can transport other pollutants that are attached to it including nutrients, trace metals, and hydrocarbons. Sediment is the primary component of total suspended solids (TSS), a common water quality analytical parameter.

Nutrients including nitrogen and phosphorous are the major plant nutrients used for fertilizing landscapes, and are often found in stormwater. These nutrients can result in excessive or accelerated growth of vegetation, such as algae, resulting in impaired use of water in lakes and other sources of water supply. For example, nutrients have led to a loss of water clarity in Lake Tahoe. In addition, un-ionized ammonia (one of the nitrogen forms) can be toxic to fish.

Bacteria and viruses are common contaminants of stormwater. For separate storm drain systems, sources of these contaminants include animal excrement and sanitary sewer overflow. High levels of indicator bacteria in stormwater have led to the closure of beaches, lakes, and rivers to contact recreation such as swimming.

Oil and grease includes a wide array of hydrocarbon compounds, some of which are toxic to aquatic organisms at low concentrations. Sources of oil and grease include leakage, spills, cleaning and sloughing associated with vehicle and equipment engines and suspensions, leaking and breaks in hydraulic systems, restaurants, and waste oil disposal.

Metals including lead, zinc, cadmium, copper, chromium, and nickel are commonly found in stormwater. Many of the artificial surfaces of the urban environment (e.g., galvanized metal, paint, automobiles, or preserved wood) contain metals, which enter stormwater as the surfaces corrode, flake, dissolve, decay, or leach. Over half the trace metal load carried in stormwater is associated with sediments. Metals are of concern because they are toxic to aquatic organisms, can bioaccumulate (accumulate to toxic levels in aquatic animals such as fish), and have the potential to contaminate drinking water supplies.

Organics may be found in stormwater in low concentrations. Often synthetic organic compounds (adhesives, cleaners, sealants, solvents, etc.) are widely applied and may be improperly stored and disposed. In addition, deliberate dumping of these chemicals into storm drains and inlets causes environmental harm to waterways.

Pesticides (including herbicides, fungicides, rodenticides, and insecticides) have been repeatedly detected in stormwater at toxic levels, even when pesticides have been applied in accordance with label instructions. As pesticide use has increased, so too have concerns about adverse effects of pesticides on the environment and human health. Accumulation of these compounds in simple aquatic organisms, such as plankton, provides an avenue for biomagnification through the food web, potentially resulting in elevated levels of toxins in organisms that feed on them, such as fish and birds.

Gross Pollutants (trash, debris, and floatables) may include heavy metals, pesticides, and bacteria in stormwater. Typically resulting from an urban environment, industrial sites and construction sites, trash and floatables may create an aesthetic “eye sore” in waterways. Gross pollutants also include plant debris (such as leaves and lawn-clippings from landscape maintenance), animal excrement, street litter, and other organic matter. Such substances may harbor bacteria, viruses, vectors, and depress the dissolved oxygen levels in streams, lakes, and estuaries sometimes causing fish kills.

Vector production (e.g., mosquitoes, flies, and rodents) is frequently associated with sheltered habitats and standing water. Unless designed and maintained properly, standing water may occur in treatment control BMPs for 72 hours or more, thus providing a source for vector habitat and reproduction (Metzger, 2002).

1.7 Regulatory Requirements

The federal Clean Water Act (CWA), as amended in 1987, is the principal legislation for establishing requirements for the control of stormwater pollutants. Enforcement of the CWA and other laws such as the Endangered Species Act has generated a number of federal, state and local requirements and programs that deal directly or indirectly with controlling stormwater discharges. In the following sections, various programs are discussed in relationship to control of pollutants in stormwater from municipal storm drain systems. These programs are expected to evolve over the next several years and the user is advised to contact local regulatory and/or municipal officials for further information.

Federal NPDES Programs

In 1972, provisions of the federal Water Pollution Control Act, also referred to as the Clean Water Act (CWA) was amended so that discharge of pollutants to waters of the United States from any point source is effectively prohibited, unless the discharge is in compliance with a National Pollutant Discharge Elimination (NPDES) permit. The 1987 amendments to the CWA added Section 402(p), which established a framework for regulating municipal, industrial, and construction stormwater discharges under the NPDES program. On November 16, 1990, USEPA published final Phase I regulations that established application requirements for stormwater permits for municipal separate storm sewer systems (MS4s) serving a population of over 100,000 and certain industrial facilities, including construction sites greater than 5 acres. These regulations were revised in July 1998 (USEPA, 1998). On December 8, 1999, USEPA published the final Phase II regulations for communities under 100,000 and operators of construction sites between 1 and 5 acres (USEPA, 1999).

Municipal NPDES Stormwater Programs

In Michigan, municipalities were given the option to either have an individual permit (based on jurisdictional boundaries), or to have a watershed based approach, which allows many municipalities within a watershed to work as a group, through a watershed management plan to meet Phase II requirements. Each plan serves as a blueprint for

protecting water quality within the various watersheds. The watershed management plans are used in turn to identify more specific controls for discharges (e.g., wastewater treatment plant effluent, urban runoff, and agriculture drainage).

In Michigan, the federal NPDES stormwater permitting program is administered by the Michigan Department of Environmental Quality (MDEQ) by issuing general NPDES permits. Municipalities with a population of over 100,000 or that have been determined to be a significant contributor of pollutants are required to obtain an individual NPDES stormwater permit. These municipalities are classified as Phase I communities and are typically referred to as MS4s (municipal separate storm sewer systems). To meet CWA Section 402(p) requirements, Phase I MS4s are required to implement a stormwater management program that contains the following elements:

Program Management: including program structure, institutional arrangements, legal authority, and fiscal resources.
Illicit Discharges: including prohibition of illicit connections and dumping, and enforcement procedures.
Industrial / Commercial Discharges: including identification of sources, BMPs, outreach, inspections, staff training, and coordination with state General Permit.
New Development and Re-development: including planning processes, local permits, staff training, post-construction structural BMPs, and outreach.
Construction: including erosion and grading permits, construction BMPs, site inspections, enforcement, and coordination with state General Permit.
Public Agency (Municipal) Operations: including inventory and BMPs for corporation yards, parks and recreation, storm drain system operation and maintenance, streets and roads, flood control, public facilities, and ponds, fountains and other public water bodies. (This is a primary focus of this handbook.)
Public Information and Participation: including general and focused outreach, school education programs, citizen participation, and effectiveness evaluation of the public information program.
Program Evaluation: including performance standards, annual and sub-annual reports, internal reporting and record keeping, and Stormwater Management Plan revisions.
Monitoring: including system characterization, source identification, control measure effectiveness, pollutant loading, and data management.

Smaller, Phase II communities (fewer than 100,000 in population) are covered by a General Permit. Phase II communities are required to develop and implement a stormwater management plan with the following six minimum control measures:

Public Education and Outreach - Distributing educational materials and performing outreach to inform citizens about the impacts polluted stormwater runoff discharges can have on water quality.
Public Involvement and Participation - Providing opportunities for citizens to participate in program development, implementation, and review, including effectively publicizing public hearings or participation.

Illicit Discharge Detection and Elimination - Developing and implementing a plan to detect and eliminate illicit discharges to the storm drain system including illicit connections and illegal dumping.
Construction Site Runoff Control - Developing, implementing, and enforcing an erosion and sediment control program for construction activities that disturb one or more acres of land.
Pollution Prevention / Good Housekeeping for Municipal Operations - Developing and implementing a program to prevent or reduce pollutant runoff from municipal operations. (This is a primary focus of this handbook.)
Post-Construction Stormwater Management in New Development and Redevelopment - Developing, implementing, and enforcing a program to address discharges of stormwater runoff from new and redevelopment areas.

In addition to the six measures listed above, the stormwater management plan must identify measurable goals (or performance standards) for each minimum control measure. Measurable goals will be used by the MS4 and the MDEQ to gauge compliance and evaluate the effectiveness of individual BMPs or control measures and the stormwater management program as a whole. Phase II communities must also monitor their efforts and prepare annual reports demonstrating that the community has implemented the minimum control measures and complied with the measurable goals.

1.8 Definitions

Many of the common definitions for stormwater control are found in the Glossary (see Section 4). Throughout the handbook, the user will find references to the following terms:

NPDES Permit for Stormwater Discharges NPDES is an acronym for National Pollutant Discharge Elimination System. NPDES is the national program for administering and regulating Sections 307, 318, 402 and 405 of the Clean Water Act (CWA). In Michigan, MDEQ has issued a General Permit for stormwater discharges associated with Phase II communities. For Phase I communities MDEQ issues individual NPDES permits to individual permittees.

Notice of Intent (NOI) is a formal notice to the MDEQ submitted by a Phase II municipality. The NOI provides information on the permittee, location of discharge, type of discharge and certifies that the permittee will comply with conditions of the Phase II General Permit. The NOI is not a permit application and does not require approval.

A ***Best Management Practice (BMP)*** is defined as any program, technology, process, siting criteria, operating method, measure, or device which controls, prevents, removes, or reduces pollution.

Source Control BMPs are operational practices that prevent pollution by reducing potential pollutants at the source. They typically do not require maintenance or construction.

Non-Stormwater Discharge is any discharge to municipal separate storm sewer that is not composed entirely of stormwater.

Vector is any animal capable of transmitting the causative agent of human disease or capable of producing human discomfort or injury, including, but not limited to, mosquitoes, flies, other insects, ticks, mites, and rodents.

1.9 References and Resources

California Department of Transportation, *Guidance Manual: Stormwater Monitoring Protocols*, 2nd ed., July 2000. Available at www.dot.ca.gov/hq/env/stormwater/special/index.htm

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Urban Runoff Quality Management. Water Environment Federation/American Society of Civil Engineers. 1998. On-line: http://www.wef.org

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United States Environmental Protection Agency (USEPA). 1998. Federal Register. 40 CFR Part 122. Subpart B – Permit Application and Special NPDES Program Requirements. Section 122.26 Stormwater discharges (applicable to state NPDES programs). Revised July 1, 1998.

United States Environmental Protection Agency (USEPA). 1999. Federal Register. 40 CFR Parts 9, 122, 123, and 124 National Pollutant Discharge Elimination System – Regulations for Revision of the Water Pollution Control Program Addressing Stormwater Discharges; Final Rule. Report to Congress on the Phase II Stormwater Regulations. Wednesday, December 8,1999.

United States Environmental Protection Agency (U.S.E.P.A). *Measurable Goals Guidance for Phase II Small MS4s*, http://cfpub.epa.gov/npdes/stormwater/measurablegoals/part4.cfm#sub7

United States Environmental Protection Agency (U.S.E.P.A.). *NPDES Stormwater Sampling Guidance Document*. 1992, EPA 833-B-92-001, U.S. Environmental Protection Office, Office of Wastewater Enforcement and Compliance, Washington, DC.

http://www.swrcb.ca.gov/stormwtr/municipal.html#phaseii. This link on the State Water Resources Control Board website provides Phase I MS4 area wide permits in each region, a link to Phase I and II resources.

http://cfpub.epa.gov/npdes/stormwater/swphase1.cfm. This link on the USEPA website provides an overview of the Phase I NPDES stormwater program and specific information on requirements pertaining to Phase I stormwater discharges.

Municipal Programs

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Model Urban Runoff Program, Supplementary 2000 Workbook: A Resource for Implementing Your Municipal Urban Runoff Program.

Los Angeles County Stormwater Quality Model Programs. Public Agency Activities http://ladpw.org/wmd/npdes/model_links.cfm

Orange County Stormwater Program. http://www.ocwatersheds.com/StormWater/swp_documents_intro.asp

San Diego Stormwater Co-permittees Jurisdictional Urban Runoff Management Plan. 2001.

Municipal Activities Model Program Guidance. November 2001.

Santa Clara Valley Urban Runoff Pollution Prevention Program. 1997 Urban Runoff Management Plan. September 1997, updated October 2000.

Section 2 Stormwater Pollution Prevention Planning for Municipal Operations

2.1 Introduction

As noted in Section 1 municipalities are required to develop and implement a comprehensive stormwater management program including the reduction of pollutants from municipal operations. In this section, a planning process is suggested for municipal operations, which allows the municipality to identify the activities that generate pollutants and the best management practices (BMPs) applicable to the activities. The recommended process includes the following key components:

Inventory: First, an inventory is developed of all municipal facilities and activities that may be a source of pollutants in stormwater (Section 2.2).

Assessment: Next, the activities are evaluated for their potential to discharge pollutants to storm drains and/or to receiving waters (Section 2.3).

BMP Selection: BMPs are then selected to deal with the identified sources of stormwater pollution. Emphasis is placed on source control (procedures) BMPs (Section 2 and Sections 3 and 4).

Implementation: BMPs are implemented and their effectiveness evaluated. The monitoring, reporting, and inspection requirements of the BMPs is oriented toward gaining insight into the performance of the BMPs (Section 5).

It is worth noting that some municipal facilities may be classified as an industrial–type facility subject to the State NPDES General Permit for Industrial Activities. This handbook is intended for municipal facilities.

2.2 Develop Inventory of Public Agency Activities

This section describes steps that may be used to generate and maintain comprehensive inventories of the pollutant generating activities associated with municipal operations. These activities can be categorized into two groups as described below:

Fixed Facilities – specific locations municipalities own and operate and at which municipal activities occur. These types of facilities may also be municipally owned but privately leased. Examples of fixed facility types include municipal waste facilities and corporation yards.

Field Programs - a set of related municipal activities that take place throughout the municipality. These types of activities may also be privately contracted. Examples of municipal field programs include roads, streets, and highways maintenance, and drainage system operation and maintenance.

The flow chart presented in Figure 2-1 illustrates the two steps involved in compiling the inventories for both fixed facilities and field programs. A summary of the information that is collected as part of inventory is provided in Table 2-1. Sections 2 provide the guidelines for fully completing the inventories.

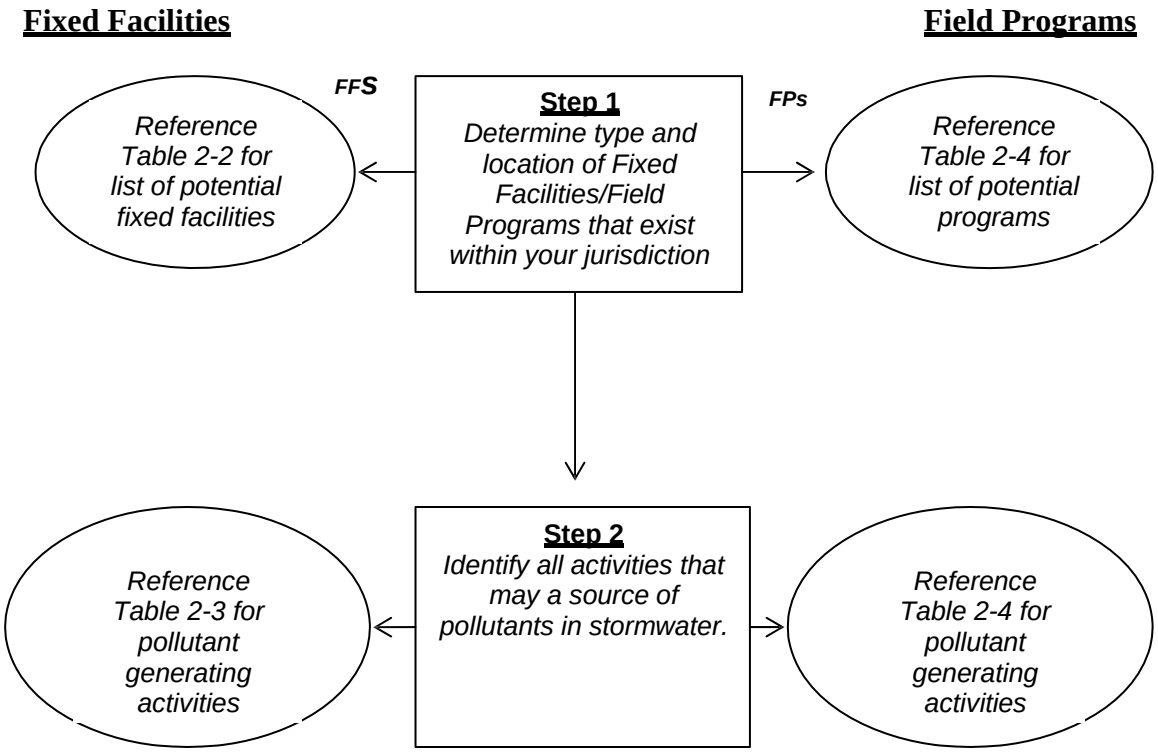

Figure 2-1
Inventory Process for Fixed Facilities and Field Programs

Table 2-1 Inventory Information

Fixed Facility

Facility Type and Location (Step 1)

Facility name/type of facility
Sub-category facility type (see Table 2-2)
Physical Address Information
Watershed and nearby water bodies
GIS Information (longitude and latitude, etc.)
Site Map

Facilities Activities and Pollutants (Step 2)

Facility Activities
Potential Polluntants (See Table 2-3)
Pollutants of concern into a 303(d) listed water body or other ESA
List of past significant spills and leaks
List of significant materials and chemicals
Potential non-stormwater discharges

Field Program

Program Type and Location (Step 1)

Program type
Name and contact information of contractor (if work contracted out)
Area of coverage
Watershed(s) within coverage area (hydrologic units)
Description of drainage facilities (number, size, length of open channels and closed conduits)
Adjacent to and/or discharge to 303(d) listed water body or other ESA

Program Activities and Pollutants (Step 2)

Activities performed (see Table 2-4)
Potential Pollutants (See Table 2-4)
Pollutants of concern into a 303(d) listed water body or other ESA
Potential non-stormwater discharges

Fixed Facility Inventory Procedures

Step 1 – Determine Fixed Facilities Type and Location

The first step in the inventory process is to identify fixed facilities that are owned and operated or owned and leased by the city (county). Baseline information about the fixed facility needs to be developed including the name, address, type of facility, longitude and latitude, and watershed.

Each fixed facility should be identified with a main and subcategory type within the inventory. The main and subcategory types that typically have the greatest potential for discharging pollutants are listed in Table 2-2. A site map should be prepared for each fixed facility that includes:

- The facility boundaries
- The outline of all stormwater drainage areas
- Portions of the drainage area impacted by run-on from surrounding areas
- Direction of flow of each drainage area
- On-site surface water bodies
- Areas of soil erosion
- Nearby water bodies (such as rivers, lakes, ponds)
- Municipal storm drain inlets where the facility's stormwater discharges
- Stormwater collection and conveyance system, associated points of discharge, and the flow direction
- Control measures that affect stormwater discharges
- Locations of all catch basins
- Location of authorized non-stormwater discharges to the storm drain
- Outline of all impervious areas of the facility
- Locations where materials are directly exposed to precipitation
- Locations where significant spills or leaks have occurred
- Areas of municipal activities

Table 2-2 Types of Municipal Fixed Facilities

Main Fixed Facility Types	Subcategory of Fixed Facilities
Municipal Waste Facilities	Active or Closed Municipal Landfills
	Publicly Owned Treatment Facilities
	Incinerators
	Solid Waste Transfer Facilities
	Land Application Sites
	Sites for Disposing and Treating Sewage Sludge
	Hazardous Waste Treatment, Disposal, and Recovery Facilities
	Uncontrolled Sanitary Landfills
Corporation Yards	Corporation Yards
	Maintenance Yards
	Storage Yards for Materials
Other Municipal Owned and/or Operated Facilities	Airfields
	Parks, Cemeteries & Golf Courses
	Public Buildings (Police, Fire, Libraries, etc.)
	Stadiums
	Stables
	Animal Shelters/Services
	Public Parking Facilities
	Fairgrounds
	Other Facilities Identified by the Municipality

The inventory should also determine whether the facility is within or adjacent to or discharging directly to an Environmentally Sensitive Area (ESA). For the purposes of this Handbook, “adjacent” is defined as being located within 200 feet of the listed water body. “Discharging directly to” is defined as a discharge from a drainage system servicing the subject facility or activity that flows to the ESA without mixing with other flows (i.e., discharge from an urban area that co-mingles with downstream flows prior to an ESA is not subject to this definition).

An ESA exists if any of the following designations have been applied to the water body of concern:

Clean Water Act 303(d) listed impaired water body. It should be noted that the 303(d) list is updated on a regular basis by the state and USEPA. Each time that happens, maps showing 303(d) listed water bodies and the inventories will need to be updated. Any discharge directly to a water body.

An example of an inventory of municipal operations is provided in Appendix A.

Step 2 – Identify Potential Pollutant Generating Activities

In addition to the identification of the main and subcategories of fixed facility types in Step 1, the potential pollutant generating activities and potential pollutants for each fixed facility should be identified and included in the inventory.

A list of fixed facility activities that have the potential to generate pollutant discharges and the potential pollutants that are associated with those activities is presented in Table 2-3. This list is not inclusive but does provide a good starting point to identify potential pollutants. In addition to these activities, efforts should be made to compile a list of past significant spills and leaks and a list of materials and chemicals stored on-site.

Finally, determine if pollutants associated with identified activities have the potential to discharge into 303 (d) listed water bodies for which the pollutant is listed.

Table 2-3 Potential Pollutants Likely Associated with Fixed Facility Activities

Fixed Facility Activity	Potential Pollutants								
	Sediment	Nutrients	Trash	Metals	Bacteria	Oil &	Organics	Pesticides	Oxygen Demanding
Building and Ground Maintenance and Repair	x	x	x	x	x	x	x	x	x
Parking/Storage Area Maintenance	x	x	x	x	x	x	x		x
Waste Handling and Disposal	x	x	x	x	x	x	x	x	x
Vehicle and Equipment Fueling			x	x		x	x		
Vehicle and Equipment Maintenance Repair				x		x	x		
Vehicle and Equipment Washing and Steam Cleaning	x	x	x	x		x	x		
Outdoor Loading and Unloading Materials	x	x	x	x		x	x	x	x
Outdoor Container Storage of Liquids		x		x		x	x	x	x
Outdoor Storage of Raw Materials	x	x	x			x	x	x	x
Outdoor Process Equipment	x		x	x		x	x		
Over water Activities			x	x	x	x	x	x	x
Landscape Maintenance	x	x	x		x			x	x

Field Program Inventory Procedures

Step 1 – Determine Field Program Type and Location

The first step in the inventory process is to identify all field programs conducted by a municipality. The field program and associated activities that have the potential for pollutant discharges are listed in Table 2-4. This list is not inclusive but serves as a starting point for identifying applicable field programs. Baseline information about field programs should be included in the inventory, such as the approximate area of coverage for the field program and an identifier if the performance of the field program is contracted out.

In addition, the watershed where the program occurs should be identified. Most field programs are conducted throughout a political jurisdiction and therefore may affect multiple watersheds. The inventory should reflect all those watersheds in which field programs occur. Mapping the field program infrastructure according to watershed may be useful in this step. As with the fixed facilities inventory information regarding environmentally sensitive areas including location and stressor pollutant should be compiled as part of the inventory effort. See Table 2-1 for a more complete list of information that may be collected during the inventory procedure.

Step 2 – Identify Potential Pollutant Generating Activities

The potential pollutant generating activities and potential pollutants for each field program must be identified and included in the inventory. A list of field program activities that have the potential to generate pollutant discharges and the potential pollutants that are associated with those activities is presented in Table 2-4.

Although Table 2-4 identifies the primary pollutants typically associated with stormwater runoff there are other environmental conditions that may be applicable to a field program. These include pH, temperature, and toxicity.

Table 2-4 Field Program Activities and Associated Potential Pollutants										
Field Programs	Activities	Potential Pollutants								
		Sediment	Nutrients	Trash	Metals	Bacteria	Oil & Grease	Organics	Pesticides	Oxygen Demanding
Roads, Streets, and Highways Operation and Maintenance	Sweeping and Cleaning	x		x	x		x			x
	Street Repair, Maintenance, and Striping/Painting	x		x	x		x	x		
	Bridge and Structure Maintenance	x		x	x		x	x		
Plaza, Sidewalk, and Parking Lot Maintenance and Cleaning	Surface Cleaning	x	x			x	x			x
	Graffiti Cleaning	x	x		x			x		
	Sidewalk Repair	x		x						
	Controlling Litter	x		x		x	x			x
Fountains, Pools, Lakes, and Lagoons Maintenance	Fountain and Pool Draining		x	x	x	x	x	x	x	x
	Lake and Lagoon Maintenance	x	x					x		
Landscape Maintenance	Mowing/Trimming/Planting	x	x	x		x			x	x
	Fertilizer & Pesticide Management	x	x						x	
	Managing Landscape Wastes			x					x	x
	Erosion Control	x	x							
Drainage System Operation and Maintenance	Inspection and Cleaning of Stormwater Conveyance Structures	x	x	x		x		x		x
	Controlling Illicit Connections and Discharges	x	x	x	x	x	x	x	x	x
	Controlling Illegal Dumping	x	x	x	x	x	x	x	x	x
	Maintenance of Inlet and Outlet Structures	x		x	x		x			x
Waste Handling and Disposal	Solid Waste Collection		x	x	x	x	x	x		x
	Waste Reduction and Recycling			x	x					x
	Household Hazardous Waste Collection			x	x		x	x	x	
	Controlling Litter			x	x	x		x		x
	Controlling Illegal Dumping	x		x		x	x		x	x
Water and Sewer Utility Operation and Maintenance	Water line Maintenance	x				x	x			
	Sanitary Sewer Maintenance	x				x	x			x
	Spill/Leak/Overflow Control, Response, and Containment	x	x			x		x		x

2.3 Assessment

This section outlines the procedures for assessing fixed facilities and field programs for BMP selection and implementation. Data gathered during the inventory process should be used to support the assessment process described below.

Assessment of Fixed Facilities

The first step in the assessment is to identify BMPs already in place at a facility. These may include pavement sweeping, drain inlet cleaning, covered waste storage bins, and spill prevention and cleanup procedures. This information should be considered when determining which BMPs should be selected and implemented at a site. Worksheet 1 provides a checklist that may be helpful in determining existing BMPs at a site. Other BMPs that were installed for reasons unrelated to stormwater control, such as berming, covered materials storage, and designated wash areas, should also be identified.

Once the existing BMPs have been identified and the inventory completed per Section 2.2, an assessment of all municipal activities and potential pollutant sources should be conducted to determine which areas of the facility are likely sources of pollutants in stormwater and non-stormwater discharges, and which pollutants are likely to be present in stormwater and non-stormwater discharges. Worksheet 1 may help with this task.

Facility operators must then decide whether additional or new BMPs should be implemented to reduce stormwater pollutants to the maximum extent practicable from a site. The municipality should consider and evaluate various factors when performing this assessment, such as:

effectiveness of current BMPs
type of activities
type and quantities of significant materials handled, produced, stored, or disposed of
history of spill or leaks
non-stormwater discharges
size of facility (including percent impervious)
proximity to receiving water and/or type of receiving water

The municipality should also consider whether its facility is discharging pollutants identified to be causing impairment in the local water bodies. Appendix B provides an example of a method for assessing a facility for BMP implementation.

Assessment of Field Programs

Similar to the effort at a fixed facility a municipality should identify BMPs that are already in place and the extent of their effectiveness. Using this information and the inventory data the municipality can identify the activities with the potential for discharging pollutants, the type of pollutants being discharged, and the extent that the pollutants are being addressed with current procedures or BMPs. The municipality can then assess whether additional or new BMPs are necessary. In considering the need for new or additional BMPs, a municipality should consider:

effectiveness of current BMPs
type of field program and pollutants being discharged
exposure of activities to stormwater
land use category
proximity to receiving water and/or type of receiving water

2.4 Identify and Select BMPs

Selection of BMPs should focus first on source control BMPs and second on treatment control BMPs. For the purposes of this handbook, only source control BMPs are described. Typically, source control BMPs will serve to reduce pollutants from activities to the maximum extent practicable. Treatment controls BMPs should be considered when source control BMPs have been shown to be ineffective or when special environmental or site conditions warrant a more comprehensive approach. An example of selecting source control BMPs is provided in Appendix C.

Municipalities can identify and select BMPs from those presented in Section 3 Source Control BMPs. The BMPs are described in activity-based and field program-based fact sheets that also provide information on the pollutants that can be addressed by the BMP. The BMPs shown in Section 3 are a comprehensive collection and not all may be applicable to the activities or field programs of a particular municipality. In order to be effective, BMPs must be appropriate to the application and properly implemented.

Section 3 Source Control BMPs

3.1 Introduction

This section provides a description of specific source control Best Management Practices (BMPs) for activities related to municipal operations. As noted in Sections 1 and 2, municipal fixed facilities conduct activities that have the potential to generate pollutants. The source control BMPs in this section address these activities (see Table 3-1).

In addition, municipalities conduct various field programs where activities may occur and create pollutants.

Table 3-1 Municipal Fixed Facility	
BMPs	
Non-Stormwater Management	
SC-1	Non-Stormwater Discharges
SC-2	Spill Prevention, Control and Cleanup
Vehicle and Equipment Management	
SC-3	Vehicle and Equipment Fueling
SC-4	Vehicle and Equipment Cleaning
SC-5	Vehicle and Equipment Repair
Material and Waste Management	
SC-6	Outdoor Loading/Unloading
SC-7	Outdoor Container Storage
SC-8	Outdoor Equipment Maintenance
SC-9	Outdoor Storage of Raw Materials
SC-10	Waste Handling and Disposal
Building and Grounds Management	
SC-11	Building and Grounds Maintenance
SC-12	Parking/Storage Area Maintenance
General Stormwater Management	
SC-13	Housekeeping Practices
SC-14	Safer Alternative Products
Table 3-2 Municipal Field Program BMPs	
SC-15	Road and Street Maintenance
SC-16	Salt Application and Storage
SC-17	Plaza and Sidewalk Cleaning
SC-18	Fountains & Pools Maintenance
SC-19	Landscape Maintenance
SC-20	Drainage System Maintenance
SC-21	Waste Handling and Disposal
SC-22	Water and Sewer Utility Maintenance

Fact Sheet Format

Each BMP fact sheet is a short document that gives all the information about a particular BMP. Typically, each fact sheet contains the information outlined in Figure 3-1. The fact sheets contain side bar presentations with information on BMP objectives and targeted constituents. The information provided in each fact sheet is extensive and may not be applicable to all municipal operations. The readers may find it helpful to modify and simplify the BMP fact sheets to better reflect their existing operations.

Figure 3-1
Example Fact Sheet

SC-xx Example Fact Sheet

Description of the BMP

Approach

- Pollution Prevention
- Suggested Protocols
- Training
- Spill Response and Prevention
- Other Considerations

Requirements

- Costs
- Maintenance

Supplemental Information

- Further Details on the BMP
- Examples

References and Resources

BMP Fact Sheets

BMP fact sheets for fixed facilities activities and field programs follow. The BMP fact sheets are individually page numbered and are suitable for photocopying and inclusions in stormwater quality management plans. Individual electronic copies of the fact sheets can be individually downloaded from the GLRC website (www.mywatersheds.org).

Non-Stormwater Discharges SC-1

Description

Objectives
Contain
Educate
Reduce/Minimize

Targeted Constituents
Sediment 9
Nutrients 9
Trash 9
Metals 9
Bacteria 9
Oil and Grease 9
Organics 9
Oxygen Demanding 9

Non-stormwater discharges are those flows that do not consist entirely of stormwater. For municipalities non-stormwater discharges present themselves in two situations. One is from fixed facilities owned and/or operated by the municipality. The other situation is non-stormwater discharges that are discovered during the normal operation of a field program. Some non-stormwater discharges do not include pollutants and may be discharged to the storm drain. These include uncontaminated groundwater and natural springs. There are also some non-stormwater discharges that typically do not contain pollutants and may be discharged to the storm drain with conditions. These include car washing, and surface cleaning. However, there are certain non-stormwater discharges that pose environmental concern. These discharges may originate from illegal dumping or from internal floor drains, appliances, industrial processes, sinks, and toilets that are connected to the nearby storm drainage system. These discharges (which may include: process waste waters, cooling waters, wash waters, (and sanitary wastewater) can carry substances (such as paint, oil, fuel and other automotive fluids, chemicals and other pollutants) into storm drains. The ultimate goal is to effectively eliminate non-stormwater discharges to the stormwater drainage system through implementation of measures to detect, correct, and enforce against illicit connections and illegal discharges.

Approach

The municipality must address non-stormwater discharges from its fixed facilities by assessing the types of non-stormwater discharges and implementing BMPs for the discharges determined to pose environmental concern. For field programs the field staff must be trained to now what to look for regarding non-stormwater discharges and the procedures to follow in investigating the detected discharges.

Suggested Protocols

Fixed Facility

General

Post “No Dumping” signs with a phone number for reporting dumping and disposal. Signs should also indicate fines and penalties for illegal dumping.

Stencil storm drains, where applicable, to prevent illegal disposal of pollutants. Storm drain inlets should have messages such as “Dump No Waste Drains to Stream”

stenciled next to them to warn against ignorant or intentional dumping of pollutants into the storm drainage system.

Landscaping and beautification efforts of hot spots might also discourage future dumping, as well as provide open space and increase property values.

Lighting or barriers may also be needed to discourage future dumping.

Illicit Connections

Locate discharges from the fixed facility drainage system to the municipal storm drain system through review of “as-built” piping schematics.

Use techniques such as smoke testing, dye testing and television camera inspection (as noted below) to verify physical connections.

Isolate problem areas and plug illicit discharge points.

Visual Inspection and Inventory

Inventory and inspect each discharge point during dry weather.

Keep in mind that drainage from a storm event can continue for several days following the end of a storm and groundwater may infiltrate the underground stormwater collection system. Also, non-stormwater discharges are often intermittent and may require periodic inspections.

Review Infield Piping

Review the “as-built” piping schematic as a way to determine if there are any connections to the stormwater collection system.

Inspect the path of floor drains in older buildings.

Smoke Testing

Smoke testing of wastewater and stormwater collection systems is used to detect connections between the two systems.

During dry weather the stormwater collection system is filled with smoke and then traced to sources. The appearance of smoke at the base of a toilet indicates that there may be a connection between the sanitary and the stormwater system.

Dye Testing

A dye test can be performed by simply releasing a dye into either your sanitary or process wastewater system and examining the discharge points from the stormwater collection system for discoloration.

TV Inspection of Storm Sewer

TV Cameras can be employed to visually identify illicit connections to the fixed facility storm drain system.

Illegal Dumping

Regularly inspect and clean up hot spots and other storm drainage areas where illegal dumping and disposal occurs.

Clean up spills on paved surfaces with as little water as possible. Use a rag for small spills, a damp mop for general cleanup, and absorbent material for larger spills. If the spilled material is hazardous, then the used cleanup materials are also hazardous and must be sent to a certified laundry (rags) or disposed of as hazardous waste.

Never hose down or bury dry material spills. Sweep up the material and dispose of properly.

Use adsorbent materials on small spills rather than hosing down the spill. Remove the adsorbent materials promptly and dispose of properly.

For larger spills, a private spill cleanup company or Hazmat team may be necessary.

See fact sheet SC-2 Spill Prevention, Control, and Clean Up.

Field Program

General

Develop clear protocols and lines of communication for effectively prohibiting non-stormwater discharges, especially ones that involve more than one jurisdiction and those that are not classified as hazardous, which are often not responded to as effectively as they need to be.

Stencil storm drains, where applicable, to prevent illegal disposal of pollutants. Storm drain inlets should have messages such as “Dump No Waste Drains to Stream” stenciled next to them to warn against ignorant or intentional dumping of pollutants into the storm drainage system

See SC-20 Stormwater Drainage System Maintenance for additional information.

Field Inspection

Regularly inspect and clean up hot spots and other storm drainage areas where illegal dumping and disposal occurs.

During routine field program maintenance field staff should look for evidence of illegal discharges or illicit connection:

- Is there evidence of spills such as paints, discoloring, etc.
- Are there any odors associated with the drainage system
- Record locations of apparent illegal discharges/illicit connections and notify appropriate investigating agency.

If trained, conduct field investigation of non-stormwater discharges to determine whether they pose a threat to water quality.

Recommended Complaint Investigation Equipment

Field Screening Analysis

- pH paper or meter
- Commercial stormwater pollutant screening kit that can detect for reactive phosphorus, nitrate nitrogen, ammonium nitrogen, specific conductance, and turbidity
- Sample jars
- Sample collection pole
- A tool to remove access hole covers

Laboratory Analysis

- Sample cooler
- Ice
- Sample jars and labels
- Chain of custody forms.

Documentation

- Camera
- Notebook
- Pens
- Notice of Violation forms
- Educational materials

Reporting

A database is useful for defining and tracking the magnitude and location of the problem.

Report prohibited non-stormwater discharges observed during the course of normal daily activities so they can be investigated, contained and cleaned up or eliminated.

Document that non-stormwater discharges have been eliminated by recording tests performed, methods used, dates of testing, and any onsite drainage points observed.

Maintain documentation of illicit connection and illegal dumping incidents, including significant conditionally exempt discharges that are not properly managed.

Enforcement

Educate the responsible party if identified on the impacts of their actions, explain the stormwater requirements, and provide information regarding Best Management Practices (BMP), as appropriate. Initiate follow-up and/or enforcement procedures.

If an illegal discharge is traced to a commercial, residential or industrial source, conduct the following activities or coordinate the following activities with the appropriate agency:

- Contact the responsible party to discuss methods of eliminating the non-stormwater discharge, including disposal options, recycling, and possible discharge to the sanitary sewer (if within POTW limits).
- Provide information regarding BMPs to the responsible party, where appropriate.
- Begin enforcement procedures, if appropriate.
- Continue inspection and follow-up activities until the illicit discharge activity has ceased.

If an illegal discharge is traced to a commercial or industrial activity, coordinate information on the discharge with the jurisdiction's commercial and industrial facility inspection program.

Training

Train technical staff to identify and document illegal dumping incidents.

Well-trained employees can reduce human errors that lead to accidental releases or spills.

The employee should have the tools and knowledge to immediately begin cleaning up a spill if one should occur. Employees should be familiar with the Spill Prevention Control and Countermeasure Plan.

Train employees to identify non-stormwater discharges and report them to the appropriate departments.

Train staff who have the authority to conduct surveillance and inspections, and write citations for those caught illegally dumping.

Train municipal staff responsible for surveillance and inspection in the following:

- OSHA-required Health and Safety Training (29 CFR 1910.120) plus annual refresher training (as needed).
- OSHA Confined Space Entry training (Cal-OSHA Confined Space, Title 8 and federal OSHA 29 CFR 1910.146).

- Procedural training (field screening, sampling, smoke/dye testing, TV inspection).

Educate the identified responsible party on the impacts of his or her actions.

Spill Response and Prevention

See SC-2 Spill Prevention Control and Clean Up

Other Considerations

The elimination of illegal dumping is dependent on the availability, convenience, and cost of alternative means of disposal. 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.

Municipal codes should include sections prohibiting the discharge of soil, debris, refuse, hazardous wastes, and other pollutants into the storm drain system.

Many facilities do not have accurate, up to date schematic drawings.

Can be difficult to locate illicit connections especially if there is groundwater infiltration.

Requirements

Costs

Eliminating illicit connections can be expensive especially if structural modifications are required such re-plumbing cross connections under an existing slab.

Minor cost to train field crews regarding the identification of non-stormwater discharges. The primary cost is for a fully integrated program to identify and eliminate illicit connections and illegal dumping. However, by combining with other municipal programs (i.e. pretreatment program) cost may be lowered.

Municipal cost for containment and disposal may be borne by the discharger.

Supplemental Information

Further Detail of the BMP

What constitutes a "non-stormwater" discharge?

Non-stormwater discharges are discharges not made up entirely of stormwater and include water used directly in the manufacturing process (process wastewater), air conditioning condensate and coolant, non-contact cooling water, cooling equipment condensate, outdoor secondary containment water, vehicle and equipment wash water, landscape irrigation, sink and drinking fountain wastewater, sanitary wastes, or other wastewaters.

Permit Requirements

Current municipal NPDES permits require municipalities to effectively prohibit non-stormwater discharges unless authorized by a separate NPDES permit or allowed in accordance with the current NPDES permit conditions. Typically the current permits allow certain non-stormwater discharges in the storm drain system as long as the discharges are not significant sources of pollutants. In this context the following non-stormwater discharges are typically allowed:

- Diverted stream flows;
- Rising found waters;
- Uncontaminated ground water infiltration
- Uncontaminated pumped ground water;
- Foundation drains;
- Springs;
- Water from crawl space pumps;
- Footing drains;
- Air conditioning condensation;
- Flows from riparian habitats and wetlands;
- Water line and hydrant flushing ;
- Landscape irrigation;
- Planned and unplanned discharges from potable water sources;
- Irrigation water;
- Individual residential car washing; and
- Lawn watering.

Municipal facilities subject to industrial general permit requirements must include a certification that the stormwater collection system has been tested or evaluated for the presence of non-stormwater discharges. The state's General Industrial Stormwater Permit requires that non-stormwater discharges be eliminated prior to implementation of the facility's Stormwater Pollution Prevention Initiative (SWPPI).

Illegal Dumping

Establish a system for tracking incidents. The system should be designed to identify the following:

- Illegal dumping hot spots
- Types and quantities (in some cases) of wastes
- Patterns in time of occurrence (time of day/night, month, or year)
- Mode of dumping (abandoned containers, "midnight dumping" from moving vehicles, direct dumping of materials, accidents/spills)

- Responsible parties

Outreach

One of the keys to success of reducing or eliminating illegal dumping is increasing the number of people on the street who are aware of the problem and who have the tools to at least identify the incident, if not correct it. There we a number of ways of accomplishing this:

Train municipal staff from all departments (public works, utilities, street cleaning, parks and recreation, industrial waste inspection, hazardous waste inspection, sewer maintenance) to recognize and report the incidents.

Deputize municipal staff that may come into contact with illegal dumping with the authority to write illegal dumping tickets for offenders caught in the act (see below).

Educate the public. As many as 3 out of 4 people do not understand that in most communities the storm drain does not go to the wastewater treatment plant. Unfortunately, with the heavy emphasis in recent years on public education about solid waste management, including recycling and household hazardous waste, the sewer system (both storm and sanitary) has been the likely recipient of cross-media transfers of waste.

Provide the public with a mechanism for reporting incidents such as a hot line and/or door hanger (see below).

Help areas where incidents occur more frequently set up environmental watch programs (like crime watch programs).

Train volunteers to notice and report the presence and suspected source of an observed pollutant to the appropriate public agency.

Storm Drain Stenciling

Stencil storm drain inlets with a message to prohibit illegal dumping, especially in areas with waste handling facilities.

Encourage public reporting of improper waste disposal by a HOTLINE number stenciled onto the storm drain inlet.

See Supplemental Information section of this fact sheet for further detail on stenciling program approach.

Oil Recycling

Contract collection and hauling of used oil to a private licensed used oil hauler/recycler.

Comply with all applicable state and federal regulations regarding storage, handling, and transport of petroleum products.

Create procedures for collection such as; collection locations and schedule, acceptable containers, and maximum amounts accepted.

For information about recycling used oil, contact the Michigan Recycling Coalition at 517-327-9207 or www.michiganrecycles.org.

Household Hazardous Waste

Provide household hazardous waste (HHW) collection facilities. Several types of collection approaches are available including permanent, periodic, or mobile centers, curbside collection, or a combination of these systems.

Training

Train municipal employees and contractors in proper and consistent methods for waste disposal.

Train municipal employees to recognize and report illegal dumping.

Train employees and subcontractors in proper hazardous waste management.

Spill Response and Prevention

Refer to SC-2, Spill Prevention, Control & Cleanup.

Have spill cleanup materials readily available and in a known location.

Cleanup spills immediately and use dry methods if possible.

Properly dispose of spill cleanup material.

Other Considerations

Federal Regulations (RCRA, SARA, CERCLA) and state regulations exist regarding the disposal of hazardous waste.

Municipalities are required to have a used oil recycling element and a HHW element within their integrated waste management plan.

Significant liability issues are involved with the collection, handling, and disposal of HHW.

Examples

The City of Palo Alto has developed a public participation program for reporting dumping violations. When a concerned citizen or public employee encounters evidence of illegal dumping, a door hanger (similar in format to hotel "Do Not Disturb" signs) is placed on the front doors in the neighborhood. The door hanger notes that a violation has occurred in the neighborhood, informs the reader why illegal dumping is a problem, and notes that illegal dumping carries a significant financial penalty. Information is also provided on what citizens can do as well as contact numbers for more information or to report a violation.

The Port of Long Beach has a state of the art database incorporating storm drain infrastructure, potential pollutant sources, facility management practices, and a pollutant tracking system.

References and Resources

http://www.stormwatercenter.net/

California's Nonpoint Source Program Plan
http://www.co.clark.wa.us/pubworks/bmpman.pdf

King County Stormwater Pollution Control Manual -
http://dnr.metrokc.gov/wlr/dss/spcm.htm

Orange County Stormwater Program,
http://www.ocwatersheds.com/stormwater/swp_introduction.asp

San Diego Stormwater Co-permittees Jurisdictional Urban Runoff Management Program (http://www.projectcleanwater.org)

Santa Clara Valley Urban Runoff Pollution Prevention Program
http://www.scvurppp-w2k.com/pdf%20documents/PS_ICID.PDF

12/18/07

Spill Prevention, Control & Cleanup SC-2

Description

Spills and leaks, if not properly controlled, can adversely impact the storm drain system and receiving waters. Due to the type of work or the materials involved, many activities that occur either at a municipal facility or as a part of municipal field programs have the potential for accidental spills and leaks. Proper spill response planning and preparation can enable municipal employees to effectively respond to problems when they occur and minimize the discharge of pollutants to the environment.

Objectives

Contain
Educate
Reduce/Minimize
Product Substitution

Targeted Constituents

Sediment	
Nutrients	9
Trash	
Metals	9
Bacteria	
Oil and Grease	9
Organics	9
Oxygen Demanding	9

Approach

An effective Pollution Incident Prevention Plan (PIPP) should include:

- Spill/leak prevention measures;
- Spill response procedures;
- Spill cleanup procedures;
- Reporting; and
- Training

A well thought out and implemented plan can prevent pollutants from entering the storm drainage system and can be used as a tool for training personnel to prevent and control future spills as well.

Pollution Prevention

Develop and implement a PIPP. The plan should include:

- A description of the facility, the address, activities and materials involved
- Identification of key spill response personnel
- Identification of the potential spill areas or operations prone to spills/leaks
- Identification of which areas should be or are bermed to contain spills/leaks
- Facility map identifying the key locations of areas, activities, materials, structural BMPs, etc.
- Material handling procedures
- Spill response procedures including:
    - Assessment of the site and potential impacts
    - Containment of the material
    - Notification of the proper personnel and evacuation procedures
    - Clean up of the site
    - Disposal of the waste material and
    - Proper record keeping

Product substitution – use less toxic materials (i.e. use water based paints instead of oil based paints)

Recycle, reclaim, or reuse materials whenever possible. This will reduce the amount of materials that are brought into the facility or into the field.

Suggested Protocols

Spill/Leak Prevention Measures

If possible, move material handling indoors, under cover, or away from storm drains or sensitive water bodies.

Properly label all containers so that the contents are easily identifiable.

Berm storage areas so that if a spill or leak occurs, the material is contained.

Cover outside storage areas either with a permanent structure or with a seasonal one such as a tarp so that rain can not come into contact with the materials.

Check containers (and any containment sumps) often for leaks and spills. Replace containers that are leaking, corroded, or otherwise deteriorating with containers in good condition. Collect all spilled liquids and properly dispose of them.

Store, contain and transfer liquid materials in such a manner that if the container is ruptured or the contents spilled, they will not discharge, flow or be washed into the storm drainage system, surface waters, or groundwater.

Place drip pans or absorbent materials beneath all mounted taps and at all potential drip and spill locations during the filling and unloading of containers. Any collected liquids or soiled absorbent materials should be reused/recycled or properly disposed of.

For field programs, only transport the minimum amount of material needed for the daily activities and transfer materials between containers at a municipal yard where leaks and spill are easier to control.

If paved, sweep and clean storage areas monthly, do not use water to hose down the area unless all of the water will be collected and disposed of properly.

Install a spill control device (such as a tee section) in any catch basins that collect runoff from any storage areas if the materials stored are oil, gas, or other materials that separate from and float on water. This will allow for easier cleanup if a spill occurs.
If necessary, protect catch basins while conducting field activities so that if a spill occurs, the material will be contained.

Training

Educate employees about spill prevention, spill response and cleanup on a routine basis.

Well-trained employees can reduce human errors that lead to accidental releases or spills:

- The employees should have the tools and knowledge to immediately begin cleaning up a spill if one should occur.
- Employees should be familiar with the Spill Prevention Control and Countermeasure Plan if one is available.

Training of staff from all municipal departments should focus on recognizing and reporting potential or current spills/leaks and who they should contact.

Employees responsible for aboveground storage tanks and liquid transfers for large bulk containers should be thoroughly familiar with the Spill Prevention Control and

Spill Response and Prevention

Identify key spill response personnel and train employees on who they are.

Store and maintain appropriate spill cleanup materials in a clearly marked location near storage areas; and train employees to ensure familiarity with the site's spill control plan and/or proper spill cleanup procedures.

Locate spill cleanup materials, such as absorbents, where they will be readily accessible (e.g. near storage and maintenance areas, on field trucks).

Follow the PIPP if one is available.

If a spill occurs, notify the key spill response personnel immediately. If the material is unknown or hazardous, the local fire department may also need to be contacted.

If safe to do so, attempt to contain the material and block the nearby storm drains so that the area impacted is minimized. If the material is unknown or hazardous wait for properly trained personnel to contain the materials.

Perform an assessment of the area where the spill occurred and the downstream area that it could impact. Relay this information to the key spill response and clean up personnel.

Spill Cleanup Procedures

Small non-hazardous spills

- Use a rag, damp cloth or absorbent materials for general clean up of liquids
- Use brooms or shovels for the general clean up of dry materials
- If water is used, it must be collected and properly disposed of. The wash water can not be allowed to enter the storm drain.
- Dispose of any waste materials properly
- Clean or dispose of any equipment used to clean up the spill properly

Large non-hazardous spills

- Use absorbent materials for general clean up of liquids
- Use brooms, shovels or street sweepers for the general clean up of dry materials
- If water is used, it must be collected and properly disposed of. The wash water can not be allowed to enter the storm drain.
- Dispose of any waste materials properly
- Clean or dispose of any equipment used to clean up the spill properly

For hazardous or very large spills, a private cleanup company or Hazmat team may need to be contacted to assess the situation and conduct the cleanup and disposal of the materials.

Chemical cleanups of material can be achieved with the use of absorbents, gels, and foams. Remove the adsorbent materials promptly and dispose of according to regulations.

If the spilled material is hazardous, then the used cleanup materials are also hazardous and must be sent to a certified laundry (rags) or disposed of as hazardous waste.

Reporting

Report any spills immediately to the identified key municipal spill response personnel.

Report spills in accordance with applicable reporting laws. Spills that pose an immediate threat to human health or the environment must be reported immediately to 911, the Pollution Emergency Alerting System (PEAS) at 800-292-4706 and the National Response Center (NRC) at 800-424-8802.

Spills that pose an immediate threat to human health or the environment may also need to be reported within 24 hours to the Local Emergency Planning Committee (LEPC), State Emergency Response Center (SERC), Michigan Department of Agriculture (MDA), various divisions of Michigan Department of Environmental Quality (MDEQ), and the Department of Labor and Economic Growth (DLEG).

Federal regulations require that any oil spill into a water body or onto an adjoining shoreline be reported to the National Response Center (NRC) at 800-424-8802 (24 hour).

After the spill has been contained and cleaned up, a detailed report about the incident should be generated and kept on file (see the section on Reporting below). The incident may also be used in briefing staff about proper procedures.

Other Considerations

A PIPP is required for facilities that are subject to the oil pollution regulations specified in Part 112 of Title 40 of the Code of Federal Regulations.

State Regulations also exist for the storage of hazardous materials (PIPP rules), including the preparation of PIPPs for emergency response to the releases or threatened releases.

Requirements

Costs

Will vary depending on the size of the facility and the necessary controls.

Prevention of leaks and spills is inexpensive. Treatment and/or disposal of wastes, contaminated soil and water is very expensive.

Maintenance

This BMP has no major administrative or staffing requirements. However, extra time is needed to properly handle and dispose of spills, which results in increased labor costs.

Supplemental Information

Further Detail of the BMP

Reporting

Record keeping and internal reporting represent good operating practices because they can increase the efficiency of the response and containment of a spill. A good record keeping system helps the municipality minimize incident recurrence, correctly respond with appropriate containment and cleanup activities, and comply with legal requirements.

A record keeping and reporting system should be set up for documenting spills, leaks, and other discharges, including discharges of hazardous substances in reportable quantities. Incident records describe the quality and quantity of non-stormwater discharges to the storm drain.

These records should contain the following information:

Date and time of the incident

Weather conditions

Duration of the spill/leak/discharge

Cause of the spill/leak/discharge

Response procedures implemented

Persons notified

Environmental problems associated with the spill/leak/discharge

Separate record keeping systems should be established to document housekeeping and preventive maintenance inspections, and training activities. All housekeeping and preventive maintenance inspections should be documented. Inspection documentation should contain the following information:

The date and time the inspection was performed

Name of the inspector

Items inspected

Problems noted

Corrective action required

Date corrective action was taken

Other means to document and record inspection results are field notes, timed and dated photographs, videotapes, and drawings and maps.

Examples
The City of Palo Alto includes spill prevention and control as a major element of its highly effective program for municipal vehicle maintenance shops.

References and Resources
Michigan Department of Environmental Quality, Emergency Response to Spills over Water,
http://michigan.gov/deq/0,1607,7-1353313-23420---,00.html

King County Stormwater Pollution Control Manual -
http://dnr.metrokc.gov/wlr/dss/spcm.htm

Orange County Stormwater Program
http://www.ocwatersheds.com/stormwater/swp_introduction.asp

San Diego Stormwater Co-permittees Jurisdictional Urban Runoff Management Program (URMP)
http://www.projectcleanwater.org/pdf/Model%20Program%20Municipal%20Facilities.pdf

12/18/07

Vehicle and Equipment Fueling SC-3

Description

Spills and leaks that occur during vehicle and equipment fueling can contribute hydrocarbons, oil and grease, as well as heavy metals to stormwater runoff. Implementing the following management practices can help prevent fuel spills and leaks.

Objectives

Cover
Contain
Educate
Reduce/Minimize

Targeted Constituents

Sediment	
Nutrients	
Trash	9
Metals	9
Bacteria	
Oil and Grease	9
Organics	9
Oxygen Demanding	

Approach

Reduce potential for pollutant discharge through source control pollution prevention and BMP implementation. Successful implementation depends on effective training of employees on applicable BMPs and general pollution prevention strategies and objectives.

Pollution Prevention

Use properly maintained offsite fueling stations whenever possible. These businesses are better equipped to handle fuel and spills properly.

Educate employees about pollution prevention measures and goals.

Focus pollution prevention activities on containment of spills and leaks, most of which may occur during liquid transfers.

Suggested Protocols

General

"Spot clean" leaks and drips routinely. Leaks are not cleaned up until the absorbent is picked up and disposed of properly.

Label drains within the facility boundary, by paint/stencil (or equivalent), to indicate whether they flow to an oil/water separator, directly to the sewer, or to a storm drain. Labels are not necessary for plumbing fixtures directly connected to the sanitary sewer but may be useful to help eliminate confusion about where the drain leads.

Post signs to remind employees not to top off the fuel tank when filling and signs that ban employees from changing engine oil or other fluids at that location.

Report leaking vehicles to fleet maintenance.

Install inlet catch basin equipped with a small sedimentation basin or grit chamber to remove large particles from stormwater in highly impervious areas. Proper maintenance of these devices is necessary.

Accumulated non-contaminated stormwater (e.g., in a secondary containment) should be released prior to next storm.

Ensure the following safeguards are in place:

- Overflow protection devices on tank systems to warn the operator to automatically shutdown transfer pumps when the tank reaches full capacity.
- Protective guards around tanks and piping to prevent vehicle or forklift damage.
- Clearly tagging or labeling all valves to reduce human error.
- Automatic shut off for severed fuel hoses.

Fuel Dispensing Areas

Maintain clean fuel-dispensing areas using dry cleanup methods such as sweeping for removal of litter and debris, or use of rags and absorbents for leaks and spills. Do not wash down areas with water.

Fit underground storage tanks with spill containment and overfill prevention systems meeting the requirements of the State.

Fit fuel dispensing nozzles with "hold-open latches" (automatic shutoffs) except where prohibited by local fire departments.

Post signs at the fuel dispenser or fuel island warning vehicle owners/operators against "topping off" of vehicle fuel tanks.

Design fueling area to prevent stormwater runoff and spills.

Cover fueling area with an overhanging roof structure or canopy so that precipitation cannot come in contact with the fueling area and if possible use a perimeter drain or slope pavement inward with drainage to a blind sump (must be properly maintained and water properly disposed of); pave area with concrete rather than asphalt.

Apply a suitable sealant that protects the asphalt from spilled fuels in areas where covering is infeasible and the fuel island is surrounded by pavement.

Install vapor recovery nozzles to help control drips as well as air pollution.

Use secondary containment when transferring fuel from the tank truck to the fuel tank.

Cover storm drains in the vicinity during transfer.

Outdoor Waste Receptacle Area

Spot clean leaks and drips routinely to prevent runoff of spillage.

Minimize the possibility of stormwater pollution from outside waste receptacles by using an effective combination of the following:

- use only watertight waste receptacle(s) and keep the lid(s) closed, or
- grade and pave the waste receptacle area to prevent run-on of stormwater, or
- install a roof over the waste receptacle area, or
- install a low containment berm around the waste receptacle area, or
- use and maintain drip pans under waste receptacles. Containment areas and drip pans must be properly maintained and collected water disposed of properly (e.g., to sanitary sewer). Several drip pans should be stored in a covered location near outdoor waste receptacle area so that they are always available, yet protected from precipitation when not in use.

Post "no littering" signs.

Air/Water Supply Area

Minimize the possibility of stormwater pollution from air/water supply areas by implementing an effective combination of the following:

- spot clean leaks and drips routinely to prevent runoff of spillage, or
- grade and pave the air/water supply area to prevent run-on of stormwater, or
- install a roof over the air/water supply area, or
- install a low containment berm around the air/water supply area. Maintain containment areas and dispose of contaminated water properly (e.g., to sanitary sewer).

Inspection

Aboveground Tank Leak and Spill Control:

- Check for external corrosion and structural failure.
- Check for spills and overfills due to operator error.
- Check for failure of piping system.
- Check for leaks or spills during pumping of liquids or gases from truck or rail car to a storage facility or vice versa.
- Visually inspect new tank or container installation for loose fittings, poor welding, and improper or poorly fitted gaskets.
- Inspect tank foundations, connections, coatings, and tank walls and piping system. Look for corrosion, leaks, cracks, scratches, and other physical damage that may weaken the tank or container system.
- Periodically, integrity testing should be conducted by a qualified professional.

Inspect and clean, if necessary, storm drain inlets and catch basins within the facility boundary before October 1 each year.

Training

Train all employees upon hiring and annually thereafter on proper methods for handling and disposing of waste. Make sure that all employees understand stormwater discharge prohibitions, wastewater discharge requirements, and these best management practices.

Train employees on proper fueling and cleanup procedures.

Use a training log or similar method to document training.

Ensure that employees are familiar with the site's spill control plan and/or proper spill cleanup procedures.

Spill Response and Prevention

Keep your Pollution Incident Prevention Plan (PIPP up to date.

Place stockpiles of spill cleanup materials where they are readily accessible.

Use adsorbent materials on small spills and general cleaning rather than hosing down the area. Remove the adsorbent materials promptly and dispose properly.

Store portable absorbent booms (long flexible shafts or barriers made of absorbent material) in unbermed fueling areas.

Report spills promptly.

Install an oil/water separator and connect to the sanitary sewer (if allowed), if a dead-end sump is not used to collect spills.

Other Considerations

Carry out all federal and state requirements regarding underground storage tanks, or install above ground tanks.

Requirements

Costs

The retrofitting of existing fueling areas to minimize stormwater exposure or spill runoff can be expensive. Good design must occur during the initial installation.

Extruded curb along the “upstream” side of the fueling area to prevent stormwater run-on is of modest cost.

Maintenance

Clean oil/water separators at appropriate intervals.

Keep ample supplies of spill cleanup materials onsite.

Inspect fueling areas, storage tanks, catch basin inserts, containment areas, and drip pans on a regular schedule.

Supplemental Information

Design Considerations

Designing New Installations

The elements listed below should be included in the design and construction of new or substantially remodeled facilities.

Fuel Dispensing Areas

Fuel dispensing areas must be paved with cement concrete (or, equivalent smooth impervious surface), with a 2% to 4% slope to prevent ponding, and must be separated from the rest of the site by a grade break that prevents run-on of stormwater to the extent practicable. The fuel dispensing area is defined as extending 6.5 feet from the corner of each fuel dispenser or the length at which the hose and nozzle assembly may be operated plus 1 foot, whichever is less. The paving around the fuel dispensing area may exceed the minimum dimensions of the "fuel dispensing area" stated above.

The fuel dispensing area must be covered, and the cover’s minimum dimensions must be equal to or greater than the area within the grade break or the fuel dispensing area, as defined above. The cover must not drain onto the fuel dispensing area.

If necessary install and maintain an oil control device in the appropriate catch basin(s) to treat runoff from the fueling area.

Outdoor Waste Receptacle Area

Grade and pave the outdoor waste receptacle area to prevent run-on of stormwater to the extent practicable.

Air/Water Supply Area

Grade and pave the air/water supply area to prevent run-on of stormwater to the extent practicable.

Designated Fueling Area

If your facility has large numbers of mobile equipment working throughout the site and you currently fuel them with a mobile fuel truck, consider establishing a designated fueling area. With the exception of tracked equipment such as bulldozers and perhaps small forklifts, most vehicles should be able to travel to a designated area with little lost time. Place temporary "caps" over nearby catch basins or manhole covers so that if a spill occurs it is prevented from entering the storm drain.

Examples

The Pollution Incident Prevention Plan (PIPP), which is required by law for some facilities, is an effective program to reduce the number of accidental spills and minimize contamination of stormwater runoff.

The City of Palo Alto has an effective program for commercial vehicle service facilities. Many of the program's elements, including specific BMP guidance and lists of equipment suppliers, are also applicable to industrial facilities.

References and Resources

Best Management Practice Guide for Retail Gasoline Outlets, California Stormwater Quality Task Force. 1997.

King County Stormwater Pollution Control Manual – http://www.dnr.metrokc.gov/wlr/dss/spcm.htm

Orange County Stormwater Program http://www.ocwatersheds.com/StormWater/swp_introduction.asp

San Diego Stormwater Co-permittees Jurisdictional Urban Runoff Management Program (URMP)

12/18/07

Vehicle and Equipment Cleaning SC-4

Description

Wash water from vehicle and equipment cleaning activities performed outdoors or in areas where wash water flows onto the ground can contribute toxic hydrocarbons and other organic compounds, oils and greases, nutrients, phosphates, heavy metals, and suspended solids to stormwater runoff. Use of the procedures outlined below can prevent or reduce the discharge of pollutants to stormwater during vehicle and equipment cleaning.

Objectives
- Cover
- Contain
- Educate
- Reduce/Minimize
- Product Substitution

Targeted Constituents

Sediment	9
Nutrients	9
Trash	9
Metals	9
Bacteria	
Oil and Grease	9
Organics	9
Oxygen Demanding	

Approach

Reduce potential for pollutant discharge through source control pollution prevention and BMP implementation. Successful implementation depends on effective training of employees on applicable BMPs and general pollution prevention strategies and objectives.

Pollution Prevention

If possible, use properly maintained off-site commercial washing and steam cleaning businesses whenever possible. These businesses are better equipped to handle and properly dispose of the wash waters.

Good housekeeping practices can minimize the risk of contamination from wash water discharges.

Suggested Protocols

General

Use biodegradable, phosphate-free detergents for washing vehicles as appropriate.

Mark the area clearly as a wash area.

Post signs stating that only washing is allowed in wash area and that discharges to the storm drain are prohibited.

Provide a trash container in wash area.

Map on-site storm drain locations to avoid discharges to the storm drain system.

Emphasize the connection between the storm drain system and runoff and help reinforce that car washing activities can have an affect on local water quality. This can be accomplished through storm drain stenciling programs.

Vehicle and Equipment Cleaning

Design wash areas to properly collect and dispose of wash water when engine cleaning is conducted and when chemical additives, solvents, or degreasers are used. This may include installation of sumps or drain lines to collect wash water or construction of a berm around the designated area and grading of the area to collect wash water as well as prevent stormwater run-on.

Consider washing vehicles and equipment inside the building if washing/cleaning must occur on-site. This will help to control the targeted constituents by directing them to the sanitary sewer.

If washing must occur on-site and outdoor:

- Use designated paved wash areas. Designated wash areas must be well marked with signs indicating where and how washing must be done. This area must be covered or bermed to collect the wash water and graded to direct the wash water to a treatment or disposal facility.
- Oil changes and other engine maintenance cannot be conducted in the designated washing area. Perform these activities in a place designated for such activities.
- Cover the wash area when not in use to prevent contact with rain water.

Use hoses with nozzles that automatically turn off when left unattended.

Perform pressure cleaning and steam cleaning 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.

Disposal

Consider filtering and recycling wash water.

Discharge equipment wash water to the sanitary sewer, a holding tank, or a process treatment system, regardless of the washing method used.

Discharge vehicle wash water to (1) the sanitary sewer, a holding tank, or process treatment system or (2) an enclosed recycling system.

Discharge wash water to sanitary sewer only after contacting the local sewer authority to find out if pretreatment is required.

Training

Train employees on proper cleaning and wash water disposal procedures and conduct "refresher" courses on a regular basis.

Train staff on proper maintenance measures for the wash area.

Train employees and contractors on proper spill containment and cleanup. The employee should have the tools and knowledge to immediately begin cleaning up a spill if one should occur.

Spill Response and Prevention

Refer to SC-2, Spill Prevention, Control and Cleanup.

Keep your Pollution Incident Prevention Plan (PIPP) up to date, and implement accordingly.

Have spill cleanup materials readily available and in a known location.

Clean up spills immediately and use dry methods if possible.

Properly dispose of spill cleanup material.

Other Considerations (Limitations and Regulations)

Some municipalities may require pretreatment and monitoring of wash water discharges to the sanitary sewer.

Steam cleaning can generate significant pollutant concentrations requiring that careful consideration be given to the environmental impacts and compliance issues related to steam cleaning.

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

Requirements

Costs

Capital costs vary depending on measures implemented

- Low cost ($500-1,000) for berm construction,

- Medium cost ($5,000-20,000) for plumbing modifications (including re-routing discharge to sanitary sewer and installing simple sump).
- High cost ($30,000-150,000) for on-site treatment and recycling.

O&M costs increase with increasing capital investment.

Maintenance

Berm repair and patching.

Sweep washing areas frequently to remove solid debris.

Inspect and maintain sumps, oil/water separators, and on-site treatment/recycling units.

Supplemental Information

Design Considerations

Designated Cleaning Areas

Washing operations outside should be conducted in a designated wash area having the following characteristics:

- Paved with Portland cement concrete,
- Covered and bermed to prevent contact with stormwater and contain wash water,
- Sloped for wash water collection,
- Equipped with an oil/water separator, if necessary.

Examples

The City of Palo Alto has an effective program for commercial vehicle service facilities. Many of the program's elements, including specific BMP guidance and lists of equipment suppliers, are applicable to industrial vehicle service facilities.

The U.S. Postal Service in West Sacramento has a new vehicle wash system that collects, filters, and recycles the wash water.

References and Resources

http://www.stormwatercenter.net/

King County - ftp://dnr.metrokc.gov/wlr/dss/spcm/Chapter%203.PDF

Orange County Stormwater Program
http://www.ocwatersheds.com/StormWater/swp_introduction.asp

San Diego Stormwater Co-permittees Jurisdictional Urban Runoff Management Program (URMP)

http://www.projectcleanwater.org/pdf/Model%20Program%20Municipal%20Facilities.pdf

12/18/07

Vehicle and Equipment Repair SC-5

Description

Vehicle or equipment maintenance and repair is potentially a significant source of stormwater pollution, due to the use of materials and wastes created that are harmful to humans and the environment. Engine repair and service (e.g. parts cleaning), replacement of fluids (e.g. oil change), and outdoor equipment storage and parking (dripping engines) can impact water quality if stormwater runoff from areas with these activities occurring on them becomes polluted by a variety of contaminants. Implementation of the following activities will prevent or reduce the discharge of pollutants to stormwater from vehicle and equipment maintenance and repair activities.

Objectives

Cover
Contain
Educate
Reduce/Minimize
Product Substitution

Targeted Constituents

Sediment	
Nutrients	
Trash	
Metals	9
Bacteria	
Oil and Grease	9
Organics	9
Oxygen Demanding	

Approach

Pollution Prevention

Keep accurate maintenance logs to evaluate materials use.

Switch to non-toxic chemicals for maintenance when possible.

Choose cleaning agents that can be recycled.

Minimize use of solvents. Clean parts without using solvents whenever possible.

Keep an accurate, up to date inventory of materials.

Recycle used motor oil, diesel oil, and other vehicle fluids and parts whenever possible.

Suggested Protocols

General

Move maintenance and repair activities indoors whenever feasible.

Store idle equipment containing fluids under cover.

Use a vehicle maintenance area designed to prevent stormwater pollution - minimize contact of stormwater with outside operations through berming and appropriate drainage routing.

Avoid hosing down your work areas. If work areas are washed, collect and direct wash water to sanitary sewer.

Paint signs on storm drain inlets to indicate that they are not to receive liquid or solid wastes.

Post signs at sinks to remind employees, not to pour hazardous wastes down drains.

Clean yard storm drain inlets(s) regularly.

Do not pour materials down drains or hose down work areas; use dry sweeping.

Cover the work area so as to limit exposure to the rain.

Place curbs around the immediate boundaries of the process equipment.

Build a shed or temporary roof over areas where you park cars awaiting repair or salvage, especially if you handle wrecked vehicles. Build a roof over vehicles you keep for parts.

Material and Waste Handling

Store materials and wastes under cover whenever possible.

Designate a special area to drain and replace motor oil, coolant, and other fluids. This area should not have any connections to the storm drain or the sanitary sewer and should allow for easy clean up of drips and spills.

Drain all fluids from wrecked vehicles immediately. Ensure that the drain pan or drip pan is large enough to contain drained fluids (e.g. larger pans are needed to contain antifreeze, which may gush from some vehicles).

Do not pour liquid waste to floor drains, sinks, outdoor storm drain inlets, or other storm drains or sewer connections.

Do not dispose of used or leftover cleaning solutions, solvents, and automotive fluids and oil in the sanitary sewer.

Dispose of all waste materials according to applicable laws and regulations.

Collect leaking or dripping fluids in drip pans or containers. Fluids are easier to recycle if kept separate.

Promptly transfer used fluids to the proper waste or recycling drums and store in an appropriately designed area that can contain spills. Don’t leave drip pans or other open containers lying around.

Do not dispose of oil filters in trash cans or dumpsters, which may leak oil and contaminate stormwater. Place the oil filter in a funnel over a waste oil recycling drum to drain excess oil before disposal. Most municipalities prohibit or discourage disposal of these items in solid waste facilities. Oil filters can also be recycled. Ask your oil supplier or recycler about recycling oil filters.

Store cracked and/or dead batteries in a non-leaking covered secondary container and dispose of properly at recycling or household hazardous waste facilities.

Maintenance and Repair Activities

Provide a designated area for vehicle maintenance.

Keep equipment clean, don't allow excessive build-up of oil and grease.

If temporary work is being conducted outside: Use a tarp, ground cloth, or drip pans beneath the vehicle or equipment to capture all spills and drips., The collected drips and spills must be disposed, reused, or recycled properly.

If possible, perform all vehicle fluid removal or changing inside or under cover to prevent the run-on of stormwater and the runoff of spills:

- Keep a drip pan under the vehicle while you unclip hoses, unscrew filters, or remove other parts. Use a drip pan under any vehicle that might leak while you work on it to keep splatters or drips off the shop floor.
- Promptly transfer used fluids to the proper waste or recycling drums. Don't leave drip pans or other open containers lying around.
- Keep drip pans or containers under vehicles or equipment that might drip during repairs.
- Do not change motor oil or perform equipment maintenance in non-appropriate areas.

If equipment (e.g., radiators, axles) is to be stored outdoors, oil and other fluids should be drained first. This is also applicable to vehicles being stored and not used on a regular basis.

Monitor parked vehicles closely for leaks and place pans under any leaks to collect the fluids for proper disposal or recycling.

Parts Cleaning

Clean vehicle parts without using liquid cleaners wherever possible to reduce waste.

Do all liquid cleaning at a centralized station so the solvents and residues stay in one area.

Discharge wastewater generated from steam cleaning and pressure washing to an appropriate treatment control that is connected to a blind sump. Non-caustic

detergents should be used instead of caustic cleaning agents, detergent-based or water-based cleaning systems in place of organic solvent degreasers, and non-chlorinated solvent in place of chlorinated organic solvents for parts cleaning. Refer to SC-21 for more information on steam cleaning.

Locate drip pans, drain boards, and drying racks to direct drips back into a solvent sink or fluid holding tank for reuse.

Inspection

Regularly inspect vehicles and equipment for leaks, and repair immediately.

Make sure incoming vehicles are checked for leaking oil and fluids. Apply controls accordingly.

Training

Train employees and contractors in the proper handling and disposal of engine fluids and waste materials.

Ensure that employees are familiar with the site's spill control plan and/or proper spill cleanup procedures (You can use reusable cloth rags to clean up small drips and spills instead of disposables; these can be washed by a permitted industrial laundry. Do not clean them at home or at a coin-operated laundry business). The employee should have the tools and knowledge to immediately begin cleaning up a spill if one should occur.

Use a training log or similar method to document training.

Spill Response and Prevention

Refer to SC-2 Spill Prevention, Control & Cleanup for more information.

Keep your Pollution Incident Prevention Plan (PIPP) up to date, and implement accordingly.

Place adequate stockpiles of spill cleanup materials where they are readily accessible.

Clean leaks, drips, and other spills with as little water as possible. Use rags for small spills, a damp mop for general cleanup, and dry absorbent material for larger spills.

Use the following three-step method for cleaning floors:

- Clean spills with rags or other absorbent materials
- Sweep floor using dry absorbent material
- Mop the floor. Mop water may be discharged to the sanitary sewer via a toilet or sink.

Remove absorbent materials used for cleaning small spills promptly and properly. Do not saturate rags or absorbent material to eliminate need for disposal of spilled material as hazardous waste.

Other Considerations

Space and time limitations may preclude all work being conducted indoors.

It may not be possible to contain and clean up spills from vehicles/equipment brought onsite after working hours.

Drain pans (usually 1 ft. x 1 ft.) are generally too small to contain antifreeze, so drip pans (3 ft. x 3 ft.) may have to be purchased or fabricated.

Identification of engine leaks may require some use of solvents, which may require disposal as hazardous waste.

Installation of structural treatment practices for pretreatment controls 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 treatment practice maintenance or solvent equipment and solvent recycling.

Requirements

Costs

Should be low, but will vary depending on the size of the facility.

Maintenance

Sweep the maintenance area weekly, if it is paved, to collect loose particles, and wipe up spills with rags and other absorbent material immediately, do not hose down the area to a storm drain.

Supplemental Information

Further Detail of the BMP

Recycling

Separating wastes allows for easier recycling and may reduce treatment costs. Keep hazardous and non-hazardous wastes separate, do not mix used oil and solvents, and keep

chlorinated solvents (e.g., 1,1,1-trichloroethane) separate from non-chlorinated solvents (e.g., kerosene and mineral spirits). Many products made of recycled (i.e., refined or purified) materials are available. Engine oil, transmission fluid, antifreeze, and hydraulic fluid are available in recycled form. Buying recycled products supports the market for recycled materials.

Recycling is always preferable to disposal of unwanted materials.

Separate wastes for easier recycling. Keep hazardous and non-hazardous wastes separate, do not mix used oil and solvents, and keep chlorinated solvents separate from non-chlorinated solvents.

Label and track the recycling of waste material (e.g. used oil, spent solvents, batteries).

Purchase recycled products to support the market for recycled materials.

Safer Alternatives

If possible, eliminate or reduce the amount of hazardous materials and waste by substituting non-hazardous or less hazardous material:

Use non-caustic detergents instead of caustic cleaning for parts cleaning.

Use detergent-based or water-based cleaning systems in place of organic solvent degreasers. Wash water may require treatment before it can be discharged to the sewer.

Replace chlorinated organic solvents with non-chlorinated solvents. Non-chlorinated solvents like kerosene or mineral spirits are less toxic and less expensive to dispose of properly. Check list of active ingredients to see whether it contains chlorinated solvents.

Choose cleaning agents that can be recycled.

Refer to SC-14 Safer Alternative Products fact sheet for more information.

References and Resources

DTSC Doc. No. 619a Switching to Water Based Cleaners

DTSC Doc. No. 621 http://www.stormwatercenter.net/

King County - ftp://dnr.metrokc.gov/wlr/dss/spcm/Chapter%203.PDF

Model Urban Runoff Program: A How-To-Guide for Developing Urban Runoff Programs for Small Municipalities. Prepared by City of Monterey, City of Santa Cruz, California Coastal Commission, Monterey Bay National Marine Sanctuary, Association of Monterey Bay Area Governments, Woodward-Clyde, Central Coast Regional Water

Quality Control Board. July 1998 (Revised February 2002 by the California Coastal Commission).

Orange County Stormwater Program
http://www.ocwatersheds.com/StormWater/swp_introduction.asp

San Diego Stormwater Co-permittees Jurisdictional Urban Runoff Management Program (URMP) -
http://www.projectcleanwater.org/pdf/Model%20Program%20Municipal%20Facilities.pdf

12/18/07

Outdoor Loading/Unloading SC-6

Description

The loading/unloading of materials usually takes place outside on docks or terminals; therefore, materials spilled, leaked, or lost during loading/unloading may collect in the soil or on other surfaces and have the potential to be carried away by stormwater runoff or when the area is cleaned. Additionally, rainfall may wash pollutants from machinery used to unload or move materials. Loading and unloading of material may include package products, barrels, and bulk products. Implementation of the following protocols will prevent or reduce the discharge of pollutants to stormwater from outdoor loading/unloading of materials.

Objectives

- Cover
- Contain
- Educate
- Reduce/Minimize
- Product Substitution

Targeted Constituents

Sediment	9
Nutrients	9
Trash	
Metals	9
Bacteria	
Oil and Grease	9
Organics	9
Oxygen Demanding	9

Approach

Pollution Prevention

Keep accurate maintenance logs to evaluate materials removed and improvements made.

Park tank trucks or delivery vehicles in designated areas so that spills or leaks can be contained.

Limit exposure of materials with the potential to contaminate stormwater.

Prevent stormwater run-on.

Regularly check equipment for leaks.

When loading and unloading an attendant should be present at all times.

Suggested Protocols

Loading and Unloading – General Guidelines

Develop an operations plan that describes procedures for loading and/or unloading.

Do not conduct loading and unloading during wet weather, whenever possible.

Cover designated loading/unloading areas to reduce exposure of materials to rain.

A seal or door skirt between delivery vehicles and building can reduce or prevent exposure to rain.

Design loading/unloading area to prevent stormwater run-on which would include grading or berming the area, and positioning roof downspouts so they direct stormwater away from the loading/unloading areas.

If feasible, load and unload all materials and equipment in covered areas such as building overhangs at loading docks.

Load/unload only at designated loading areas.

Use drip pans underneath hose and pipe connections and other leak-prone spots during liquid transfer operations, and when making and breaking connections. Several drip pans should be stored in a covered location near the liquid transfer area so that they are always available, yet protected from precipitation when not in use. Drip pans can be made specifically for railroad tracks. Drip pans must be cleaned periodically, and drip collected materials must be disposed of properly.

Pave loading areas with concrete instead of asphalt.

Avoid placing storm drains in the area.

Grade and/or berm he loading/ unloading area to a drain that is connected to a dead-end sump.

Inspection

Check loading and unloading equipment regularly for leaks, including valves, pumps, flanges and connections.

Look for dust or fumes during loading or unloading operations.

Training

Train employees (e.g. fork lift operators) and contractors on proper spill containment and cleanup.

Employees trained in spill containment and cleanup should be present during the loading/unloading.

Train employees in proper handling techniques during liquid transfers to avoid spills.

Make sure forklift operators are properly trained on loading and unloading procedures.

Spill Response and Prevention

Refer to SC-2, Spill Prevention, Control & Cleanup

Keep your Pollution Incident Prevention Plan (PIPP) up to date, and implement accordingly.

Have spill cleanup materials readily available and in a known location.

Cleanup spills immediately and use dry methods if possible.

Properly dispose of spill cleanup material.

Other Considerations

Space, material characteristics and/or time limitations may preclude all transfers from being performed indoors or under cover.

Requirements

Costs

Should be low except when covering a large loading/unloading area.

Maintenance

Conduct regular inspections and make repairs as necessary. The frequency of repairs will depend on the age of the facility.

Check loading and unloading equipment regularly for leaks.

Regular broom dry-sweeping of area.

Conduct major clean-out of loading and unloading area and sump prior to October 1 of each year.

Supplemental Information

Further Detail of the BMP

Special Circumstances for Indoor Loading/Unloading of Materials

As appropriate loading or unloading of liquids should occur indoors so that any spills that are not completely retained can be discharged to the sanitary sewer, treatment plant, oil and water separator, or treated in a manner consistent with local sewer authorities and permit requirements.

For loading and unloading tank trucks to above and below ground storage tanks, the following procedures should be used:

- The area where the transfer takes place should be paved.
- Transfer area should be designed to prevent run-on of stormwater from adjacent areas.

Sloping the pad and using a curb, like a speed bump, around the uphill side of the transfer area should reduce run-on.

- Transfer area should be designed to prevent runoff of spilled liquids from the area. Sloping the area to a drain should prevent runoff. The drain should be connected to a dead-end sump or to the sanitary sewer (if allowed). A positive control valve should be installed on the drain.

For transfer from rail cars to storage tanks that must occur outside, use the following procedures:

- Drip pans should be placed at locations where spillage may occur, such as hose connections, hose reels, and filler nozzles, Use drip pans when making and breaking connections.
- Drip pan systems should be installed between the rails to collect spillage from tank cars.

References and Resources

http://www.stormwatercenter.net/

King County - ftp://dnr.metrokc.gov/wlr/dss/spcm/Chapter%203.PDF

Orange County Stormwater Program
http://www.ocwatersheds.com/StormWater/swp_introduction.asp

San Diego Stormwater Co-permittees Jurisdictional Urban Runoff Management Program (URMP) -
http://www.projectcleanwater.org/pdf/Model%20Program%20Municipal%20Facilities.pdf

12/18/07

Outdoor Container Storage SC-7

Description

Accidental releases of materials from above ground liquid storage tanks, drums, and dumpsters present the potential for contaminating stormwater with many different pollutants. Tanks may store many potential stormwater runoff pollutants, such as gasoline, aviation gas, diesel fuel, ammonia, solvents, syrups, etc. Materials spilled, leaked, or lost from storage tanks may accumulate in soils or on other surfaces and be carried away by rainfall runoff. These source controls apply to containers located outside of a building used to temporarily store liquid materials and include installing safeguards against accidental releases, installing secondary containment, conducting regular inspections, and training employees in standard operating procedures and spill cleanup techniques.

Objectives

Cover
Contain
Educate
Reduce/Minimize
Product Substitution

Targeted Constituents

Sediment	
Nutrients	9
Trash	
Metals	9
Bacteria	
Oil and Grease	9
Organics	9
Oxygen Demanding	9

Approach

Pollution Prevention

Educate employees about pollution prevention measures and goals.

Keep an accurate, up to date inventory of the materials delivered and stored on-site. Re-evaluate inventory needs and consider purchasing alternative products. Properly dispose of outdated products.

Try to keep chemicals in their original containers, and keep them well labeled.

Suggested Protocols

General

Develop an operations plan that describes procedures for loading and/or unloading. Refer to SC-6 Outdoor Loading/Unloading for more detailed BMP information pertaining to loading and unloading of liquids.

Protect materials from rainfall, run-on, runoff, and wind dispersal:

- Cover the storage area with a roof.
- Minimize stormwater run-on by enclosing the area or building a berm around it.
- Use a “doghouse” structure for storage of liquid containers.
- Use covered dumpsters for waste product containers.

Employ safeguards against accidental releases:

- Provide overflow protection devices to warn operator or automatic shut down transfer pumps.
- Provide protection guards (bollards) around tanks and piping to prevent vehicle or forklift damage, and
- Provide clear tagging or labeling, and restricting access to valves to reduce human error.

Berm or surround tank or container with secondary containment system using dikes, liners, vaults, or double walled tanks.

Contact the appropriate regulatory agency regarding environmental compliance for facilities with “spill ponds” designed to intercept, treat, and/or divert spills.

Have registered and specifically trained professional engineers can identify and correct potential problems such as loose fittings, poor welding, and improper or poorly fitted gaskets for newly installed tank systems.

Storage Areas

Provide storage tank piping located below product level with a shut-off valve at the tank; ideally this valve should be an automatic shear valve with the shut-off located inside the tank.

Provide barriers such as posts or guard rails, where tanks are exposed, to prevent collision damage with vehicles.

Provide secure storage to prevent vandalism.

Place tight-fitting lids on all containers.

Enclose or cover the containers where they are stored.

Raise the containers off the ground by use of a spill pallet or similar method, with provisions for spill control and secondary containment.

Contain the material in such a manner that if the container leaks or spills, the contents will not discharge, flow, or be washed into the storm drainage system, surface waters or groundwater.

Place drip pans or absorbent materials beneath all mounted container taps, and at all potential drip and spill locations during filling and unloading of containers. Drip pans must be cleaned periodically, and all collected liquids and soiled absorbent materials must be reused/recycled or properly disposed.

Ensure that any underground or aboveground storage tanks shall be designed and managed in accordance with applicable regulations, be identified as a potential pollution source, have secondary containment.

Rainfall collected in secondary containment system must not contain pollutants for discharge to storm drain system.

Container Management

Keep containers in good condition without corrosion or leaky seams.

Place containers in a lean-to structure or otherwise covered to keep rainfall from reaching the drums.

Replace containers if they are deteriorating to the point where leakage is occurring. Keep all containers undercover to prevent the entry of stormwater. Employees should be made aware of the importance of keeping the containers free from leaks.

Keep waste container drums in an area such as a service bay. All drums should be inside and stored in a structure, she or walk-in container.

Storage of Hazardous Materials

Storage of reactive, ignitable, or flammable liquids must comply with the fire and hazardous waste codes.

Place containers in a designated area that is paved, free of cracks and gaps, and impervious in order to contain leaks and spills. The area should also be covered.

Surround stored hazardous materials and waste with a curb or dike to provide the volume to contain 10 percent of the volume of all of the containers or 110 percent of the volume of the largest container, whichever is greater. The area inside the curb should slope to a drain and a dead-end sump should be installed in the drain.

Structures that store hazardous materials should have proper labeling on side of structure indicating types of hazardous materials in the building.

All storage drums should have hazardous material labels.

Inspection

Provide regular inspections:

- Inspect storage areas regularly for leaks or spills.
- Conduct routine inspections and check for external corrosion of material containers. Also check for structural failure, spills and overfills due to operator error, failure of piping system.
- Check for leaks or spills during pumping of liquids or gases from truck or rail car to a storage facility or vice versa.
- Visually inspect new tank or container installations for loose fittings, poor welding, and improper or poorly fitted gaskets.

- Inspect tank foundations, connections, coatings, and tank walls and piping system. Look for corrosion, leaks, cracks, scratches, and other physical damage that may weaken the tank or container system.
- Replace containers that are leaking, corroded, or otherwise deteriorating with ones in good condition. If the liquid chemicals are corrosive, containers made of compatible materials must be used instead of metal drums.
- Label new or secondary containers with the product name and hazards.

Training

Train employees (e.g. fork lift operators) and contractors in proper spill containment and cleanup. The employee should have the tools and knowledge to immediately begin cleaning up a spill if one should occur.

Train employees in proper storage measures.

Use a training log or similar method to document training.

Spill Response and Prevention

Keep your Pollution Incident Prevention Plan (PIPP) up to date, and implement accordingly.

Have an emergency plan, equipment and trained personnel ready at all times to deal immediately with major spills.

Collect all spilled liquids and properly dispose of them.

Employees trained in emergency spill cleanup procedures should be present when dangerous waste, liquid chemicals, or other wastes are delivered.

Operator errors can be prevented by using engineering safe guards and thus reducing accidental releases of pollutant.

Store and maintain appropriate spill cleanup materials in a location known to all near the tank storage area.

See Aboveground Tank Leak and Spill Control section of the Spill Prevention, Control & Cleanup fact sheet (SC-2) for additional information.

Other Considerations

Storage sheds often must meet building and fire code requirements.

The local fire district must be consulted for limitations on clearance of roof covers over containers used to store flammable materials.

All specific standards set by federal and state laws concerning the storage of oil and hazardous materials must be met.

Storage of reactive, ignitable, or flammable liquids should comply with the Uniform Fire Code and the National Electric Code.

Storage of oil and hazardous materials must meet specific federal and state standards including:

- Pollution Incident Prevention Plan (PIPP)
- Secondary containment
- Integrity and leak detection monitoring
- Emergency preparedness plans

Requirements

Costs

Will vary depending on the size of the facility and the necessary controls, such as berms or safeguards against accidental controls.

Maintenance

Conduct weekly inspection.

Sweep and clean the storage area regularly if it is paved, do not hose down the area to a storm drain.

Supplemental Information

The most common causes of unintentional releases are:

- Installation problems,
- Failure of piping systems (pipes, pumps, flanges, couplings, hoses, and valves),
- External corrosion and structural failure,
- Spills and overfills due to operator error, and
- Leaks during pumping of liquids or gases from truck or rail car to a storage tank or vice versa

Further Detail of the BMP

Dikes – Secondary Containment

One of the best protective measures against contamination of stormwater is diking. Containment dikes are berms or retaining walls that are designed to hold spills. Diking is an effective pollution prevention measure for above ground storage tanks and railcar or tank truck loading and unloading areas. The dike surrounds the area of concern and holds

the spill, keeping spill materials separated from the stormwater side of the dike area. Diking can be used in any industrial or municipal facility, but it is most commonly used for controlling large spills or releases from liquid storage areas and liquid transfer areas.

For single-wall tanks, containment dikes should be large enough to hold the contents of the storage tank for the facility plus rain water.
For trucks, diked areas should be capable of holding an amount equal to the volume of the tank truck compartment. Diked construction material should be strong enough to safely hold spilled materials.
Dike materials can consist of earth, concrete, synthetic materials, metal, or other impervious materials.
Strong acids or bases may react with metal containers, concrete, and some plastics. Where strong acids or bases or stored, alternative dike materials should be considered. More active organic chemicals may need certain special liners for dikes.
Dikes may also be designed with impermeable materials to increase containment capabilities.
Dikes should be inspected during or after significant storms or spills to check for washouts or overflows.
Regular checks of containment dikes to insure the dikes are capable of holding spills should be conducted.
Inability of a structure to retain stormwater, dike erosion, soggy areas, or changes in vegetation indicate problems with dike structures. Damaged areas should be patched and stabilized immediately.
Accumulated stormwater in the containment are should be analyzed for pollutants before it is released to surface waters. If pollutants are found or if stormwater quality is not determined, then methods other than discharging to surface waters should be employed (e.g., discharge to sanitary sewer if allowed).
Earthen dikes may require special maintenance of vegetation such as mulching and irrigation.

Curbing

Curbing is a barrier that surrounds an area of concern. Curbing is similar to containment diking in the way that it prevents spills and leaks from being released into the environment. The curbing is usually small scaled and does not contain large spills like diking. Curbing is common at many facilities in small areas where handling and transfer liquid materials occur. Curbing can redirect stormwater away from the storage area. It is useful in areas where liquid materials are transferred from one container to another. Asphalt is a common material used for curbing; however, curbing materials include earth, concrete, synthetic materials, metal, or other impenetrable materials.

Spilled materials should be removed immediately from curbed areas to allow space for future spills.

Curbs should have manually-controlled pump systems rather than common drainage systems for collection of spilled materials.

The curbed area should be inspected regularly to clear clogging debris.

Maintenance should also be conducted frequently to prevent overflow of any spilled materials as curbed areas are designed only for smaller spills.

Curbing has the following advantages:

- Excellent run-on control,
- Inexpensive,
- Ease of installment,
- Provides option to recycle materials spilled in curb areas, and
- Common industry practice.

Examples

The "doghouse" design has been used to store small liquid containers. The roof and flooring design prevent contact with direct rain or runoff. The doghouse has two solid structural walls and two canvas covered walls. The flooring is wire mesh about secondary containment. The unit has been used successfully at Lockheed Missile and Space Company in Sunnyvale.

References and Resources

British Columbia Lake Stewardship Society. Best Management Practices to Protect Water Quality from Non-Point Source Pollution. March 2000
http://www.nalms.org/bclss/storage.html

King County Stormwater Pollution Control Manual –
http://dnr.metrokc.gov/wlr/dss/spcm.htm

San Diego Stormwater Co-permittees Jurisdictional Urban Runoff Management Program (URMP) -
http://www.projectcleanwater.org/pdf/Model%20Program%20Municipal%20Facilities.pdf

12/18/07

Outdoor Equipment Maintenance SC-8

Description

Outside process equipment operations and maintenance can contaminate stormwater runoff. Activities, such as grinding, painting, coating, sanding, degreasing or parts cleaning, landfills and waste piles, solid waste treatment and disposal, are examples of process operations that can lead to contamination of stormwater runoff. Source controls for outdoor process equipment operations and maintenance include reducing the amount of waste created, enclosing or covering all or some of the equipment, installing secondary containment, and training employees.

Objectives

Cover
Contain
Educate
Reduce/Minimize
Product Substitution

Targeted Constituents

Sediment	☺
Nutrients	
Trash	☺
Metals	☺
Bacteria	
Oil and Grease	☺
Organics	☺
Oxygen Demanding	

Approach

Pollution Prevention

Perform the activity during dry periods.

Use non-toxic chemicals for maintenance and minimize or eliminate the use of solvents.

Suggested Protocols

Consider enclosing the activity in a building and connecting the floor drains to the sanitary sewer and/or oil and water separator.

Cover the work area with a permanent roof.

Minimize contact of stormwater with outside process equipment operations through berming and drainage routing (run-on prevention). If allowed, connect process equipment area to public sewer.

Dry clean the work area regularly.

Training

Train employees to perform the activity during dry periods only and to use less or non-toxic materials.

Train employee and contractors in proper techniques for spill containment and cleanup. The employee should have the tools and knowledge to immediately begin cleaning up a spill if one should occur.

Spill Response and Prevention

Refer to SC-2, Spill Prevention, Control & Cleanup.

Keep your Pollution Incident Prevention Plan (PIPP) up-date, and implement accordingly.

Have spill cleanup materials readily available and in a known location.

Cleanup spills immediately and use dry methods if possible.

Properly dispose of spill cleanup material.

Other Considerations

Space limitations may preclude enclosing some equipment.

Storage sheds often must meet building and fire code requirements.

Requirements

Costs

Costs vary depending on the complexity of the operation and the amount of control necessary for stormwater pollution control.

Providing cover may be expensive.

Maintenance

Conduct routine preventive maintenance, including checking process equipment for leaks.

Clean the storm drain system regularly.

Supplemental Information

Further Detail of the BMP

Hydraulic/Treatment Modifications

In some cases it may be necessary to capture and treat polluted stormwater. If the municipality does not have its own process wastewater treatment system, consider discharging to the public sewer system. Use of the public sewer might be allowed under the following conditions:

If the activity area is very small (less than a few hundred square feet), the local sewer authority may be willing to allow the area to remain uncovered with the drain connected to the public sewer.

It may be possible under unusual circumstances to connect a much larger area to the public sewer, as long as the rate of stormwater discharges does not exceed the capacity of the wastewater treatment plant. The stormwater could be stored during the storm and then transferred to the public sewer when the normal flow is low, such as at night.

References and Resources

California's Nonpoint Source Program Plan http://www.swrcb.ca.gov/nps/index.html

Clark County Stormwater Pollution Control Manual
http://www.co.clark.wa.us/pubworks/bmpman.pdf

King County Stormwater Pollution Control Manual
http://dnr.metrokc.gov/wlr/dss/spcm.htm

Santa Clara Valley Urban Runoff Pollution Prevention Program http://www.scvurppp.org

The Stormwater Managers Resource Center http://www.stormwatercenter.net/

12/18/07

Outdoor Storage of Raw Materials SC-9

Description

Objectives
Cover
Contain
Educate
Reduce/Minimize

Targeted Constituents
Sediment 9
Nutrients 9
Trash 9
Metals
Bacteria
Oil and Grease 9
Organics 9
Oxygen Demanding 9

Raw materials, by-products, finished products, containers, and material storage areas exposed to rain and/or runoff can pollute stormwater. Stormwater can become contaminated when materials wash off or dissolve into water or are added to runoff by spills and leaks. Improper storage of these materials can result in accidental spills and the release of materials. To prevent or reduce the discharge of pollutants to stormwater from material delivery and storage, pollution prevention and source control measures, such as minimizing the storage of hazardous materials on-site, enclosing or covering materials, storing materials in a designated area, installing secondary containment, conducting regular inspections, preventing stormwater run-on and runoff, and training employees and subcontractors must be implemented.

Approach

Pollution Prevention

Employee education is paramount for successful BMP implementation.

Minimize inventory of raw materials.

Keep an accurate, up to date inventory of the materials delivered and stored on-site.

Try to keep chemicals in their original containers, and keep them well labeled.

Suggested Protocols

General

Store all materials inside. If this is not feasible, then all outside storage areas should be covered with a roof, and bermed, or enclosed to prevent stormwater contact. At the very minimum, a temporary waterproof covering made of polyethylene, polypropylene or hypalon should be used over all materials stored outside.

Cover and contain the stockpiles of raw materials to prevent stormwater from running into the covered piles. The covers must be in place at all times when work with the stockpiles is not occurring (applicable to small stockpiles only).

If the stockpiles are so large that they cannot feasibly be covered and contained, implement erosion control practices at the perimeter of your site and at any catch basins to prevent erosion of the stockpiled material off site.

Keep liquids in a designated area on a paved impervious surface within a secondary containment.

Keep outdoor storage containers in good condition.

Keep storage areas clean and dry.

Design paved areas to be sloped in a manner that minimizes the pooling of water on the site, particularly with materials that may leach pollutants into stormwater and/or groundwater, such as compost, logs, and wood chips. A minimum slope of 1.5 percent is recommended.

Secure drums stored in an area where unauthorized persons may gain access to prevent accidental spillage, pilferage, or any unauthorized use.

Cover wood products treated with chromated copper arsenate, ammonical copper zinc arsenate, creosote, or pentachlorophenol with tarps or store indoors.

Raw Material Containment

Do not store chemicals, drums, or bagged materials directly on the ground. Place these items in secondary containers if applicable.

Prevent the run-on of uncontaminated stormwater from adjacent areas as well as runoff of stormwater from the stockpile areas, by placing a curb along the perimeter of the area. The area inside the curb should slope to a drain.

Tanks should be bermed or surrounded by a secondary containment system.

Release accumulated stormwater in petroleum storage areas prior to the next storm. At a minimum, water should pass through an oil/water separator and, if allowed, discharged to a sanitary sewer.

Inspection

Conduct regular inspections of storage areas so that leaks and spills are detected as soon as possible.

Conduct routine inspections and check for external corrosion of material containers. Also check for structural failure, spills and overfills due to operator error, failure of piping system.

Check for leaks or spills during pumping of liquids or gases from truck or rail car to a storage facility or vice versa.

Visually inspect new tank or container installations for loose fittings, poor welding, and improper or poorly fitted gaskets.

Inspect tank foundations, connections, coatings, and tank walls and piping system. Look for corrosion, leaks, cracks, scratches, and other physical damage that may weaken the tank or container system.

Training

Employees should be well trained in proper material storage.

Train employees and contractors in proper techniques for spill containment and cleanup.

Spill Response and Prevention

Refer to SC-2, Spill Prevention, Control & Cleanup.

Keep your Pollution Incident Prevention Plan (PIPP) up to date, and implement accordingly.

Have spill cleanup materials readily available and in a known location.

Cleanup spills immediately and use dry methods if possible.

Properly dispose of spill cleanup material.

Have employees trained in spill containment and cleanup present during loading/unloading of dangerous waste, liquid chemicals and other potentially hazardous materials.

Other Considerations

Storage sheds often must meet building and fire code requirements. Storage of reactive, ignitable, or flammable liquids must comply with the Uniform Fire Code and the National Electric Code.

Space limitations may preclude storing some materials indoors.

Some municipalities require that secondary containment areas (regardless of size) be connected to the sanitary sewer, prohibiting any hard connections to the storm drain. Storage sheds often must meet building and fire code requirements.

The local fire district must be consulted for limitations on clearance of roof covers over containers used to store flammable materials.

Requirements

Costs

Costs will vary depending on the size of the facility and the necessary controls. They should be low except where large areas may have to be covered.

Maintenance

Accurate and up to date inventories should be kept of all stored materials.

Berms and curbs may require periodic repair and patching.

Parking lots or other surfaces near bulk materials storage areas should be swept periodically to remove debris blown or washed from storage area.

Sweep paved storage areas regularly for collection and disposal of loose solid materials, do not hose down the area to a storm drain or conveyance ditch.

Keep outdoor storage areas in good condition (e.g. repair roofs, floors, etc. to limit releases to runoff).

Supplemental Information

Further Detail of the BMP

Raw Material Containment

Paved areas should be sloped in a manner that minimizes the pooling of water on the site, particularly with materials that may leach pollutants into stormwater and/or groundwater, such as compost, logs, and wood chips. A minimum slope of 1.5 percent is recommended.

- Curbing should be placed along the perimeter of the area to prevent the runon of uncontaminated stormwater from adjacent areas as well as runoff of stormwater from the stockpile areas.
- The storm drainage system should be designed to minimize the use of catch basins in the interior of the area as they tend to rapidly fill with manufacturing material.
- The area should be sloped to drain stormwater to the perimeter where it can be collected or to internal drainage alleyways where material is not stockpiled.
- If the raw material, by-product, or product is a liquid, more information for outside storage of liquids can be found under SC-31, Outdoor Container Storage.

Examples
The "doghouse" design has been used to store small liquid containers. The roof and flooring design prevent contact with direct rain or runoff. The doghouse has two solid structural walls and two canvas covered walls. The flooring is wire mesh about secondary containment. The unit has been used successively at Lockheed Missile and Space Company in Sunnyvale.

References and Resources
King County Stormwater Pollution Control Manual - http://dnr.metrokc.gov/wlr/dss/spcm.htm

Model Urban Runoff Program: A How-To-Guide for Developing Urban Runoff Programs for Small Municipalities. Prepared by City of Monterey, City of Santa Cruz, California Coastal Commission, Monterey Bay National Marine Sanctuary, Association of Monterey Bay Area Governments, Woodward-Clyde, Central Coast Regional Water Quality Control Board. July 1998 (Revised February 2002 by the California Coastal Commission).

Orange County Stormwater Program
http://www.ocwatersheds.com/StormWater/swp_introduction.asp

San Diego Stormwater Co-permittees Jurisdictional Urban Runoff Management Program (URMP)
http://www.projectcleanwater.org/pdf/Model%20Program%20Municipal%20Facilities.pdf

12/18/07

Waste Handling & Disposal (solid waste) SC-10

Description

Improper storage and handling of solid wastes can allow toxic compounds, oils and greases, heavy metals, nutrients, suspended solids, and other pollutants to enter stormwater runoff. The discharge of pollutants to stormwater from waste handling and disposal can be prevented and reduced by tracking waste generation, storage, and disposal; reducing waste generation and disposal through source reduction, re-use, and recycling; and preventing run-on and runoff.

Objectives

Cover
Contain
Educate
Reduce/Minimize
Product Substitution

Targeted Constituents

Sediment	9
Nutrients	9
Trash	9
Metals	9
Bacteria	9
Oil and Grease	9
Organics	9
Oxygen Demanding	9

Approach

Pollution Prevention

Reduction in the amount of waste generated can be accomplished using the following source controls such as:

- Production planning and sequencing
- Process or equipment modification
- Raw material substitution or elimination
- Loss prevention and housekeeping
- Waste segregation and separation
- Close loop recycling

Establish a material tracking system to increase awareness about material usage. This may reduce spills and minimize contamination, thus reducing the amount of waste produced.

Recycle materials whenever possible.

Suggested Protocols

General

Cover storage containers with leak proof lids or some other means. If waste is not in containers, cover all waste piles (plastic tarps are acceptable coverage) and prevent stormwater run-on and runoff with a berm. The waste containers or piles must be covered except when in use.

Use drip pans or absorbent materials whenever grease containers are emptied by vacuum trucks or other means. Grease cannot be left on the ground. Collected grease must be properly disposed of as garbage.

Check storage containers weekly for leaks and to ensure that lids are on tightly. Replace any that are leaking, corroded, or otherwise deteriorating.

Sweep and clean the storage area regularly. If it is paved, do not hose down the area to a storm drain.

Dispose of rinse and wash water from cleaning waste containers into a sanitary sewer if allowed by the local sewer authority. Do not discharge wash water to the street or storm drain.

Transfer waste from damaged containers into safe containers.

Take special care when loading or unloading wastes to minimize losses. Loading systems can be used to minimize spills and fugitive emission losses such as dust or mist. Vacuum transfer systems can minimize waste loss.

Controlling Litter

Post "No Littering" signs and enforce anti-litter laws.

Provide a sufficient number of litter receptacles for the facility.

Clean out and cover litter receptacles frequently to prevent spillage.

Waste Collection

Keep waste collection areas clean.

Inspect solid waste containers for structural damage or leaks regularly. Repair or replace damaged containers as necessary.

Secure solid waste containers; containers must be closed tightly when not in use.

Place waste containers under cover if possible.

Do not fill waste containers with washout water or any other liquid.

Ensure that only appropriate solid wastes are added to the solid waste container. Certain wastes such as hazardous wastes, appliances, fluorescent lamps, pesticides, etc. may not be disposed of in solid waste containers (see chemical/ hazardous waste collection section below).

Do not mix wastes; this can cause chemical reactions, make recycling impossible, and complicate disposal.

Good Housekeeping

Use the entire product before disposing of the container.

Keep the waste management areas clean at all times by sweeping and cleaning up spills immediately.

Use dry methods when possible (e.g. sweeping, use of absorbents) when cleaning around restaurant/food handling dumpster areas. If water must be used after sweeping/using absorbents, collect water and discharge through grease interceptor to the sewer.

Stencil storm drains on the facility's property with prohibitive message regarding waste disposal.

Chemical/Hazardous Wastes

Select designated hazardous waste collection areas on-site.

Store hazardous materials and wastes in covered containers protected from vandalism, and in compliance with fire and hazardous waste codes.

Place hazardous waste containers in secondary containment.

Make sure that hazardous waste is collected, removed, and disposed of only at authorized disposal areas.

Run-on/Runoff Prevention

Prevent stormwater run-on from entering the waste management area by enclosing the area or building a berm around the area.

Prevent the waste materials from directly contacting rain.

Cover waste piles with temporary covering material such as reinforced tarpaulin, polyethylene, polyurethane, polypropyleneor or hypalon.

Cover the area with a permanent roof if feasible.

Cover dumpsters to prevent rain from washing waste out of holes or cracks in the bottom of the dumpster.

Move the activity indoor after ensuring all safety concerns such as fire hazard and ventilation are addressed.

Inspection

Inspect and replace faulty pumps or hoses regularly to minimize the potential of releases and spills.

Check waste management areas for leaking containers or spills.

Repair leaking equipment including valves, lines, seals, or pumps promptly.

Training

Train staff pollution prevention measures and proper disposal methods.

Train employees and contractors proper spill containment and cleanup. The employee should have the tools and knowledge to immediately begin cleaning up a spill if one should occur.

Train employees and subcontractors in proper hazardous waste management.

Spill Response and Prevention

Refer to SC-2, Spill Prevention, Control & Cleanup.

Keep your Pollution Incident Prevention Plan (PIPP) up to date, and implement accordingly.

Have spill cleanup materials readily available and in a known location.

Cleanup spills immediately and use dry methods if possible.

Properly dispose of spill cleanup material.

Vehicles transporting waste should have spill prevention equipment that can prevent spills during transport. The spill prevention equipment includes:

- Vehicles equipped with baffles for liquid waste
- Trucks with sealed gates and spill guards for solid waste

Other Considerations

Hazardous waste cannot be re-used or recycled; it must be disposed of by a licensed hazardous waste hauler.

Requirements

Costs

Capital and operation and maintenance costs will vary substantially depending on the size of the facility and the types of waste handled. Costs should be low if there is an inventory program in place.

Maintenance

None except for maintaining equipment for material tracking program.

Supplemental Information

Further Detail of the BMP

Land Treatment System

Minimize the runoff of polluted stormwater from land application of municipal waste on-site by:

- Choosing a site where slopes are under 6%, the soil is permeable, there is a low water table, it is located away from wetlands or marshes, there is a closed drainage system.
- Avoiding application of waste to the site when it is raining or when the ground is saturated with water.
- Growing vegetation on land disposal areas to stabilize soils and reduce the volume of surface water runoff from the site.
- Maintaining adequate barriers between the land application site and the receiving waters. Planted strips are particularly good.
- Using erosion control techniques such as mulching and matting, filter fences, straw bales, diversion terracing, and sediment basins.
- Performing routine maintenance to ensure the erosion control or site stabilization measures are working.

References and Resources

King County Stormwater Pollution Control Manual - http://dnr.metrokc.gov/wlr/dss/spcm.htm

Orange County Stormwater Program http://www.ocwatersheds.com/StormWater/swp_introduction.asp

Pollution from Surface Cleaning Folder. 1996. Bay Area Stormwater Management Agencies Associations (BASMAA). On-line: http://www.basmaa.org

California Stormwater BMP Handbook, Municipal http://www.cabmphhandbooks.com

12/18/07

Building & Grounds Maintenance SC-11

Description

Stormwater runoff from building and grounds maintenance activities can be contaminated with toxic hydrocarbons in solvents, fertilizers and pesticides, suspended solids, heavy metals, and abnormal pH. Utilizing the following protocols will prevent or reduce the discharge of pollutants to stormwater from building and grounds maintenance activities by washing and cleaning up with as little water as possible, following good landscape management practices, preventing and cleaning up spills immediately, keeping debris from entering the storm drains, and maintaining the stormwater collection system.

Objectives

Cover
Contain
Educate
Reduce/Minimize
Product Substitution

Targeted Constituents

Sediment	9
Nutrients	9
Trash	9
Metals	9
Bacteria	9
Oil and Grease	9
Organics	9
Oxygen Demanding	9

Approach

Pollution Prevention

Switch to non-toxic chemicals for maintenance when possible.

Choose cleaning agents that can be recycled.

Encourage proper lawn management and landscaping, including use of native vegetation.

Encourage use of Integrated Pest Management techniques for pest control.

Encourage proper onsite recycling of yard trimmings.

Recycle residual paints, solvents, lumber, and other material as much as possible.

Suggested Protocols

Pressure Washing of Buildings, Rooftops, and Other Large Objects

In situations where soaps or detergents are used and the surrounding area is paved, pressure washers must use a waste water collection device that enables collection of wash water and associated solids. A sump pump, wet vacuum or similarly effective device must be used to collect the runoff and loose materials. The collected runoff and solids must be disposed of properly.

If soaps or detergents are not used, and the surrounding area is paved, wash water runoff does not have to be collected but must be screened. Pressure washers must use

filter fabric or some other type of screen on the ground and/or in the catch basin to trap the particles in wash water runoff.

If you are pressure washing on a grassed area (with or without soap), runoff must be dispersed as sheet flow as much as possible, rather than as a concentrated stream. The wash runoff must remain on the grass and not drain to pavement. Ensure that this practice does not kill grass.

Landscaping Activities

Do not apply any chemicals (insecticide, herbicide, or fertilizer) directly to surface waters, unless the application is approved and permitted by the state.

Dispose of grass clippings, leaves, sticks, or other collected vegetation as garbage, or by composting. Do not dispose of collected vegetation into waterways or storm drainage systems.

Use mulch or other erosion control measures on exposed soils.

Check irrigation schedules so pesticides will not be washed away and to minimize non-stormwater discharge.

Building Repair, Remodeling, and Construction

Do not dump any toxic substance or liquid waste on the pavement, the ground, or toward a storm drain.

Use ground or drop cloths underneath outdoor painting, scraping, and sandblasting work, and properly dispose of collected material daily.

Use a ground cloth or oversized tub for activities such as paint mixing and tool cleaning.

Clean paint brushes and tools covered with water-based paints in sinks connected to sanitary sewers or in portable containers that can be dumped into a sanitary sewer drain. Brushes and tools covered with non-water-based paints, finishes, or other materials must be cleaned in a manner that enables collection of used solvents (e.g., paint thinner, turpentine, etc.) for recycling or proper disposal.

Use a storm drain cover, filter fabric, or similarly effective runoff control mechanism if dust, grit, wash water, or other pollutants may escape the work area and enter a catch basin. The containment device(s) must be in place at the beginning of the work day, and accumulated dirty runoff and solids must be collected and disposed of before removing the containment device(s) at the end of the work day.

If you need to de-water an excavation site, you may need to filter the water before discharging to a catch basin or off-site. In which case you should direct the water through hay bales and filter fabric or use other sediment filters or traps.

Store toxic material under cover with secondary containment during precipitation events and when not in use. A cover would include tarps or other temporary cover material.

Mowing, Trimming, and Planting

Dispose of leaves, sticks, or other collected vegetation as garbage, by composting or at a permitted landfill. Do not dispose of collected vegetation into waterways or storm drainage systems.

Use mulch or other erosion control measures when soils are exposed.

Place temporarily stockpiled material away from watercourses and drain inlets, and berm or cover stockpiles to prevent material releases to the storm drain system.

Consider an alternative approach when bailing out muddy water; do not put it in the storm drain, pour over landscaped areas.

Use hand or mechanical weeding where practical.

Fertilizer and Pesticide Management

Follow all federal, state, and local laws and regulations governing the use, storage, and disposal of fertilizers and pesticides and training of applicators and pest control advisors.

Follow manufacturers' recommendations and label directions. Pesticides must never be applied if precipitation is occurring or predicted. Do not apply insecticides within 100 feet of surface waters such as lakes, ponds, wetlands, and streams.

Use less toxic pesticides that will do the job, whenever possible. Avoid use of copper-based pesticides if possible.

Do not use pesticides if rain is expected.

Do not mix or prepare pesticides for application near storm drains.

Use the minimum amount needed for the job.

Calibrate fertilizer distributors to avoid excessive application.

Employ techniques to minimize off-target application (e.g. spray drift) of pesticides, including consideration of alternative application techniques.

Apply pesticides only when wind speeds are low.

Work fertilizers into the soil rather than dumping or broadcasting them onto the surface.

Irrigate slowly to prevent runoff and then only as much as is needed.

Clean pavement and sidewalk if fertilizer is spilled on these surfaces before applying irrigation water.

Dispose of empty pesticide containers according to the instructions on the container label.

Use up the pesticides. Rinse containers, and use rinse water as product. Dispose of unused pesticide as hazardous waste.

Implement storage requirements for pesticide products with guidance from the local fire department and County Agricultural Commissioner. Provide secondary containment for pesticides.

Inspection

Inspect irrigation system periodically to ensure that the right amount of water is being applied and that excessive runoff is not occurring. Minimize excess watering, and repair leaks in the irrigation system as soon as they are observed.

Training

Educate and train employees on use of pesticides and in pesticide application techniques to prevent pollution.

Train employees and contractors in proper techniques for spill containment and cleanup.

Be sure the frequency of training takes into account the complexity of the operations and the nature of the staff.

Spill Response and Prevention

Refer to SC-2, Spill Prevention, Control & Cleanup

Keep your Pollution Incident Prevention Plan (PIPP) up to date, and implement accordingly.

Have spill cleanup materials readily available and in a known location.

Cleanup spills immediately and use dry methods if possible.

Properly dispose of spill cleanup material.

Other Considerations

Alternative pest/weed controls may not be available, suitable, or effective in many cases.

Requirements

Costs

Overall costs should be low in comparison to other BMPs.

Maintenance

Sweep paved areas regularly to collect loose particles, and wipe up spills with rags and other absorbent material immediately; do not hose down the area to a storm drain.

Supplemental Information

Further Detail of the BMP

Fire Sprinkler Line Flushing

Building fire sprinkler line flushing may be a source of non-stormwater runoff pollution. The water entering the system is usually potable water. There are subsequent factors that may drastically reduce the quality of the water in such systems. Black iron pipe is usually used since it is cheaper than potable piping but it is subject to rusting and results in lower quality water. Initially the black iron pipe has an oil coating to protect it from rusting between manufacture and installation; this will contaminate the water from the first flush but not from subsequent flushes. Nitrates, polyphosphates and other corrosion inhibitors, as well as fire suppressants and antifreeze may be added to the sprinkler water system. Water generally remains in the sprinkler system a long time, typically a year, between flushes and may accumulate iron, manganese, lead, copper, nickel and zinc. The water generally becomes anoxic and contains living and dead bacteria and breakdown products from chlorination. This may result in a significant BOD problem and the water often smells. Consequently dispose fire sprinkler line flush water into the sanitary sewer. Do not allow discharge to storm drain or infiltration due to potential high levels of pollutants in fire sprinkler line water.

References and Resources

California's Nonpoint Source Program Plan http://www.swrcb.ca.gov/nps/index.html

King County - ftp://dnr.metrokc.gov/wlr/dss/spcm/Chapter%203.PDF

Orange County Stormwater Program

http://www.ocwatersheds.com/StormWater/swp_introduction.asp

Mobile Cleaners Pilot Program: Final Report. 1997. Bay Area Stormwater Management Agencies Association (BASSMA) http://www.basmaa.org/

Pollution from Surface Cleaning Folder. 1996. Bay Area Stormwater Management Agencies
Association (BASMAA) http://www.basmaa.org/

San Diego Stormwater Co-permittees Jurisdictional Urban Runoff Management Program (URMP) -
http://www.projectcleanwater.org/pdf/Model%20Program%20Municipal%20Facilities.pdf

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Parking/Storage Area Maintenance SC-12

Description

Parking lots and storage areas can contribute a number of substances, such as trash, suspended solids, hydrocarbons, oil and grease, and heavy metals that can enter receiving waters through stormwater runoff or non-stormwater discharges. The following protocols are intended to prevent or reduce the discharge of pollutants from parking/storage areas and include using good housekeeping practices, following appropriate cleaning BMPs, and training employees.

Objectives

- Cover
- Contain
- Educate
- Reduce/Minimize
- Product Substitution

Targeted Constituents

Sediment	9
Nutrients	9
Trash	9
Metals	9
Bacteria	9
Oil and Grease	9
Organics	9
Oxygen Demanding	9

Approach

Pollution Prevention

Encourage alternative designs and maintenance strategies for impervious parking lots.

Keep accurate maintenance logs to evaluate BMP implementation.

Suggested Protocols

General

Keep the parking and storage areas clean and orderly. Remove debris in a timely fashion.

Allow sheet runoff to flow into biofilters (vegetated strip and swale) and/or infiltration devices.

Utilize sand filters or oleophilic collectors for oily waste in low concentrations.

Arrange rooftop drains to prevent drainage directly onto paved surfaces.

Design lot to include semi-permeable hardscape.

Controlling Litter

Post “No Littering” signs and enforce anti-litter laws.

Provide an adequate number of litter receptacles.

Clean out and cover litter receptacles frequently to prevent spillage.

Routinely sweep, shovel and dispose of litter in the trash.

Surface cleaning

Use dry cleaning methods (e.g. sweeping or vacuuming) to prevent the discharge of pollutants into the stormwater conveyance system.

Establish frequency of public parking lot sweeping based on usage and field observations of waste accumulation.

Sweep all parking lots at least once before the onset of the wet season.

If water is used follow the procedures below:

- Block the storm drain or contain runoff.
- Wash water should be collected and pumped to the sanitary sewer or discharged to a pervious surface, do not allow wash water to enter storm drains.
- Dispose of parking lot sweeping debris and dirt at a landfill.

When cleaning heavy oily deposits:

- Use absorbent materials on oily spots prior to sweeping or washing.
- Dispose of used absorbents appropriately.

Surface Repair

Pre-heat, transfer or load hot bituminous material away from storm drain inlets.

Apply concrete, asphalt, and seal coat during dry weather to prevent contamination form contacting stormwater runoff.

Cover and seal nearby storm drain inlets (with waterproof material or mesh) and manholes before applying seal coat, slurry seal, etc., where applicable. Leave covers in place until job is complete and until all water from emulsified oil sealants has drained or evaporated. Clean any debris from these covered manholes and drains for proper disposal.

Use only as much water as necessary for dust control, to avoid runoff.

Catch drips from paving equipment that is not in use with pans or absorbent material placed under the machines. Dispose of collected material and absorbents properly.

Inspection

Have designated personnel conduct inspections of the parking facilities and stormwater conveyance systems associated with them on a regular basis.

Inspect cleaning equipment/sweepers for leaks on a regular basis.

Training

Provide regular training to field employees and/or contractors regarding cleaning of paved areas and proper operation of equipment.

Train employees and contractors in proper techniques for spill containment and cleanup.

Spill Response and Prevention

Refer to SC-2, Spill Prevention, Control & Cleanup.

Keep your Pollution Incident Prevention Plan (PIPP) up to date, and implement accordingly.

Have spill cleanup materials readily available and in a known location.

Cleanup spills immediately and use dry methods if possible.

Properly dispose of spill cleanup material.

Other Considerations

Limitations related to sweeping activities at large parking facilities may include high equipment costs, the need for sweeper operator training, and the inability of current sweeper technology to remove oil and grease.

Requirements

Costs

Cleaning/sweeping costs can be quite large, construction and maintenance of stormwater structural controls can be quite expensive as well.

Maintenance

Sweep parking lot to minimize cleaning with water.

Clean out oil/water/sand separators regularly, especially after heavy storms.

Clean parking facilities on a regular basis to prevent accumulated wastes and pollutants from being discharged into conveyance systems during rainy conditions.

Supplemental Information

Further Detail of the BMP

Surface Repair

Apply concrete, asphalt, and seal coat during dry weather to prevent contamination form contacting stormwater runoff. Where applicable, cover and seal nearby storm drain inlets (with waterproof material or mesh) and manholes before applying seal coat, slurry seal, etc. Leave covers in place until job is complete and until all water from emulsified oil sealants has drained or evaporated. Clean any debris from these covered manholes and drains for proper disposal. Use only as much water as necessary for dust control, to avoid runoff.

References and Resources

http://www.stormwatercenter.net/

California's Nonpoint Source Program Plan http://www.swrcb.ca.gov/nps/index.html

Model Urban Runoff Program: A How-To Guide for Developing Urban Runoff Programs for Small Municipalities. Prepared by City of Monterey, City of Santa Cruz, California Coastal Commission, Monterey Bay National Marine Sanctuary, Association of Monterey Bay Area Governments, Woodward-Clyde, Central Coast Regional Water Quality control Board. July 1998 (Revised February 2002 by the California Coastal Commission).

Orange County Stormwater Program
http://www.ocwatersheds.com/StormWater/swp_introduction.asp

Oregon Association of Clean Water Agencies. Oregon Municipal Stormwater Toolbox for Maintenance Practices. June 1998.

Pollution from Surface Cleaning Folder. 1996. Bay Area Stormwater Management Agencies Association (BASMAA) http://www.basma.org

San Diego Stormwater Co-permittees Jurisdictional Urban Runoff Management Program (URMP)
http://www.projectcleanwater.org/pdf/Model%20Program%20Municipal%20Facilities.pdf

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Housekeeping Practices SC-13

Description

Promote efficient and safe housekeeping practices (storage, use, and cleanup) when handling potentially harmful materials such as fertilizers, pesticides, cleaning solutions, paint products, automotive products, and swimming pool chemicals. Related information is provided in BMP fact sheets SC-2 Spill Prevention, Control & Cleanup and SC-21 Waste Handling & Disposal.

Objectives

Cover
Contain
Educate
Reduce/Minimize
Product Substitution

Targeted Constituents

Sediment	9
Nutrients	9
Trash	9
Metals	9
Bacteria	9
Oil and Grease	9
Organics	9
Oxygen Demanding	9

Approach

Pollution Prevention

Purchase only the amount of material that will be needed for foreseeable use. In most cases this will result in cost savings in both purchasing and disposal. See SC-14 Safer Alternative Products for additional information.

Be aware of new products that may do the same job with less environmental risk and for less or the equivalent cost. Total cost must be used here; this includes purchase price, transportation costs, storage costs, use related costs, clean up costs and disposal costs.

Suggested Protocols

General

Keep work sites clean and orderly. Remove debris in a timely fashion. Sweep the area.

Dispose of wash water, sweepings, and sediments, properly.

Recycle or dispose of fluids properly.

Establish a daily checklist of office, yard and plant areas to confirm cleanliness and adherence to proper storage and security. Specific employees should be assigned specific inspection responsibilities and given the authority to remedy problems found.

Post waste disposal charts in appropriate locations detailing for each waste its hazardous nature (poison, corrosive, flammable), prohibitions on its disposal (dumpster, drain, sewer) and the recommended disposal method (recycle, sewer, burn, storage, landfill).

Summarize the chosen BMPs applicable to your operation and post them in appropriate conspicuous places.

Objectives

Require a signed checklist from every user of any hazardous material detailing amount taken, amount used, amount returned and disposal of spent material.

Do a before audit of your site to establish baseline conditions and regular subsequent audits to note any changes and whether conditions are improving or deteriorating.

Keep records of water, air and solid waste quantities and quality tests and their disposition.

Maintain a mass balance of incoming, outgoing and on hand materials so you know when there are unknown losses that need to be tracked down and accounted for.

Use and reward employee suggestions related to BMPs, hazards, pollution reduction, work place safety, cost reduction, alternative materials and procedures, recycling and disposal.

Have, and review regularly, a Pollution Incident Prevention Plan (PIPP) for spills, leaks, weather extremes etc. Make sure all employees know about it and what their role is so that it comes into force automatically.

Training

Train all employees, management, office, yard, manufacturing, field and clerical in BMPs and pollution prevention and make them accountable.

Train municipal employees who handle potentially harmful materials in good housekeeping practices.

Train personnel who use pesticides in the proper use of the pesticides.

Train employees and contractors in proper techniques for spill containment and cleanup. The employee should have the tools and knowledge to immediately begin cleaning up a spill if one should occur.

Spill Response and Prevention

Refer to SC-2, Spill Prevention, Control & Cleanup.

Keep your PIPP up to date, and implement accordingly.

Have spill cleanup materials readily available and in a known location.

Cleanup spills immediately and use dry methods if possible.

Properly dispose of spill cleanup material.

Other Considerations

There are no major limitations to this best management practice.

There are no regulatory requirements to this BMP. Existing regulations already require municipalities to properly store, use, and dispose of hazardous materials

Requirements

Costs

Minimal cost associated with this BMP. Implementation of good housekeeping practices may result in cost savings as these procedures may reduce the need for more costly BMPs.

Maintenance

Ongoing maintenance required to keep a clean site. Level of effort is a function of site size and type of activities.

Supplemental Information

Further Detail of the BMP

Ingham County residents who need to dispose of common household hazardous items, such as oil based paints and solvents can take these items to the County's Household Hazardous Waste and Clean Sweep site. The site is located at the Ingham County Human Services Building, 5303 South Cedar Street in Lansing. For schedule and more information please go tot http://www.ingham.org/hd/healthdept.htm.

Examples

There are a number of communities with effective programs. The most pro-active include Santa Clara County and the City of Palo Alto, the City and County of San Francisco, and the Municipality of Metropolitan Seattle (Metro).

References and Resources

British Columbia Lake Stewardship Society. Best Management Practices to Protect Water
Quality from Non-Point Source Pollution. March 2000.
http://www.nalms.org/bclss/bmphome.html#bmp

King County Stormwater Pollution Control Manual -
http://dnr.metrokc.gov/wlr/dss/spcm.htm

Model Urban Runoff Program: A How-To Guide for Developing Urban Runoff Programs for Small Municipalities, Prepared by City of Monterey, City of Santa Cruz, California Coastal Commission, Monterey Bay National Marine Sanctuary, Association of Monterey Bay Area Governments, Woodward-Clyde, Central Coast Regional Water Quality Control Board. July, 1998, Revised by California Coastal Commission, February 2002.

Orange County Stormwater Program
http://www.ocwatersheds.com/stormwater/swp_introduction.asp

San Mateo STOPPP - (http://stoppp.tripod.com/bmp.html)

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Safer Alternative Products SC-14

Objectives
Educate
Reduce/Minimize
Product Substitution

Targeted Constituents

Sediment	
Nutrients	9
Trash	
Metals	9
Bacteria	
Oil and Grease	9
Organics	9
Oxygen Demanding	

Descriptions

Promote the use of less harmful products. Alternatives exist for most product classes including chemical fertilizers, pesticides, cleaning solutions, janitorial chemicals, automotive and paint products, and consumables (batteries, fluorescent lamps).

Approach

Develop a comprehensive program based on:

The “Precautionary Principle,” which is an alternative to the "Risk Assessment" model that says it's acceptable to use a potentially harmful product until physical evidence of its harmful effects are established and deemed too costly from an environmental or public health perspective. For instance, a risk assessment approach might say it's acceptable to use a pesticide until there is direct proof of an environmental impact. The Precautionary Principle approach is used to evaluate whether a given product is safe, whether it is really necessary, and whether alternative products would perform just as well.

Environmentally Preferable Purchasing Program to minimize the purchase of products containing hazardous ingredients used in the facility's custodial services, fleet maintenance, and facility maintenance in favor of using alternate products that pose less risk to employees and to the environment.

Integrated Pest Management (IPM) or Less-Toxic Pesticide Program, which uses a pest management approach that minimizes the use of toxic chemicals and gets rid of pests by methods that pose a lower risk to employees, the public, and the environment.

Energy Efficiency Program including no-cost and low-cost energy conservation and efficiency actions that can reduce both energy consumption and electricity bills, along with long-term energy efficiency investments.

Consider the following mechanisms for developing and implementing a comprehensive program:

Policies

Procedures

- Standard operating procedures (SOPs)
- Purchasing guidelines and procedures
- Bid packages (services and supplies)

Materials

- Preferred or approved product and supplier lists
- Product and supplier evaluation criteria
- Training sessions and manuals
- Fact sheets for employees

Training

Employees who handle potentially harmful materials in the use of safer alternatives.

Purchasing departments should be encouraged to procure less hazardous materials and products that contain little or no harmful substances.

Regulations

This BMP has no regulatory requirements. It is encouraged to reduce the use of hazardous materials through incentives such as reduced:

Specialized equipment storage and handling requirements,

Stormwater runoff sampling requirements,

Training and licensing requirements, and

Record keeping and reporting requirements.

Equipment

There are no major equipment requirements to this BMP.

Limitations

Alternative products may not be available, suitable, or effective in every case.

Requirements

Costs

The primary cost is for staff time to: 1) develop new policies and procedures and 2) educate purchasing departments and employees who handle potentially harmful materials about the availability, procurement, and use of safer alternatives.

Some alternative products may be slightly more expensive than conventional products.

Supplemental Information

The following discussion provides some general information on safer alternatives. More specific information on particular hazardous materials and the available alternatives may be found in the references and resources listed below.

Automotive products – Less toxic alternatives are not available for many automotive products, especially engine fluids. But there are alternatives to grease lubricants, car polishes, degreasers, and windshield washer solution. Re-refined motor oil is also available.

Vehicle/Trailer lubrication – Fifth wheel bearings on trucks require routine lubrication.

Adhesive lubricants are available to replace typical chassis grease.

Cleaners – Vegetables-based or citrus-based soaps are available to replace petroleum-based soaps/detergents.

Paint products – Water-based paints, wood preservatives, stains, and finishes are available.

Pesticides – Specific alternative products or methods exist to control most insects, fungi, and weeds.

Chemical Fertilizers – Compost and soil amendments are natural alternatives.

Consumables – Manufacturers have either reduced or are in the process of reducing the amount of heavy metals in consumables such as batteries and fluorescent lamps. All fluorescent lamps contain mercury; however low-mercury containing lamps are now available from most hardware and lighting stores. Fluorescent lamps are also more energy efficient than the average incandescent lamp.

Janitorial chemicals – Even biodegradable soap can harm fish and wildlife before it biodegrades. Biodegradable does not mean non-toxic. Safer products and procedures are available for floor stripping and cleaning, as well as carpet, glass, metal, and restroom cleaning and disinfecting.

Examples – need more MI

There are a number of business and trade associations, and communities with effective programs. Some of the more prominent are listed below in the references and resources section.

References and Resources

Note: Many of these references provide alternative products for materials that typically are used inside and disposed to the sanitary sewer as well as alternatives to products that usually end up in the storm drain.

General Sustainable Practices and Pollution Prevention Including Pollutant-Specific Information
Earth 911 (www.earth911.org/master.asp)

GreenBiz.com (www.greenbiz.com)

Green Business Program (www.abag.org/bayarea/enviro/gbus/gb.html)

USEPA BMP fact sheet – Alternative products
(http://cfpub.epa.gov/npdes/stormwater/menuofbmps/poll_2.cfm)

Metals (mercury, copper)
National Electrical Manufacturers Association - Environment, Health and Safety
(www.nema.org)

Sustainable Conservation (www.suscon.org)

Auto Recycling Project

Brake Pad Partnership

Pesticides and Chemical Fertilizers
Bio-Integral Resource Center (www.birc.org)

Dioxins

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Road and Street Maintenance SC-15

Description

Streets, roads, and highways are significant sources of pollutants in stormwater discharges, and operation and maintenance (O&M) practices, if not conducted properly, can contribute to the problem. Stormwater pollution from roadway and bridge maintenance should be addressed on a site-specific basis. Use of the procedures outlined below, that address street sweeping, and repair, bridge and structure maintenance, and unpaved roads will reduce pollutants in stormwater.

Objectives

Cover
Contain
Educate
Reduce/Minimize
Product Substitution

Targeted Constituents

Sediment	9
Nutrients	
Trash	9
Metals	9
Bacteria	
Oil and Grease	9
Organics	9
Oxygen Demanding	9

Approach

Pollution Prevention

Use the least toxic materials available (e.g. water based paints, gels or sprays for graffiti removal).

Recycle paint and other materials whenever possible.

Enlist the help of citizens to keep yard waste, used oil, and other wastes out of the gutter.

Suggested Protocols

Street Sweeping and Cleaning

Maintain a consistent sweeping schedule.

Perform street cleaning during dry weather if possible.

Avoid wet cleaning or flushing of street, and utilize dry methods where possible.

Consider increasing sweeping frequency based on factors such as traffic volume, land use, field observations of sediment and trash accumulation, proximity to water courses, etc. For example:

- Increase the sweeping frequency for streets with high pollutant loadings, especially in high traffic and industrial areas.
- Increase the sweeping frequency just before the wet season to remove sediments accumulated during the summer.
- Increase the sweeping frequency for streets in special problem areas such as special events, high litter or erosion zones.

Maintain cleaning equipment in good working condition and purchase replacement equipment as needed. Old sweepers should be replaced with new technologically advanced sweepers (preferably regenerative air sweepers) that maximize pollutant removal.

Operate sweepers at manufacturer requested optimal speed levels to increase effectiveness.

To increase sweeping effectiveness consider the following:

- Institute a parking policy to restrict parking in problematic areas during periods of street sweeping.
- Post permanent street sweeping signs in problematic areas; use temporary signs if installation of permanent signs is not possible.
- Develop and distribute flyers notifying residents of street sweeping schedules.

Regularly inspect vehicles and equipment for leaks, and repair immediately.

If available use vacuum or regenerative air sweepers in the high sediment and trash areas (typically industrial/commercial).

Keep accurate logs of the number of curb-miles swept and the amount of waste collected.

Dispose of street sweeping debris and dirt at a landfill.

Do not store swept material along the side of the street or near a storm drain inlet.

Keep debris storage to a minimum during the wet season or make sure debris piles are contained (e.g. by berming the area) or covered (e.g. with tarps or permanent covers).

Street Repair and Maintenance

Pavement marking

Schedule pavement marking activities for dry weather.

Develop paint handling procedures for proper use, storage, and disposal of paints.

Transfer and load paint and hot thermoplastic away from storm drain inlets.

Provide drop cloths and drip pans in paint mixing areas.

Properly maintain application equipment.

Street sweep thermoplastic grindings. Yellow thermoplastic grindings may require special handling as they may contain lead.

Paints containing lead or tributyltin are considered a hazardous waste and must be disposed of properly.

Use water based paints whenever possible. If using water based paints, clean the application equipment in a sink that is connected to the sanitary sewer.

Properly store leftover paints if they are to be kept for the next job or dispose of properly.

Concrete installation and repair

Schedule asphalt and concrete activities for dry weather.

Take measures to protect any nearby storm drain inlets and adjacent watercourses, prior to breaking up asphalt or concrete (e.g. place sand bags around inlets or work areas).

Limit the amount of fresh concrete or cement mortar mixed, mix only what is needed for the job.

Store concrete materials under cover, away from drainage areas. Secure bags of cement after they are open. Be sure to keep wind-blown cement powder away from streets, gutters, storm drains, rainfall, and runoff.

Return leftover materials to the transit mixer. Dispose of small amounts of hardened excess concrete, grout, and mortar in the trash.

Do not wash sweepings from exposed aggregate concrete into the street or storm drain.

Collect and return sweepings to aggregate base stockpile, or dispose in the trash.

When making saw cuts in pavement, use as little water as possible and perform during dry weather. Cover each storm drain inlet completely with filter fabric or plastic during the sawing operation and contain the slurry by placing straw bales, sandbags, or gravel dams around the inlets. After the liquid drains or evaporates, shovel or vacuum the slurry residue from the pavement or gutter and remove from site. Alternatively, a small onsite vacuum may be used to pick up the slurry as this will prohibit slurry from reaching storm drain inlets.

Wash concrete trucks off site or in designated areas on site designed to preclude discharge of wash water to drainage system.

Patching, resurfacing, and surface sealing

Schedule patching, resurfacing and surface sealing for dry weather.

Stockpile materials away from streets, gutter areas, storm drain inlets or watercourses.

During wet weather, cover stockpiles with plastic tarps or berm around them if necessary to prevent transport of materials in runoff.

Pre-heat, transfer or load hot bituminous material away from drainage systems or watercourses.

Where applicable, cover and seal nearby storm drain inlets (with waterproof material or mesh) and maintenance holes before applying seal coat, slurry seal, etc. Leave covers in place until job is complete and until all water from emulsified oil sealants has drained or evaporated. Clean any debris from covered maintenance holes and storm drain inlets when the job is complete.

Prevent excess material from exposed aggregate concrete or similar treatments from entering streets or storm drain inlets. Designate an area for clean up and proper disposal of excess materials.

Use only as much water as necessary for dust control, to avoid runoff.

Sweep, never hose down streets to clean up tracked dirt. Use a street sweeper or vacuum truck. Do not dump vacuumed liquid in storm drains.

Catch drips from paving equipment that is not in use with pans or absorbent material placed under the machines. Dispose of collected material and absorbents properly.

Equipment cleaning maintenance and storage

Inspect equipment daily and repair any leaks. Place drip pans or absorbent materials under heavy equipment when not in use.

Perform major equipment repairs at the corporation yard, when practical.

If refueling or repairing vehicles and equipment must be done onsite, use a location away from storm drain inlets and watercourses.

Clean equipment including sprayers, sprayer paint supply lines, patch and paving equipment, and mud jacking equipment at the end of each day. Clean in a sink or other area (e.g. vehicle wash area) that is connected to the sanitary sewer.

Bridge and Structure Maintenance

Paint and Paint Removal

Transport paint and materials to and from job sites in containers with secure lids and tied down to the transport vehicle.

Do not transfer or load paint near storm drain inlets or watercourses.

Test and inspect spray equipment prior to starting to paint. Tighten all hoses and connections and do not overfill paint container.

Plug nearby storm drain inlets prior to starting painting where there is significant risk of a spill reaching storm drains. Remove plugs when job is completed.

If sand blasting is used to remove paint, cover nearby storm drain inlets prior to starting work.

Perform work on a maintenance traveler or platform, or use suspended netting or tarps to capture paint, rust, paint removing agents, or other materials, to prevent discharge of materials to surface waters if the bridge crosses a watercourse. If sanding, use a sander with a vacuum filter bag.

Capture all clean-up water, and dispose of properly.

Recycle paint when possible (e.g. paint may be used for graffiti removal activities). Dispose of unused paint at an appropriate household hazardous waste facility.

Graffiti Removal

Schedule graffiti removal activities for dry weather.

Protect nearby storm drain inlets prior to removing graffiti from walls, signs, sidewalks, or other structures needing graffiti abatement. Clean up afterwards by sweeping or vacuuming thoroughly, and/or by using absorbent and properly disposing of the absorbent.

When graffiti is removed by painting over, implement the procedures under Painting and Paint Removal above.

Direct runoff from sand blasting and high pressure washing (with no cleaning agents) into a landscaped or dirt area. If such an area is not available, filter runoff through an appropriate filtering device (e.g. filter fabric) to keep sand, particles, and debris out of storm drains.

If a graffiti abatement method generates wash water containing a cleaning compound (such as high pressure washing with a cleaning compound), plug nearby storm drains and vacuum/pump wash water to the sanitary sewer.

Consider using a waterless and non-toxic chemical cleaning method for graffiti removal (e.g. gels or spray compounds).

Repair Work

Prevent concrete, steel, wood, metal parts, tools, or other work materials from entering storm drains or watercourses.

Thoroughly clean up the job site when the repair work is completed.

When cleaning guardrails or fences follow the appropriate surface cleaning methods (depending on the type of surface) outlined in SC-71 Plaza & Sidewalk Cleaning fact sheet.

If painting is conducted, follow the painting and paint removal procedures above.

If graffiti removal is conducted, follow the graffiti removal procedures above.

Recycle materials whenever possible.

Unpaved Roads and Trails

Stabilize exposed soil areas to prevent soil from eroding during rain events. This is particularly important on steep slopes.

Dust suppressants should be used to minimize airborne transfer of fine aggregates into the air.

Quality aggregates should be used to minimize transfer of fine aggregates onto paved surfaces.

For roadside areas with exposed soils, the most cost-effective choice is to vegetate the area, preferably with a mulch or binder that will hold the soils in place while the vegetation is establishing. Native vegetation should be used if possible.

If vegetation cannot be established immediately, apply temporary erosion control mats/blankets; a comma straw, or gravel as appropriate.

If sediment is already eroded and mobilized in roadside areas, temporary controls should be installed. These may include: sediment control fences, fabric-covered triangular dikes, gravel-filled burlap bags, biobags, or hay bales staked in place.

Non-Stormwater Discharges

Field crews should be aware of non-stormwater discharges as part of their ongoing street maintenance efforts.

Refer to SC-1 Non-Stormwater Discharges.

Identify location, time and estimated quantity of discharges.

Notify appropriate personnel.

Training

Train employees regarding proper street sweeping operation and street repair and maintenance.

Instruct employees and subcontractors to ensure that measures to reduce the stormwater impacts of roadway/bridge maintenance are being followed.

Require engineering staff and/or consulting A/E firms to address stormwater quality in new bridge designs or existing bridge retrofits.

Use a training log or similar method to document training.

Train employees on proper spill containment and clean up, and in identifying non-stormwater discharges.

Spill Response and Prevention

Refer to SC-2, Spill Prevention, Control & Cleanup.

Keep your Pollution Incident Prevention Plan (PIPP) up to date, and implement accordingly.

Have spill cleanup materials readily available and in a known location.

Cleanup spills immediately and use dry methods if possible.

Properly dispose of spill cleanup material.

Other Considerations

Densely populated areas or heavily used streets may require parking regulations to clear streets for cleaning.

No currently available conventional sweeper is effective at removing oil and grease. Mechanical sweepers are not effective at removing finer sediments.

Limitations may arise in the location of new bridges. The availability and cost of land and other economic and political factors may dictate where the placement of a new bridge will occur. Better design of the bridge to control runoff is required if it is being placed near sensitive waters.

Requirements

Costs

The maintenance of local roads and bridges is already a consideration of most community public works or transportation departments. Therefore, the cost of pollutant reducing management practices will involve the training and equipment required to implement these new practices.

The largest expenditures for street sweeping programs are in staffing and equipment. Sweeping frequencies will determine equipment life, so programs that sweep more often should expect to have a higher cost of replacement.

A street sweeping program may require the following.

- Sweeper operators, maintenance, supervisory, and administrative personnel are required.
- Traffic control officers may be required to enforce parking restrictions.
- Skillful design of cleaning routes is required for program to be productive.
- Arrangements must be made for disposal of collected wastes.

If investing in newer technologies, training for operators must be included in operation and maintenance budgets. Costs for public education are small, and mostly deal with the need to obey parking restrictions and litter control. Parking tickets are an effective reminder to obey parking rules, as well as being a source of revenue.

Maintenance

Not applicable

Supplemental Information

Further Detail of the BMP

Street sweeping

There are advantages and disadvantages to the two common types of sweepers. The best choice depends on your specific conditions. Many communities find it useful to have a compliment of both types in their fleet.

Mechanical Broom Sweepers - More effective at picking up large debris and cleaning wet streets. Less costly to purchase and operate. Create more airborne dust.

Vacuum Sweepers - More effective at removing fine particles and associated heavy metals. Ineffective at cleaning wet streets. Noisier than mechanical broom sweepers which may restrict areas or times of operation. May require an advance vehicle to remove large debris.

Street Flushers - Not affected by biggest interference to cleaning, parked cars. May remove finer sediments, moving them toward the gutter and stormwater inlets. For this reason, flushing fell out of favor and is now used primarily after sweeping. Flushing may

be effective for combined sewer systems. Presently street flushing is not allowed under most NPDES permits.

Bridges

Bridges that carry vehicular traffic generate some of the more direct discharges of runoff to surface waters. Bridge scupper drains cause a direct discharge of stormwater into receiving waters and have been shown to carry relatively high concentrations of pollutants. Bridge maintenance also generates wastes that may be either directly deposited to the water below or carried to the receiving water by stormwater. The following steps will help reduce the stormwater impacts of bridge maintenance:

Site new bridges so that significant adverse impacts to wetlands, sensitive areas, critical habitat, and riparian vegetation are minimized.

Design new bridges to avoid the use of scupper drains and route runoff to land for treatment control. Existing scupper drains should be cleaned on a regular basis to avoid sediment/debris accumulation.

Reduce the discharge of pollutants to surface waters during maintenance by using suspended traps, vacuums, or booms in the water to capture paint, rust, and paint removing agents. Many of these wastes may be hazardous. Properly dispose of this waste.

Train employees and subcontractors to reduce the discharge of wastes during bridge maintenance.

De-icing

Do not over-apply deicing salt and sand, and routinely calibrate spreaders.

Near reservoirs and open drains, restrict the application of deicing salt and redirect any runoff away from reservoirs and open drains.

Consider using alternative deicing agents (less toxic, biodegradable, etc.).

References and Resources

Model Urban Runoff Program: A How-To Guide for Developing Urban Runoff Programs for Small Municipalities. Prepared by City of Monterey, City of Santa Cruz, California Coastal Commission, Monterey Bay National Marine Sanctuary, Association of Monterey Bay Area Governments, Woodward-Clyde, Central Coast Regional Water Quality Control Board. July. 1998.

Orange County Stormwater Program
http://www.ocwatersheds.com/stormwater/swp_introduction.asp

Oregon Association of Clean Water Agencies. Oregon Municipal Stormwater Toolbox forMaintenance Practices. June 1998.

Santa Clara Valley Urban Runoff Pollution Prevention Program. 1997 Urban Runoff Management Plan. September 1997, updated October 2000.

Santa Clara Valley Urban Runoff Pollution Prevention Program. 2001. Fresh Concrete and Mortar Application Best Management Practices for the Construction Industry. June.

Santa Clara Valley Urban Runoff Pollution Prevention Program. 2001. Roadwork and Paving Best Management Practices for the Construction Industry. June.

United States Environmental Protection Agency (USEPA). 2002. Pollution Prevention/Good Housekeeping for Municipal Operations Roadway and Bridge Maintenance. On-line http://www.epa.gov/npdes/menuofbmps/poll_13.htm

12/18/07

Salt Application and Storage SC-16

Description

Objectives
Cover
Contain
Educate
Reduce/Minimize
Product Substitution

Targeted Constituents
Sediment 9
Nutrients 9
Trash
Metals 9
Bacteria
Oil and Grease
Organics 9
Oxygen Demanding 9

The Application and storage of deicing materials, most commonly salts such as sodium chloride, can lead to water quality problems for surrounding areas. 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.

Approach

During road salt application, certain best management practices can produce significant environmental benefits. The amount of road salt applied should be regulated to prevent over-salting of motorways 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 for spreaders in trucks aid maintenance workers in the proper application of road salts. Alternative materials, such as sand or gravel, should be used in especially sensitive areas

Pollution Prevention

Use the minimum amount of salt needed to get the job done.

Establish “low salt” near sensitive environments. Salt can impact water supply wells.

Establish "low salt and/or sand areas" near sensitive environments. Sand may be detrimental in areas sensitive to sedimentation, such as streams, and salt can impact water supply wells.

Remove snow manually from driveways and sidewalks.

Limit toxic metals in specifications for deicers.

Cleanup road grit as soon as possible.

Consider pre-wetting of salt or use brine solution as a way to reduce and better control salt applications.

Use less harmful deicers such as calcium magnesium acetate, potassium acetate, or organic deicers.

Consider road temperatures when determining volume of salt to apply.

Control the rate of spreading by equipping trucks with ground-speed sensors.
Many of the problems associated with contamination of local waterways stem from the improper storage of deicing materials. Salts are very soluble when they come into contact with storm water. They can migrate into ground water used for public water supplies and also contaminate surface waters.

Facilities should be located on flat sites away from surface water and on impervious surfaces that are easily protected from overland runoff.

Salt should be stored under cover to prevent a loss due to runoff.

Contain wash water from trucks used for salting and sanding in a holding tank for disposal or discharge into sanitary sewers.

Place salt piles in areas not subject to flooding.

Cover salt piles with a tarp (polyethylene) during non-freezing spring and summer months when storage facilities are not available.

Contain stormwater runoff from areas where salt is stored by using buffers to diffuse runoff before entering waterbodies.

Use diversion berms to minimize run-on to storage areas.

Cleanup “track out” after storm events.

Suggested Protocols

Sensitive areas, such as public water supplies, lakes and ponds, should be identified and made known to salt applicators. Consider de-icing alternatives in sensitive areas.

Ground-speed controllers should be used for all spreaders.

Give salt time to work; time plowing operations to allow maximum melting by salt, before snow is plowed off the highway.

Know when to plow and reapply salt. The need for another salt application can be determined by watching melting snow kicked out behind vehicle tires. If the slush is soft and fans out like water, the salt is still working. Once the slush begins to stiffen and is thrown directly to the rear of vehicle tires, it is time to plow.

For lesser traveled roads, consider applying salt in a windrow in a four to eight foot strip along the centerline of a two lane road. Less salt is wasted with this pattern and quickly gives vehicles clear pavement under at least two wheels. Traffic will soon

move some salt off the centerline and the salt brine will move toward both shoulders for added melting across the entire road width.

Determine levels of service for all roads in a service area. Salt application rates and frequency should be based on traffic volume, road grade and curvature, intersections, and weather conditions. Sand or sand/salt mix should be used based on the level of service requirements.

Training

Train drivers to improve loading of materials, application techniques and reduce losses.

Train drivers to report areas of "over salting" to allow possible cleanup and to reduce salt runoff.

Spill Response and Prevention

Other Considerations

Requirements

Costs

Covering stored road salts may be costly; however, the benefits are greater than the perceived costs. Storing road salts correctly prevents the salt from lumping together, which makes it easier to load and apply. In addition, covering salt storage piles reduces salt loss from storm water 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.

The use of pre-wetting of salt can increase the effectiveness and reduce the usage of road salt.

The use of alternative materials on bridges and structures may be initially more costly, but can reduce longer term maintenance costs of the structure because of the less corrosive nature of these materials.

Further Detail of the BMP

Training of employees, calibrating equipment, and use of brine solutions or other materials for certain situations need to be continuously evaluated to increase effectiveness and reduce potential environmental impacts.

Use of temperature sensor technology in pavements and on vehicles is continuing to improve. As the technology improves, the costs will continue to decrease and become a more viable option.

Examples
References and Resources

http://www.deq.state.mi.us/documents/deq-swq-nps-wrm.pdf

http://www.mto.gov.on.ca/english/engineering/roadsalt.htm

http://www.saltinstitute.org/

http://www.saltinstitute.org/snowfighting/index.html

http://www.usroads.com/journals/p/rmj/9712/rm971202.htm

12/18/07

Plaza and Sidewalk Cleaning SC-17

Description

Pollutants on sidewalks and other pedestrian traffic areas and plazas are typically due to littering and vehicle use. This fact sheet describes good housekeeping practices that can be incorporated into the municipality's existing cleaning and maintenance program.

Objectives
- Cover
- Contain
- Educate
- Reduce/Minimize
- Product Substitution

Targeted Constituents

Sediment	9
Nutrients	
Trash	9
Metals	9
Bacteria	
Oil and Grease	9
Organics	9
Oxygen Demanding	9

Approach

Pollution Prevention

Use dry cleaning methods whenever practical for surface cleaning activities.

Use the least toxic materials available (e.g. water based paints, gels or sprays for graffiti removal).

Suggested Protocols

Surface Cleaning

Regularly broom (dry) sweep sidewalk, plaza and parking lot areas to minimize cleaning with water.

Dry cleanup first (sweep, collect, and dispose of debris and trash) when cleaning sidewalks or plazas, then wash with or without soap.

Block the storm drain or contain runoff when cleaning with water. Discharge wash water to landscaping or collect water and pump to a tank or discharge to sanitary sewer if allowed. (Permission may be required from local sanitation district.) Block the storm drain or contain runoff when washing parking areas, driveways or drive-throughs.

Use absorbents to pick up oil; then dry sweep. Clean with or without soap.

Collect water and pump to a tank or discharge to sanitary sewer if allowed. Street Repair and Maintenance.

Graffiti Removal

Avoid graffiti abatement activities during rain events.

Implement the procedures under Painting and Paint Removal in SC-15 Roads, Streets, and Highway Operation and Maintenance fact sheet when graffiti is removed by painting over.

Direct runoff from sand blasting and high pressure washing (with no cleaning agents) into a dirt or landscaped area after treating with an appropriate filtering device.

Plug nearby storm drain inlets and vacuum/pump wash water to the sanitary sewer if authorized to do so if a graffiti abatement method generates wash water containing a cleaning compound (such as high pressure washing with a cleaning compound). Ensure that a non-hazardous cleaning compound is used or dispose as hazardous waste, as appropriate.

Surface Removal and Repair

Schedule surface removal activities for dry weather if possible.

Avoid creating excess dust when breaking asphalt or concrete.

Take measures to protect nearby storm drain inlets prior to breaking up asphalt or concrete (e.g. place hay bales or sand bags around inlets). Clean afterwards by sweeping up as much material as possible.

Designate an area for clean up and proper disposal of excess materials.

Remove and recycle as much of the broken pavement as possible to avoid contact with rainfall and stormwater runoff.

When making saw cuts in pavement, use as little water as possible. Cover each storm drain inlet completely with filter fabric during the sawing operation and contain the slurry by placing straw bales, sandbags, or gravel dams around the inlets. After the liquid drains or evaporates, shovel or vacuum the slurry residue from the pavement or gutter and remove from site.

Always dry sweep first to clean up tracked dirt. Use a street sweeper or vacuum truck. Do not dump vacuumed liquid in storm drains. Once dry sweeping is complete, the area may be hosed down if needed. Wash water should be directed to landscaping or collected and pumped to the sanitary sewer if allowed.

Concrete Installation and Repair

Schedule asphalt and concrete activities for dry weather.

Take measures to protect any nearby storm drain inlets and adjacent watercourses, prior to breaking up asphalt or concrete (e.g. place san bags around inlets or work areas).

Limit the amount of fresh concrete or cement mortar mixed, mix only what is needed for the job.

Store concrete materials under cover, away from drainage areas. Secure bags of cement after they are open. Be sure to keep wind-blown cement powder away from streets, gutters, storm drains, rainfall, and runoff.

Return leftover materials to the transit mixer. Dispose of small amounts of hardened excess concrete, grout, and mortar in the trash.

Do not wash sweepings from exposed aggregate concrete into the street or storm drain. Collect and return sweepings to aggregate base stockpile, or dispose in the trash.

Protect applications of fresh concrete from rainfall and runoff until the material has dried.

Do not allow excess concrete to be dumped onsite, except in designated areas.

Wash concrete trucks off site or in designated areas on site designed to preclude discharge of wash water to drainage system.

Controlling Litter

Post "No Littering" signs and enforce anti-litter laws.

Provide litter receptacles in busy, high pedestrian traffic areas of the community, at recreational facilities, and at community events.

Cover litter receptacles and clean out frequently to prevent leaking/spillage or overflow.

Clean parking lots on a regular basis with a street sweeper.

Training

Provide regular training to field employees and/or contractors regarding surface cleaning and proper operation of equipment.

Train employee and contractors in proper techniques for spill containment and cleanup.

Use a training log or similar method to document training.

Spill Response and Prevention

Refer to SC-2, Spill Prevention, Control & Cleanup.

Have spill cleanup materials readily available and in a known location.

Cleanup spills immediately and use dry methods if possible.

Properly dispose of spill cleanup material.

Other Considerations

Limitations related to sweeping activities at large parking facilities may include current sweeper technology to remove oil and grease.

Surface cleaning activities that require discharges to the local sewer agency will require coordination with the agency.

Arrangements for disposal of the swept material collected must be made, as well as accurate tracking of the areas swept and the frequency of sweeping.

Requirements

Costs

The largest expenditures for sweeping and cleaning of sidewalks, plazas, and parking lots are in staffing and equipment. Sweeping of these areas should be incorporated into street sweeping programs to reduce costs.

Maintenance Not applicable

Supplemental Information

Further Detail of the BMP

Community education, such as informing residents about their options for recycling and waste disposal, as well as the consequences of littering, can instill a sense of citizen responsibility and potentially reduce the amount of maintenance required by the municipality.

Additional BMPs that should be considered for parking lot areas include:

Allow sheet runoff to flow into biofilters (vegetated strip and swale) and infiltration devices.

Utilize sand filters or oleophilic collectors for oily waste in low concentrations.

Arrange rooftop drains to prevent drainage directly onto paved surfaces.

Design lot to include semi-permeable hardscape.

Structural BMPs such as storm drain inlet filters can be very effective in reducing the amount of pollutants discharged from parking facilities during periods of rain.

References and Resources

Bay Area Stormwater Management Agencies Association (BASMAA). 1996. Pollution From Surface Cleaning Folder http://www.basmaa.org

Model Urban Runoff Program: A How-To Guide for Developing Urban Runoff Programs for Small Municipalities. Prepared by City of Monterey, City of Santa Cruz, California Coastal Commission, Monterey Bay National Marine Sanctuary, Association of Monterey Bay Area Governments, Woodward-Clyde, Central Coast Regional Water Quality Control Board. July.1998.

Oregon Association of Clean Water Agencies. Oregon Municipal Stormwater Toolbox for Maintenance Practices. June 1998.

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Santa Clara Valley Urban Runoff Pollution Prevention Program. Maintenance Best Management Practices for the Construction Industry. Brochures: Landscaping, Gardening, and Pool; Roadwork and Paving; and Fresh Concrete and Mortar Application. June 2001.

San Diego Stormwater Co-permittees Jurisdictional Urban Runoff Management Plan. 2001. Municipal Activities Model Program Guidance. November.

12/18/07

Fountain & Pool Maintenance SC-18

Description

The primary pollutant of concern in municipal swimming pool water is chlorine or chloramine used as a disinfectant. This water, if discharged to the storm drain system, can be toxic to aquatic life. In lakes, lagoons, and fountains, the pollutants of concern are chemical algaecides that are added to control algae mainly for aesthetic reasons (visual and odor). Following the procedures noted in this fact sheet will reduce the pollutants in this discharge.

Objectives

Contain
Educate
Reduce/Minimize
Product Substitution

Targeted Constituents

Sediment	9
Nutrients	9
Trash	9
Metals	
Bacteria	9
Oil and Grease	
Organics	9
Oxygen Demanding	9

Approach

Pollution Prevention

Prevent algae problems with regular cleaning, consistent adequate chlorine levels, and well-maintained water filtration and circulation systems.

Manage pH and water hardness to minimize corrosion of copper pipes.

Suggested Protocols

Pools and Fountains

Do not use copper-based algaecides. Control algae with chlorine or other alternatives, such as sodium bromide.

Do not discharge water to a street or storm drain when draining pools or fountains; discharge to the sanitary sewer if permitted to do so. If water is dechlorinated with a neutralizing chemical or by allowing chlorine to dissipate for a few days (do not use the facility during this time), the water may be recycled/reused by draining it gradually onto a landscaped area. Water must be tested prior to discharge to ensure that chlorine is not present.

Prevent backflow if draining a pool to the sanitary sewer by maintaining an “air gap” between the discharge line and the sewer line (do not seal the connection between the hose and sewer line). Be sure to call the local wastewater treatment plant for further guidance on flow rate restrictions, backflow prevention, and handling special cleaning waste (such as acid wash). Discharge flows should be kept to the low levels typically possible through a garden hose. Higher flow rates may be prohibited by local ordinance.

Provide drip pans or buckets beneath drain pipe connections to catch leaks. This will be especially pertinent if pool or spa water that has not been dechlorinated is pumped through piping to a discharge location.

Never clean a filter in the street or near a storm drain.

Rinse cartridge filters onto a dirt area, and spade filter residue into soil.

Backwash diatomaceous earth filters onto dirt. Dispose of spent diatomaceous earth in the garbage. Spent diatomaceous earth cannot be discharged to surface waters, storm drainage systems, septic systems, or on the ground.

If there is not a suitable dirt or grass area to discharge filter backwash or rinse water to the sanitary sewer if permitted to do so by the local sewer agency.

Lakes and Lagoons

Reduce fertilizer use in areas around the water body. High nitrogen fertilizers can produce excess growth requiring more frequent mowing or trimming, and may contribute to excessive algae growth.

To control bacteria, discourage the public from feeding birds and fish (i.e. place signs that prohibit feeding of waterfowl).

Consider introducing fish species that consume algae. Contact the Michigan Department of Natural Resources regarding this.

Mechanically remove pond scum (blue-green algae) using a 60 micron net.

Educate the public on algae and that no controls are necessary for certain types of algae that are beneficial to the water body.

Control erosion by doing the following:

- Maintain vegetative cover on banks to prevent soil erosion. Apply mulch or leave clippings to serve as additional cover for soil stabilization and to reduce the velocity of stormwater runoff.
- Areas should be designed (sloped) to prevent runoff and erosion and to promote better irrigation practices.
- Provide energy dissipaters (e.g. riprap) along banks to minimize potential for erosion.
- Confine excavated materials to surfaces away from lakes. Material must be covered if rain is expected.

Conduct inspections to detect illegal dumping of clippings/cuttings in or near a lake. Materials found should be picked up and properly disposed of.

Avoid landscape wastes in and around lakes should be avoided by either using bagging equipment or by manually picking up the material. Collect trash and debris from within water bodies where feasible.

Provide and maintain trash receptacles near recreational water bodies to hold refuse generated by the public.

Increase trash collection during peak visitation months (generally June, July and August).

Training

Train maintenance personnel to test chlorine levels and to apply neutralizing chemicals.

Train personnel regarding proper maintenance of pools, ponds and lakes.

Spill Response and Prevention

Refer to SC-2, Spill Prevention, Control & Cleanup.

Have spill cleanup materials readily available and in a known location.

Cleanup spills immediately and use dry methods if possible.

Properly dispose of spill cleanup material.

Other Considerations

Managers of pools located in sensitive areas or adjacent to shorelines should check with the appropriate authorities to determine if code requirements apply.

Cleanup activities at lakes and lagoons may create a slight disturbance for local aquatic species. If the lake is recognized as a wetland, many activities, including maintenance, may be subject to regulation and permitting.

Requirements

Costs

The maintenance of pools and lakes is already a consideration of most municipal public works departments. Therefore the cost associated with this BMP is minimal and only reflects an increase in employee training and public outreach.

Maintenance

Not applicable

Supplemental Information

Further Detail of the BMP

When dredging is conducted, adhere to the following:

Dredge with shovels when laying/maintaining pipes.

To determine amount to dredge, determine rate of volume loss due to sediments.

For large lakes, dredge every 10 years.

When dredging small lakes, drain lake.

When dredging large lakes, use vacuum equipment.

After dredging test sediment piles for proper disposal. Dredged sediment can be used as fill, or may have to be land filled.

References and Resources

King County Stormwater Pollution Control Manual. Best Management Practices for Businesses. 1995. King County Surface Water Management. July. On-line: http://dnr.metrokc.gov/wlr/dss/spcm.htm

Los Angeles County Stormwater Quality. Public Agency Activities Model Program. On-line: http://ladpw.org/wmd/npdes/public_TC.cfm

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Pool; Roadwork and Paving; and Fresh Concrete and Mortar Application. June 2001.

12/18/07

Landscape Maintenance SC-19

Description

Landscape maintenance activities include vegetation removal; herbicide and insecticide application; fertilizer application; watering; and other gardening and lawn care practices. Vegetation control typically involves a combination of chemical (herbicide) application and mechanical methods. All of these maintenance practices have the potential to contribute pollutants to the storm drain system. The major objectives of this BMP are to minimize the discharge of pesticides, herbicides and fertilizers to the storm drain system and receiving waters; prevent the disposal of landscape waste into the storm drain system by collecting and properly disposing of clippings and cuttings, and educating employees and the public.

Objectives
- Contain
- Educate
- Reduce/Minimize
- Product Substitution

Targeted Constituents

Sediment	9
Nutrients	9
Trash	9
Metals	
Bacteria	
Oil and Grease	
Organics	
Oxygen Demanding	9

Approach

Pollution Prevention

Implement an Integrated Pest Management (IPM) program. IPM is a sustainable approach to managing pests by combining biological, cultural, physical, and chemical tools.

Choose low water using flowers, trees, shrubs, and groundcover.

Consider alternative landscaping techniques such as naturescaping (planting native species) and xeriscaping (using drought tolerate plants).

Conduct appropriate maintenance (i.e. properly timed fertilizing, weeding, pest control, and pruning) to help preserve the landscapes water efficiency.

Consider grass cycling (grass cycling is the natural recycling of grass by leaving the clippings on the lawn when mowing. Grass clippings decompose quickly and release valuable nutrients back into the lawn).

Suggested Protocols

Mowing, Trimming, and Weeding

Whenever possible use mechanical methods of vegetation removal (e.g mowing with tractor-type or push mowers, hand cutting with gas or electric powered weed trimmers) rather than applying herbicides. Use hand weeding where practical.

Avoid loosening the soil when conducting mechanical or manual weed control, this could lead to erosion. Use mulch or other erosion control measures when soils are exposed.

Performing mowing at optimal times. Mowing should not be performed if significant rain events are predicted.

Mulching mowers may be recommended for certain flat areas. Other techniques may be employed to minimize mowing such as selective vegetative planting using low maintenance grasses and shrubs.

Collect lawn and garden clippings, pruning waste, tree trimmings, and weeds. Chip if necessary, and compost (see waste management section of this fact sheet).

Place temporarily stockpiled material away from watercourses, and berm or cover stockpiles to prevent material releases to storm drains.

Planting

Determine existing native vegetation features (location, species, size, function, importance) and consider the feasibility of protecting them. Consider elements such as their effect on drainage and erosion, hardiness, maintenance requirements, and possible conflicts between preserving vegetation and the resulting maintenance needs.

Retain and/or plant selected native vegetation whose features are determined to be beneficial, where feasible. Native vegetation usually requires less maintenance (e.g., irrigation, fertilizer) than planting new vegetation.

Consider using low water use groundcovers when planting or replanting.

Waste Management

Compost leaves, sticks, or other collected vegetation or dispose of at a permitted landfill. Do not dispose of collected vegetation into waterways or storm drainage systems.

Place temporarily stockpiled material away from watercourses and storm drain inlets, and berm or cover stockpiles to prevent material releases to the storm drain system. Reduce the use of high nitrogen fertilizers that produce excess growth requiring more frequent mowing or trimming.

Avoid landscape wastes in and around storm drain inlets by either using bagging equipment or by manually picking up the material.

Irrigation

Where practical, use automatic timers to minimize runoff.

Use popup sprinkler heads in areas with a lot of activity or where there is a chance the pipes may be broken. Consider the use of mechanisms that reduce water flow to sprinkler heads if broken.

Ensure that there is no runoff from the landscaped area(s) if re-claimed water is used for irrigation.

If bailing of muddy water is required (e.g. when repairing a water line leak), do not put it in the storm drain; pour over landscaped areas.

Irrigate slowly or pulse irrigate to prevent runoff and then only irrigate as much as is needed.

Apply water at rates that do not exceed the infiltration rate of the soil.

Fertilizer and Pesticide Management

Utilize a comprehensive management system that incorporates IPM techniques. There are many methods and types of IPM, including the following:

- Mulching can be used to prevent weeds where turf is absent, fencing installed to keep rodents out, and netting used to keep birds and insects away from leaves and fruit.
- Visible insects can be removed by hand (with gloves or tweezers) and placed in soapy water or vegetable oil. Alternatively, insects can be sprayed off the plant with water or in some cases vacuumed off of larger plants.
- Store-bought traps, such as species-specific, pheromone-based traps or colored sticky cards, can be used.
- Slugs can be trapped in small cups filled with beer that are set in the ground so the slugs can get in easily.
- In cases where microscopic parasites, such as bacteria and fungi, are causing damage to plants, the affected plant material can be removed and disposed of (pruning equipment should be disinfected with bleach to prevent spreading the disease organism).
- Small mammals and birds can be excluded using fences, netting, tree trunk guards.
- Beneficial organisms, such as bats, birds, green lacewings, ladybugs, praying mantis, ground beetles, parasitic nematodes, trichogramma wasps, seed head weevils, and spiders that prey on detrimental pest species can be promoted.

Follow all federal, state, and local laws and regulations governing the use, storage, and disposal of fertilizers and pesticides and training of applicators and pest control advisors.

Use pesticides only if there is an actual pest problem (not on a regular preventative schedule).

Do not use pesticides if rain is expected. Apply pesticides only when wind speeds are low (less than 5 mph).

Do not mix or prepare pesticides for application near storm drains.

Prepare the minimum amount of pesticide needed for the job and use the lowest rate that will effectively control the pest.

Employ techniques to minimize off-target application (e.g. spray drift) of pesticides, including consideration of alternative application techniques.

Fertilizers should be worked into the soil rather than dumped or broadcast onto the surface.

Calibrate fertilizer and pesticide application equipment to avoid excessive application.

Periodically test soils for determining proper fertilizer use.

Sweep pavement and sidewalk if fertilizer is spilled on these surfaces before applying irrigation water.

Purchase only the amount of pesticide that you can reasonably use in a given time period (month or year depending on the product).

Triple rinse containers, and use rinse water as product. Dispose of unused pesticide as hazardous waste.

Dispose of empty pesticide containers according to the instructions on the container label.

Inspection

Inspect irrigation system periodically to ensure that the right amount of water is being applied and that excessive runoff is not occurring. Minimize excess watering, and repair leaks in the irrigation system as soon as they are observed.

Inspect pesticide/fertilizer equipment and transportation vehicles daily.

Training

Educate and train employees on use of pesticides and in pesticide application techniques to prevent pollution. Pesticide application must be under the supervision of a Michigan qualified pesticide applicator.

Train/encourage municipal maintenance crews to use IPM techniques for managing public green areas.

Annually train employees within departments responsible for pesticide application on the appropriate portions of the agency's IPM Policy, SOPs, and BMPs, and the latest IPM techniques.

Employees who are not authorized and trained to apply pesticides should be periodically (at least annually) informed that they cannot use over-the-counter pesticides in or around the workplace.

Use a training log or similar method to document training.

Spill Response and Prevention

Refer to SC-2, Spill Prevention, Control & Cleanup.

Have spill cleanup materials readily available and in a known in location.

Cleanup spills immediately and use dry methods if possible.

Properly dispose of spill cleanup material.

Other Considerations

Pesticide use is regulated by the following : Michigan Act 24 – New Pesticide Requirements; Act 451, Part 83, Pesticide Control; Regulation 633, Restricted Use Pesticides; Regulation 636, Pesticide Applicators; and Regulation 637, Pesticide Use. Links can be found on the Michigan Department of Agriculture's Web site (see below). These acts and regulations place strict controls over pesticide application and handling and specify training, annual refresher, and testing requirements. The regulations generally cover: a list of approved pesticides and selected uses, updated regularly; general application information; equipment use and maintenance procedures; and record keeping.

The Michigan Department of Agriculture coordinates and maintains the licensing and certification programs. All public agency employees who apply pesticides and herbicides in "agricultural use" areas such as parks, golf courses, rights-of-way and recreation areas should be properly certified in accordance with state regulations. Contracts for landscape maintenance should include similar requirements.

All employees who handle pesticides should be familiar with the most recent material safety data sheet (MSDS) files.

The Michigan Acts have imposed requirements on school districts regarding pesticide use in schools, public buildings and health care facilities. An IPM program must be in place. Also for schools and daycares, written notification must be sent to the parents or guardians of the children before pesticides are applied on school property. All applicators must attend a training program approved by the Michigan Department of Agriculture.

Requirements

Costs

Additional training of municipal employees will be required to address IPM techniques and BMPs. IPM methods will likely increase labor cost for pest control which may be offset by lower chemical costs.

Maintenance Not applicable

Supplemental Information

Further Detail of the BMP

Waste Management

Composting is one of the better disposal alternatives if locally available. Most municipalities either have or are planning yard waste composting facilities as a means of reducing the amount of waste going to the landfill. Lawn clippings from municipal maintenance programs as well as private sources would probably be compatible with most composting facilities

Contractors and Other Pesticide Users

Municipal agencies should develop and implement a process to ensure that any contractor employed to conduct pest control and pesticide application on municipal property engages in pest control methods consistent with the IPM Policy adopted by the agency. Specifically, municipalities should require contractors to follow the agency's IPM policy, SOPs, and BMPs; provide evidence to the agency of having received training on current IPM techniques when feasible; provide documentation of pesticide use on agency property to the agency in a timely manner.

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12/18/07

Drainage System Maintenance SC-20

Description

As a consequence of its function, the stormwater conveyance system collects and transports urban runoff that may contain certain pollutants. Maintaining catch basins, stormwater inlets, and other stormwater conveyance structures on a regular basis will remove pollutants, prevent clogging of the downstream conveyance system, restore catch basins' sediment trapping capacity, and ensure the system functions properly hydraulically to avoid flooding.

Objectives
Contain
Educate
Reduce/Minimize

Targeted Constituents
Sediment 9
Nutrients 9
Trash 9
Metals 9
Bacteria 9
Oil and Grease 9
Organics 9
Oxygen Demanding 9

Approach

Suggested Protocols

Catch Basins/Inlet Structures

Municipal staff should regularly inspect facilities to ensure the following:

- Immediate repair of any deterioration threatening structural integrity.
- Cleaning before the sump is 40% full. Catch basins should be cleaned as frequently as needed to meet this standard.
- Stenciling of catch basins and inlets (see SC-21 Waste Handling and Disposal).

Clean catch basins, storm drain inlets, and other conveyance structures in high pollutant load areas just before the wet season to remove sediments and debris accumulated during the summer.

Conduct inspections more frequently during the wet season for problem areas where sediment or trash accumulates more often. Clean and repair as needed.

Keep accurate logs of the number of catch basins cleaned.

Record the amount of waste collected.

Store wastes collected from cleaning activities of the drainage system in appropriate containers or temporary storage sites in a manner that prevents discharge to the storm drain.

Dewater the wastes with outflow into the sanitary sewer if permitted. Water should be treated with an appropriate filtering device prior to discharge to the sanitary sewer. If discharge to the sanitary sewer is not allowed, water should be pumped or vacuumed to a tank and properly disposed of. Do not dewater near a storm drain or stream.

Except for small communities with relatively few catch basins that may be cleaned manually, most municipalities will require mechanical cleaners such as eductors, vacuums, or bucket loaders.

Storm Drain Conveyance System

Locate reaches of storm drain with deposit problems and develop a flushing schedule that keeps the pipe clear of excessive buildup.

Collect flushed effluent and pump to the sanitary sewer for treatment.

Pump Stations

Clean all storm drain pump stations prior to the wet season to remove silt and trash.

Do not allow discharge from cleaning a storm drain pump station or other facility to reach the storm drain system.

Conduct quarterly routine maintenance at each pump station.

Inspect, clean, and repair as necessary all outlet structures prior to the wet season.

Sample collected sediments to determine if landfill disposal is possible, or illegal discharges in the watershed are occurring.

Open Channel

Consider modification of storm channel characteristics to improve channel hydraulics, to increase pollutant removals, and to enhance channel/creek aesthetic and habitat value.

Conduct channel modification/improvement in accordance with existing laws. Contact the State of Michigan at 800-662-9278 to investigate which agencies will regulate the proposed activity. The developer-applicant should also contact local governments (city, county, special districts).

Illicit Connections and Discharges

During routine maintenance of conveyance system and drainage structures field staff should look for evidence of illegal discharges or illicit connections:

- Is there evidence of spills such as paints, discoloring, etc.
- Are there any odors associated with the drainage system
- Record locations of apparent illegal discharges/illicit connections
- Track flows back to potential dischargers and conduct aboveground inspections. This can be done through visual inspection of up gradient manholes or alternate techniques including zinc chloride smoke testing,

fluorometric dye testing, physical inspection testing, or television camera inspection.
- Once the origin of flow is established, require illicit discharger to eliminate the discharge.

Stencil storm drains, where applicable, to prevent illegal disposal of pollutants. Storm drain inlets should have messages such as "Dump No Waste Drains to Stream" stenciled next to them to warn against ignorant or intentional dumping of pollutants into the storm drainage system.

Refer to fact sheet SC-1 Non-Stormwater Discharges.

Illegal Dumping

Regularly inspect and clean up hot spots and other storm drainage areas where illegal dumping and disposal occurs.

Establish a system for tracking incidents. The system should be designed to identify the following:

- Illegal dumping hot spots
- Types and quantities (in some cases) of wastes
- Patterns in time of occurrence (time of day/night, month, or year)
- Mode of dumping (abandoned containers, "midnight dumping" from moving vehicles, direct dumping of materials, accidents/spills)
- Responsible parties

Post "No Dumping" signs in problem areas with a phone number for reporting dumping and disposal. Signs should also indicate fines and penalties for illegal dumping.

Refer to fact sheet SC-1 Non-Stormwater Discharges.

To report environmental violations during business hours, contact the State's Environmental Assistance Division at 800-662-9278. Emergency calls and calls after business hours, during weekends and holidays should be directed to the Pollution Emergency Alerting System (PEAS) at 800-292-4706.

Training

Train crews in proper maintenance activities, including record keeping and disposal.

Only properly trained individuals are allowed to handle hazardous materials/wastes.

Train municipal employees from all departments (public works, utilities, street cleaning, parks and recreation, industrial waste inspection, hazardous waste inspection, sewer maintenance) to recognize and report illegal dumping.

Train municipal employees and educate businesses, contractors, and the general public in proper and consistent methods for disposal.

Train municipal staff regarding non-stormwater discharges (See SC-1 Non-Stormwater Discharges).

Spill Response and Prevention

Refer to SC-2, Prevention, Control & Cleanup

Have spill cleanup materials readily available and in a known location.

Cleanup spills immediately and use dry methods if possible.

Properly dispose of spill cleanup material.

Other Considerations

Cleanup activities may create a slight disturbance for local aquatic species. Access to items and material on private property may be limited. Trade-offs may exist between channel hydraulics and water quality/riparian habitat. If storm channels or basins are recognized as wetlands, many activities, including maintenance, may be subject to regulation and permitting.

Storm drain flushing is most effective in small diameter pipes (36-inch diameter pipe or less, depending on water supply and sediment collection capacity). Other considerations associated with storm drain flushing may include the availability of a water source, finding a downstream area to collect sediments, liquid/sediment disposal, and disposal of flushed effluent to sanitary sewer may be prohibited in some areas.

Regulations may include adoption of substantial penalties for illegal dumping and disposal.

Municipal codes should include sections prohibiting the discharge of soil, debris, refuse, hazardous wastes, and other pollutants into the storm drain system.

Private property access rights may be needed to track illegal discharges up gradient.

Municipal ordinance authority is required guaranteeing rights of entry for suspected source verification testing of illicit connections necessary for guaranteed rights of entry.

Requirements

Costs

An aggressive catch basin cleaning program could require a significant capital and O&M budget. A careful study of cleaning effectiveness should be undertaken before increased cleaning is implemented. Catch basin cleaning costs are less expensive if vacuum street sweepers are available; cleaning catch basins manually can cost approximately twice as much as cleaning the basins with a vacuum attached to a sweeper.

Methods used for illicit connection detection (smoke testing, dye testing, visual inspection, and flow monitoring) can be costly and time-consuming. Site-specific factors, such as the level of impervious area, the density and ages of buildings, and type of land use will determine the level of investigation necessary. Encouraging reporting of illicit discharges by employees can offset costs by saving expense on inspectors and directing resources more efficiently. Some programs have used funds available from "environmental fees" or special assessment districts to fund their illicit connection elimination programs.

Maintenance

Two-person teams may be required to clean catch basins with vactor trucks.

Identifying illicit discharges requires teams of at least two people (volunteers can be used), plus administrative personnel, depending on the complexity of the storm sewer system.

Arrangements must be made for proper disposal of collected wastes.

Requires technical staff to detect and investigate illegal dumping violations, and to coordinate public education.

Supplemental Information

Further Detail of the BMP

Storm Drain flushing

Sanitary sewer flushing is a common maintenance activity used to improve pipe hydraulics and to remove pollutants in sanitary sewer systems. The same principles that make sanitary sewer flushing effective can be used to flush storm drains. Flushing may be designed to hydraulically convey accumulated material to strategic locations, such as to an open channel, to another point where flushing will be initiated, or over to the sanitary sewer and on to the treatment facilities, thus preventing re-suspension and overflow of a portion of the solids during storm events. Flushing prevents "plug flow" discharges of concentrated pollutant loadings and sediments. The deposits can hinder the designed conveyance capacity of the storm drain system and potentially cause backwater conditions in severe cases of clogging.

Storm drain flushing usually takes place along segments of pipe with grades that are too flat to maintain adequate velocity to keep particles in suspension. An upstream manhole is selected to place an inflatable device that temporarily plugs the pipe. Further upstream, water is pumped into the line to create a flushing wave. When the upstream reach of pipe is sufficiently full to cause a flushing wave, the inflated device is rapidly deflated with the assistance of a vacuum pump, releasing the backed up water and resulting in the cleaning of the storm drain segment. To further reduce the impacts of stormwater pollution, a second inflatable device, placed well downstream, may be used to re-collect the water after the force of the flushing wave has dissipated. A pump may then be used to transfer the water and accumulated material to the sanitary sewer for treatment. In some cases, an interceptor structure may be more practical or required to re-collect the flushed waters.

It has been found that cleansing efficiency of periodic flush waves is dependent upon flush volume, flush discharge rate, sewer slope, sewer length, sewer flow rate, sewer diameter, and population density. As a rule of thumb, the length of line to be flushed should not exceed 700 feet. At this maximum recommended length, the percent removal efficiency ranges between 65- 75 percent for organics and 55-65 percent for dry weather grit/inorganic material. The percent removal efficiency drops rapidly beyond that. Water is commonly supplied by a water truck, but fire hydrants can also supply water. To make the best use of water, it is recommended that reclaimed water be used or that fire hydrant line flushing coincide with storm drain flushing.

Flow Management

Flow management has been one of the principal motivations for designing urban stream corridors in the past. Such needs may or may not be compatible with the stormwater quality goals in the stream corridor. Downstream flood peaks can be suppressed by reducing through flow velocity. This can be accomplished by reducing gradient with grade control structures or increasing roughness with boulders, dense vegetation, or complex banks forms. Reducing velocity correspondingly increases flood height, so all such measures have a natural association with floodplain open space. Flood elevations laterally adjacent to the stream can be lowered by increasing through flow velocity. However, increasing velocity increases flooding downstream and inherently conflicts with channel stability and human safety. Where topography permits, another way to lower flood elevation is to lower the level of the floodway with drop structures into a large but subtly excavated bowl where flood flows we allowed to spread out.

Stream Corridor Planning

Urban streams receive and convey stormwater flows from developed or developing watersheds. Planning of stream corridors thus interacts with urban stormwater management programs. If local programs are intended to control or protect downstream environments by managing flows delivered to the channels, then it is logical that such programs should be supplemented by management of the materials, forms, and uses of the downstream riparian corridor. Any proposal for stream alteration or management should be investigated for its potential flow and stability effects on upstream,

downstream, and laterally adjacent areas. The timing and rate of flow from various tributaries can combine in complex ways to alter flood hazards. Each section of channel is unique, influenced by its own distribution of roughness elements, management activities, and stream responses.

Flexibility to adapt to stream features and behaviors as they evolve must be included in stream reclamation planning. The amenity and ecology of streams may be enhanced through the landscape design options of **1) corridor reservation, 2) bank treatment, 3) geomorphic restoration, and 4) grade control.**

Corridor reservation - Reserving stream corridors and valleys to accommodate natural stream meandering, aggradation, degradation, and over bank flows allows streams to find their own form and generate less ongoing erosion. Open stream corridors in urban developments can produce recreational open space, irrigation of streamside plantings, and the aesthetic amenity of flowing water.

Bank treatment - The use of armoring, vegetative cover, and flow deflection may be used to influence a channel's form, stability, and biotic habitat. To prevent bank erosion, armoring can be done with rigid construction materials, such as concrete, masonry, wood planks and logs, riprap, and gabions. Concrete linings have been criticized because of their lack of provision of biotic habitat. In contrast, riprap and gabions make relatively porous and flexible linings. Boulders, placed in the bed reduce velocity and erosive power. Riparian vegetation can stabilize the banks of streams that are at or near a condition of equilibrium. Binding networks of roots increase bank shear strength. During flood flows, resilient vegetation is forced into erosion-inhibiting mats. The roughness of vegetation leads to lower velocity, further reducing erosive effects. Structural flow deflection can protect banks from erosion or alter fish habitat. By concentrating flow, a deflector causes a pool to be scoured in the bed.

Geomorphic restoration – Restoration refers to alteration of disturbed streams so their form and behavior emulate those of undisturbed streams. Natural meanders are retained, with grading to gentle slopes on the inside of curves to allow point bars and riffle-pool sequences to develop. Trees are retained to provide scenic quality, biotic productivity, and roots for bank stabilization, supplemented by plantings where necessary. A restorative approach can be successful where the stream is already approaching equilibrium. However, if upstream urbanization continues new flow regimes will be generated that could disrupt the equilibrium of the treated system.

Grade Control - A grade control structure is a level shelf of a permanent material, such as stone, masonry, or concrete, over which stream water flows. A grade control structure is called a sill, weir, or drop structure, depending on the relation of its invert elevation to upstream and downstream channels. A sill is installed at the preexisting channel bed elevation to prevent upstream migration of nick points. It establishes a firm base level below which the upstream channel can not erode. A weir or check dam is installed with invert above the preexisting bed elevation. A weir raises the local base level of the stream and causes aggradation upstream. The gradient, velocity, and erosive potential of the stream channel are reduced. A drop structure lowers the downstream invert below its

preexisting elevation, reducing downstream gradient and velocity. Weirs and drop structure control erosion by dissipating energy and reducing slope velocity.

When carefully applied, grade control structures can be highly versatile in establishing human and environmental benefits in stabilized channels. To be successful, application of grade control structures should be guided by analysis of the stream system both upstream and downstream from the area to be reclaimed.

Examples
In Buena Vista Park, upper floodway slopes are gentle and grassed to achieve continuity of usable park land across the channel of small boulders at the base of the slopes.

The San Diego River is a large, vegetative lined channel, which was planted in a variety of species to support riparian wildlife while stabilizing the steep banks of the floodway.

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12/18/07

Waste Handling and Disposal SC-21

Description

It is important to control litter to eliminate trash and other materials in stormwater runoff. Waste reduction is a major component of waste management and should be encouraged through training and public outreach. Management of waste once it is collected may involve reuse, recycling, or proper disposal.

Objectives
- Cover
- Contain
- Educate
- Reduce/Minimize

Targeted Constituents

Sediment	9
Nutrients	9
Trash	9
Metals	9
Bacteria	9
Oil and Grease	9
Organics	9
Oxygen Demanding	9

Approach

Pollution Prevention

Reuse products when possible.

Encourage recycling programs with recycling bins, used oil collection, etc.

Suggested Protocols

Solid Waste Collection

Implement procedures, where applicable, to collect, transport, and dispose of solid waste at appropriate disposal facilities in accordance with applicable federal, state, and local laws and regulations.

Include properly designed trash storage areas. If feasible provide cover over trash storage areas.

Regularly inspect solid waste containers for structural damage. Repair or replace damaged containers as necessary.

Secure solid waste containers; containers must be closed tightly when not in use.

Do not fill waste containers with washout water or any other liquid.

Ensure that only appropriate solid wastes are added to the solid waste container. Certain wastes such as hazardous wastes, appliances, fluorescent lamps, pesticides, etc. may not be disposed of in solid waste containers (see chemical/ hazardous waste collection section below).

Do not mix wastes; this can cause chemical reactions, make recycling impossible, and complicate disposal.

Refer to SC-10 Waste Handling and Disposal (solid waste) for more information regarding solid waste facilities.

Waste Reduction and Recycling

Recycle wastes whenever possible. Many types of waste can be recycled; recycling options for each waste type is limited. All gasoline, antifreeze, waste oil, and lead-acid batteries can be recycled. Latex and oil-based paint can be reused, as well as recycled. Materials that cannot be reused or recycled should either be incinerated or disposed of at a properly permitted landfill.

Recycling is always preferable to disposal of unwanted materials.

Recycling bins for glass, metal, newspaper, plastic bottles and other recyclable household solid wastes should be provided at public facilities and/or for residential curbside collection.

Controlling Litter

Post "No Littering" signs and enforce anti-litter laws.

Provide litter receptacles in busy, high pedestrian traffic areas of the community, at recreational facilities, and at community events.

Clean out and cover litter receptacles frequently to prevent spillage.

Illegal Dumping

Substances illegally dumped on streets and into the storm drain system and creeks include paints, used oil and other automotive fluids, construction debris, chemicals, fresh concrete, leaves, grass clipping, and pet wastes.

Post "No Dumping" signs with a phone number for reporting dumping and disposal. Signs should also indicate fines and penalties for illegal dumping.

Landscaping and beautification efforts of hot spots might also discourage future dumping.

See SC-20 Drainage System Maintenance, and SC-1 Non-Stormwater Discharges.

Requirements

Costs

The costs for a solid waste source control program vary depending on the type of method. The cost of a community education program or a plan to increase the number of trash receptacles can be very minimal. Costs for structural controls such as

trash racks, bar screens, and silt traps can be quite costly ranging from $250,000 to $900,000.

A collection facility or curbside collection for used oil may result in significant costs. Commercial locations (automobile service stations, quick oil change centers, etc.) as collection points eliminate hauling and recycling costs.

Collection and disposal of hazardous waste can be very expensive and requires trained operators; laboratory and detection equipment; and extensive record keeping including dates, types, and quantities.

Use of volunteer work forces can lower storm drain stenciling program costs. Stenciling kits require procurement of durable/disposable items. The stenciling program can aid in the cataloging of the storm drain system. Stencil kits should be provided on a loan basis to volunteer groups free of charge with the understanding that kit remnants are to be returned.

Maintenance

The primary staff demand for stenciling programs is for program setup to provide marketing and training. Ongoing/follow-up staff time is minimal because of volunteer services.

Staffing requirements are minimal for oil recycling programs if collection/recycling is contracted out to a used oil hauler/recycler or required at commercial locations.

Staff requirements for maintaining good housekeeping BMPs at waste handling sites is minimal.

Manifest of waste collected, includes dates, etc. should be kept on record.

Supplemental Information

Further Detail of the BMP

Waste Reduction

An approach to reduce stormwater pollution from waste handling and disposal is to assess activities and reduce waste generation. The assessment is designed to find situations where waste can be eliminated or reduced and emissions and environmental damage can be minimized. The assessment involves collecting process specific information, setting pollution prevention targets, and developing, screening and selecting waste reduction options for further study. Starting a waste reduction program is economically beneficial because of reduced raw material purchases and lower waste disposal fees.

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12/18/07

Water & Sewer Utility Maintenance SC-22

Description

Although the operation and maintenance of public utilities are not considered chronic sources of stormwater pollution, some activities and accidents can result in the discharge of pollutants that can pose a threat to both human health and the quality of receiving waters if they enter the storm drain system. Sewage incident response and investigation may involve a coordinated effort between staff from a number of different departments/agencies. Cities that do not provide maintenance of water and sewer utilities must coordinate with the contracting agency responsible for these activities and ensure that these model procedures are followed.

Objectives

Cover
Contain
Educate
Reduce/Minimize

Targeted Constituents

Sediment	9
Nutrients	9
Trash	
Metals	
Bacteria	9
Oil and Grease	9
Organics	9
Oxygen Demanding	9

Approach

Pollution Prevention

Inspect potential non-stormwater discharge flow paths and clear/cleanup any debris or pollutants found (i.e. remove trash, leaves, sediment, and wipe up liquids, including oil spills).

Suggested Protocols

Water Line Maintenance and Cleaning

Procedures can be employed to reduce pollutants from discharges associated with water utility operation and maintenance activities. Planned discharges may include fire hydrant testing, flushing water supply mains after new construction, flushing lines due to complaints of taste and odor, dewatering mains for maintenance work. Unplanned discharges from treated, recycled water, raw water, and groundwater systems operation and maintenance activities can occur from water main breaks, sheared fire hydrants, equipment malfunction, and operator error.

Planned discharges

Identify a suitable discharge option in the following order of preference:

- Apply to the land.
- Reuse water for dust suppression, irrigation, or construction compaction.
- Discharge to a sanitary sewer system with approval.

- Discharge to the storm drain system using applicable pollution control measures. (Only available to clean water discharges such as water main/ water storage tank/water hydrant flushing).

If water is discharged to a storm drain, control measures must be put in place to control potential pollutants (i.e. sediment, chlorine, etc.). Examples of some storm drain protection options include:

- Silt fence – appropriate where the inlet drains a relatively flat area.
- Gravel and wire mesh sediment filter – Appropriate where concentrated flows are expected.
- Wooden weir and fabric – use at curb inlets where a compact installation is desired.
- Other commercially available device for controlling sediment.

Prior to discharge, inspect discharge flow path and clear/cleanup any debris or pollutants found (i.e. remove trash, leaves, sediment, and wipe up liquids, including oil spills).

General Design considerations for inlet protection devices include the following:

- The device should be constructed such that cleaning and disposal of trapped sediment is made easy, while minimizing interference with discharge activities.
- Devices should be constructed so that any standing water resulting from the discharge will not cause excessive inconvenience or flooding/damage to adjacent land or structures.

The effectiveness of control devices must be monitored during the discharge period and any necessary repairs or modifications made.

Unplanned Discharges

Stop the discharge as quickly as possible.

Inspect flow path of the discharged water:

- Identify erodible areas which may need to be repaired or protected during subsequent repairs or corrective actions
- Identify the potential for pollutants to be washed into the waterway

If repairs or corrective action will cause additional discharges of water, select the appropriate procedures for erosion control, chlorine residual, turbidity, and chemical additives. Prevent potential pollutants from entering the flow path.

Sanitary Sewer Maintenance

This section is applicable to municipalities who own and operate a sewage collection system. Facilities that are covered under this program include sanitary sewer pipes and

pump stations owned and operated by a municipality. The owner of the sanitary sewer facilities is the entity responsible for carrying out this prevention and response program.

Clean sewer lines on a regular basis to remove grease, grit, and other debris that may lead to sewer backups.

Establish routine maintenance program. Cleaning should be conducted at an established minimum frequency and more frequently for problem areas such as restaurants that are identified.

Cleaning activities may require removal of tree roots and other identified obstructions.

During routine maintenance and inspection note the condition of sanitary sewer structures and identify areas that need repair or maintenance. Items to note may include the following:

- Cracked/deteriorating pipes
- Leaking joints/seals at manhole
- Frequent line plugs
- Line generally flows at or near capacity
- Suspected infiltration or exfiltration.

Prioritize repairs based on the nature and severity of the problem. Immediate clearing of blockage or repair is required where an overflow is currently occurring or for urgent problems that may cause an imminent overflow (e.g. pump station failures, sewer line ruptures, sewer line blockages). These repairs may be temporary until scheduled or capital improvements can be completed.

Review previous sewer maintenance records to help identify “hot spots” or areas with frequent maintenance problems and locations of potential system failure.

Spills and Overflows

Identify and track sanitary sewer discharges. Identify dry weather infiltration and inflow first. Wet weather overflow connections are very difficult to locate.

Locate wet weather overflows and leaking sanitary sewers using conventional source identification techniques such as monitoring and field screening. Techniques used to identify other illicit connection sources can also be used for sewer system evaluation surveys (see SC-20 Drainage System Operation and Maintenance).

Implement community awareness programs for monitoring sanitary sewer wet weather overflows. A citizen’s hotline for reporting observed overflow conditions should be established to supplement field screening efforts.

Establish lead department/agency responsible for spill response and containment. Provide coordination within departments.

When a spill, leak, and/or overflow occurs and when disinfecting a sewage contaminated area, take every effort to ensure that the sewage, disinfectant and/or sewage treated with the disinfectant is not discharged to the storm drain system or receiving waters. Methods may include:

- Blocking storm drain inlets and catch basins
- Containing and diverting sewage and disinfectant away from open channels and other storm drain fixtures (using sandbags, inflatable dams, etc.)
- Removing the material with vacuum equipment

Record required information at the spill site.

Perform field tests as necessary to determine the source of the spill.

Develop notification procedures regarding spill reporting.

Septic Systems

Ensure that homeowners, installers, and inspectors are educated in proper maintenance of septic systems. This may require coordination with staff from other departments. Outreach to homeowners should include inspection reminders informing then that inspection and perhaps maintenance is due for their systems. Recommend that the system be inspected annually and pumped-out regularly.

Programs which seek to address failing septic systems should consider using field screening to pinpoint areas where more detailed onsite inspection surveys are warranted.

Training

Conduct annual training of water utility personnel and service contractors. (field screening, sampling, smoke/dye testing, TV inspection).

OSHA-required Health and Safety Training 29 CFR 1910.120 plus annual Refresher Training (as needed).

OSHA Confined Space Entry training (Cal-OSHA Confined Space, Title 8 and federal OSHA 29 CFR 1910.146).

MIOSHA General Industry Standard, Part 90. Confined Space Entry (29CFR 1910.146)

MIOSHA Occupational Health Standard, Part 490. Permit Required Confined Spaces (29CFR 1910.146)

MIOSHA Construction Standard Part 1, R408.40121. General Rules, Confined or Enclosed Spaces; Testing" Neutralizing Hazard

MIOSHA Part 622. Control Measures for Hazardous Atmosphere in Confined Spaces for Construction

MIOSHA General Industry Safety Standards, Part 33, Personal Protective Equipment

Hazard Communication Training as specified in and MIOSHA Part 42, R 408.44201 to R408.44203 (Construction Safety Standards), MIOSHA Part 92, R408.19501 to R408.19203 (General Industry Safety Standards) and MIOSHA Rules 325.77001 to 325.77003. (Occupational Health Standards)

Spill Response and Prevention

See previous section regarding spills and overflows.

Refer to SC-2, Spill Prevention, Control & Cleanup.

Have spill cleanup materials readily available and in a known location.

Cleanup spills immediately and use dry methods if possible.

Properly dispose of spill cleanup material.

Other Considerations

Enact ordinance granting "right-of-entry" to locate potentially responsible parties for sewer overflows.

Reliance on individual onsite inspection to detect failed septic systems can be a major limitation. The individual onsite inspection is very labor-intensive and requires access to private property to pinpoint the exact location of the failing system.

A significant limitation to correcting failing septic systems is the lack of techniques available for detecting individual failed septic systems.

Requirements

Costs

Departmental cooperation recommended for sharing or borrowing staff resources and equipment from municipal wastewater department.

Infiltration, inflow, and wet weather overflows from sanitary sewers are very labor and equipment intensive to locate.

The costs associated with detecting and correcting septic system failures are subject to a number of factors, including availability of trained personnel, cost of materials, and the level of follow-up required to fix the system problems.

Maintenance

Minimum 2-person teams to perform field screening and associated sampling.

Larger teams required for implementing other techniques (i.e. smoke testing, fluorometric dye testing, television camera inspection and physical inspection with confined space entry) to identify sewer system leaks.

Program coordination required for handling emergencies, record keeping, etc.

Many of the problems associated with improper use of septic systems may be attributed to lack of user knowledge on operation and maintenance. Educational materials for homeowners and training courses for installers and inspectors can reduce the incidence of pollution from these widespread and commonly used pollution control devices.

Supplemental Information

Further Detail of the BMP

Onsite Sewage Disposal Systems

New onsite sewage disposal systems should be designed, located, and installed away from open waterbodies and sensitive resources such as wetlands and floodplains. A protective separation between the OSDS and groundwater should also be established. OSDSs should be operated and maintained to prevent surface water discharges and reduce pollutant loadings to groundwater. Inspection of OSDSs should occur regularly and repairs made immediately. New or replacement plumbing fixtures should be of the high efficiency type.

Typical Sanitary Sewer Problems

Old and deteriorated main and lateral pipes - Sewers range in age from 30 to 100 years with an average age of 50 years.

Cracked sewer pipes - Existing sewers are mostly clay pipes which can crack as they deteriorate with age and also by earth movement.

Misaligned and open pipe joints - Most of the mortar used to seal the joints between sections of clay pipe has deteriorated.

Undersized sewer pipe - The existing sewer system is overloaded due to new sewer hookups, underground water infiltration, and illegal roof and/or yard drain connections.

Defective manholes - Old manholes are made of bricks. Typical problems associated with brick manholes are loose bricks, missing bricks, and misaligned manholes.

Missing and/or unrecorded sewer pipes and manholes - This problem is typical in the easement/backline sewer. Sewer pipe locations shown on the sewer record map are different from the actual sewer location.

Sewer main under houses and other improvements - Complaints of sewer main alignment crossing the house and other improvements. A solution to this problem requires an agreement with the property owner for a new sewer easement at a relocated line.

Causes of Sanitary Sewer Backups

Root infiltration - Tree roots are a major cause of backups.

Water inflow/infiltration - Rain water entering the sewer pipe causes overflows.

Solids - Typical solids that buildup in the pipe and cause backups are grease, dirt, bones, tampons, paper towels, diapers, broken dishware, garbage, concrete, and debris.

Structural defects in pipes and manholes - Sags in the line, cracks, holes, protruding laterals, misaligned pipe, offset joints are all possible causes of backups.

Design Considerations

Sanitary sewer overflows can often be reduced or eliminated by a number of practices, in addition to sewer system cleaning and maintenance, including the following:

Reducing infiltration and inflow through rehabilitation and repair of broken or leaking sewer lines.

Enlarging or upgrading the capacity of sewer lines, pump stations, or sewage treatment plants.

Constructing wet weather storage and treatment facilities to treat excess flows.

Addressing SSOs during sewer system master planning and facilities planning.

Septic Systems

Two field screening techniques that have been used with success at identifying possible locations of failing septic systems are the brightener test and color infrared (CIR) aerial photography. The first involves the use of specific phosphorus-based elements found in many laundry products, often called brighteners, as an indicator of the presence of failing onsite wastewater systems.

The second technique uses color infrared (CIR) aerial photography to characterize the performance of septic systems. This method has been found to be a quick and cost-effective method for assessing the potential impacts of failing systems and uses variations in vegetative growth or stress patterns over septic system field lines to identify those systems that may potentially be malfunctioning. Then a more detailed onsite visual and physical inspection will confirm whether the system has truly failed and the extent of the repairs needed. These inspections may be carried out by county health departments or other authorized personnel.

References and Resources

Alameda Countywide Clean Water Program on-line
http://www.ci.berkeley.ca.us/pw/Storm/stormala.html

Los Angeles County Stormwater Quality. Public Agency Activities Model Program. On-line: http://ladpw.org/wmd/npdes/public_TC.cfm

Orange County Stormwater Program
http://www.ocwatersheds.com/StormWater/swp_introduction.asp

Santa Clara Valley Urban Runoff Pollution Prevention Program. 1997 Urban Runoff Management Plan. September 1997, updated October 2000.

Santa Clara Valley Urban Runoff Pollution Prevention Program. 1998. Water Utility Operation and Maintenance Discharge Pollution Prevention Plan. June

United States Environmental Protection Agency (USEPA). 2001. Illicit Discharge Detection and Elimination. On-line:
http://cfpub.epa.gov/npdes/stormwater/menuofbmps/illi_1.cfm

United States Environmental Protection Agency (USEPA). 2001. Pollution Prevention/Good Housekeeping for Municipal Operators Septic System Controls. On-line: http://www.epa.gov/npdes/menuofbmps/poll_14.htm

12/18/07

Section 4

Glossary and List of Acronyms

4.1 Glossary

303(d) Listed: Water bodies listed as impaired as per Section 303(d) of the 1972 Clean Water Act.

Best Management Practices (BMPs): Includes schedules of activities, prohibitions of practices, maintenance procedures, and other management practices to prevent, eliminate, or reduce the pollution of waters of the receiving waters. BMPs also include treatment requirements, operating procedures, and practices to control plant site runoff spillage or leaks, sludge or waste disposal, or drainage from raw material storage.

Catch Basin (Also known as Inlet): Box-like underground concrete structure with openings in curbs and gutters designed to collect runoff from streets and pavement.

Clean Water Act (CWA): (33 U.S.C. 1251 et seq.) requirements of the NPDES program are defined under Sections 307, 402, 318 and 405 of the CWA.

Construction Activity: Includes clearing, grading, excavation, and contractor activities that result in soil disturbance.

Construction General Permit: A National Pollutant Discharge Elimination System (NPDES) permit issued by the State Water Resources Control Board for the discharge of stormwater associated with construction activity from soil disturbance of five acres or more. Threshold lowered to one acre beginning October 10, 2003. Construction General Permit No. CAS000002.

Denuded: Land stripped of vegetation or land that has had its vegetation worn down due to the impacts from the elements or humans.

Detention: The capture and subsequent release of stormwater runoff from the site at a slower rate than it is collected, the difference being held in temporary storage.

Discharge: A release or flow of stormwater or other substance from a conveyance system or storage container. Broader – includes release to storm drains, etc.

Effluent Limits: Limitations on amounts of pollutants that may be contained in a discharge. Can be expressed in a number of ways including as a concentration, as a concentration over a time period (e.g., 30-day average must be less than 20 mg/l), or as a total mass per time unit, or as a narrative limit.

Erosion: The wearing away of land surface by wind or water. Erosion occurs naturally from weather or runoff but can be intensified by land-clearing practices related to farming, new development, redevelopment, road building, or timber cutting.

Facility: Is a collection of industrial processes discharging stormwater associated with industrial activity within the property boundary or operational unit.

Grading: The cutting or filling of the land surface to a desired slope or elevation.

Hazardous Waste: A waste or combination of wastes that, because of its quantity, concentration, or physical, chemical or infectious characteristics, may either cause or significantly contribute to an increase in mortality or an increase in serious irreversible illness; or pose a substantial present or potential hazard to human health or the environment when improperly treated, stored, transported, disposed of or otherwise managed. Possesses at least one of four characteristics (ignitability, corrosivity, reactivity, or toxicity) or appears on special EPA or state lists. Regulated under the federal Resource Conservation and Recovery Act and the California Health and Safety Code.

Illicit Discharges: Any discharge to a municipal separate storm sewer that is not in compliance with applicable laws and regulations as discussed in this document.

Industrial General Permit: A National Pollutant Discharge Elimination System (NPDES) Permit issued by the Michigan Department of Environmental Quality.

Inlet: An entrance into a ditch, storm drain, or other waterway.

Integrated Pest Management(IPM): An ecosystem-based strategy that focuses on long-term prevention of pests or their damage through a combination of techniques such as biological control, habitat manipulation, modification of cultural practices, and use of resistant varieties. Pesticides are used only after monitoring indicates they are needed according to established guidelines, and treatments are made with the goal of removing only the target organism.

Municipal Separate Storm Sewer System (MS4): A conveyance or system of conveyances (including roads with drainage systems, municipal streets, catch basins, curbs, gutters, ditches, man-made channels, or storm drains): (i) designed or used for collecting or conveying storm water; (ii) which is not a combined sewer; and (iii) which is not part of a Publicly Owned Treatment Works (POTW) as defined at Title 40 of the Code of Federal Regulations (CFR) 122.2. A “Small MS4” is defined as an MS4 that is not a permitted MS4 under the Phase I regulations. This definition of a Small MS4 applies to MS4 operated within cities and counties as well as governmental facilities that have a system of storm sewers.

Non-Stormwater Discharge: Any discharge to municipal separate storm sewer that is not composed entirely of stormwater.

Nonpoint Source Pollution: Pollution that does not come from a point source. Nonpoint source pollution originates from aerial diffuse sources that are mostly related to land use.

Notice of Intent (NOI): A formal notice to SWRCB submitted by the owner of an industrial site or construction site that said owner seeks coverage under a General Permit for discharges associated with industrial and construction activities. The NOI provides information on the owner, location, type of project, and certifies that the owner will comply with the conditions of the construction General Permit.

Notice of Termination (NOT): Formal notice submitted by owner/ developer that a construction project is complete.

NPDES Permit: NPDES is an acronym for National Pollutant Discharge Elimination System. NPDES is the national program for administering and regulating Sections 307, 318, 402, and 405 of the Clean Water Act (CWA). The Michigan Department of Environmental Quality has issued a General Permit for stormwater discharges associated with industrial activities (see Appendix A).

Outfall: The end point where storm drains discharge water into a waterway.

Point Source: Any discernible, confined, and discrete conveyance from which pollutants are or may be discharged. This term does not include return flows from irrigated agriculture or agricultural stormwater runoff.

Pollutant: Generally, any substance introduced into the environment that adversely affects the usefulness of a resource.

Pollution Prevention (P2): Practices and actions that reduce or eliminate the generation of pollutants.

Precipitation: Any form of rain or snow.

Pretreatment: Treatment of waste stream before it is discharged to a collection system.

Reclaim (water reclamation): Planned use of treated effluent that would otherwise be discharged without being put to direct use.

Retention: The storage of stormwater to prevent it from leaving the development site.

Reuse (water reuse): (see Reclaim)

Runoff: Water originating from rainfall, melted snow, and other sources (e.g., sprinkler irrigation) that flows over the land surface to drainage facilities, rivers, streams, springs, seeps, ponds, lakes, and wetlands.

Run-on: Off site stormwater surface flow or other surface flow which enters your site.

Scour: The erosive and digging action in a watercourse caused by flowing water.

Secondary Containment: Structures, usually dikes or berms, surrounding tanks or other storage containers, designed to catch spilled materials from the storage containers.

Sedimentation: The process of depositing soil particles, clays, sands, or other sediments that were picked up by runoff.

Sediments: Soil, sand, and minerals washed from land into water, usually after rain, that collect in reservoirs, rivers, and harbors, destroying fish nesting areas and clouding the water, thus preventing sunlight from reaching aquatic plants. Farming, mining, and building activities without proper implementation of BMPs will expose sediment materials, allowing them to be washed off the land after rainfalls.

Significant Materials: Includes, but not limited to, raw materials; fuels; materials such as solvents, detergents, and plastic pellets; finished materials such as metallic products; raw materials used in food processing or production; hazardous substances designed under Section 101(14) of CERLCA; any chemical the facility is required to report pursuant to Section 313 of Title III of SARA; fertilizers; pesticides; and waste products such as ashes, slag, and sludge that have the potential to be released with stormwater discharges.

Significant Quantities: The volume, concentrations, or mass of a pollutant in stormwater discharge that can cause or threaten to cause pollution, contamination, or nuisance that adversely impact human health or the environment and cause or contribute to a violation of any applicable water quality standards for receiving water.

Source Control BMPs: Operational practices that reduce potential pollutants at the source.

Source Reduction (also source control): The technique of stopping and/ or reducing pollutants at their point of generation so that they do not come into contact with stormwater.

Storm Drains: Above- and below-ground structures for transporting stormwater to streams or outfalls for flood control purposes.

Stormwater: Defined as urban runoff and snowmelt runoff consisting only of those discharges, which originate from precipitation events. Stormwater is that portion of precipitation that flows across a surface to the storm drain system or receiving waters.

Stormwater Discharge Associated with Industrial Activity: Discharge from any conveyance which is used for collecting and conveying stormwater from an area that is directly related to manufacturing, processing, or raw materials storage activities at an industrial plant.

Stormwater Pollution Control Plan (SWPCP): A less formal plan than the SWPPI that addresses the implementation of BMPs at facilities/businesses not covered by a general permit but that have the potential to discharge pollutants.

Stormwater Pollution Prevention Initiative (SWPPI): A written plan that documents the series of phases and activities that, first, characterizes your site, and then prompts you to select and carry out actions which prevent the pollution of stormwater discharges.

Treatment Control BMPs: Treatment methods to remove pollutants from stormwater.

Toxicity: Adverse responses of organisms to chemicals or physical agents ranging from mortality to physiological responses such as impaired reproduction or growth anomalies.

Turbidity: Describes the ability of light to pass through water. The cloudy appearance of water caused by suspended and colloidal matter (particles).

4.2 Acronyms

AASHTO American Association of State Highway and Transportation Officials
AC Asphalt Concrete
ADL Aerially Deposited Lead
AIMP Impervious Area
AINF Infiltration Area
ANSI American National Standards Institute
APHA American Public Health Association
APWA American Public Works Association
ASTM American Society for Testing Materials
AWWA American Water Works Association
BAT Best Available Technology (economically available)
BCT Best Conventional Technology (pollution control)
BFP Bonded Fiber Matrix
BMPs Best Management Practices
BOD Biological Oxygen Demand
CA Contractor Activities
CCS Cellular Confinement System
CERCLA Comprehensive Environmental Response Compensation and Liability Act
CFR Code of Federal Register
CMA Congestion Management Program
COE U.S. Army Corps of Engineers
CPI Coalescing Plate Interceptor
CWA Clean Water Act (Federal Water Pollution Control Act of 1972 as amended in 1987)
DCIA Directly Connected Impervious Area
DLEG Department of Labor and Economic Growth
EEC Effect Effluent Concentration
EIR Environmental Impact Report
EMC Event Mean Concentration
EOS Equivalent Opening Size
ESA Environmentally Sensitive Area
ESC Erosion and Sedimentation Control
FEMA Federal Emergency Management Agency
FHWA Federal Highway Administration
GIS Geographical Information System
Hazmat Hazardous Material
HSG Hydrologic Soil Groups
IPM Integrated Pest Management
LEPC Local Emergency Planning Committee
MDA Michigan Department of Agriculture
MDEQ Michigan Department of Environmental Quality
MEP Maximum Extent Practicable
MS4 Municipal Separate Storm Sewer System
MSDS Material Safety Data Sheet

MSHA Mine Safety and Health Administration
NMFS National Marine Fisheries Service
NOAA National Oceanographic and Atmospheric Administration
NOI Notice of Intent
NPDES National Pollution Discharge Elimination System
NPS Nonpoint Source
NRC National Response Center
NRCS Natural Resources Conservation Service
NSF National Science Foundation
NURP National Urban Runoff Program
O&G Oil and Grease
O&M Operations and Maintenance
OSDS On-site Disposal System
OSHA Occupational Safety and Health Administration
P2 Pollution Prevention
PAHs Polyaromatic Hydrocarbons
PAM Polyacrylamide
PCBs Polychlorinated Biphenyls
PEAS Pollution Emergency Alerting System
PIPP Pollution Incident Pollution Plan
PPT Pollution Prevention Team
POTW Publicly Owned Treatment Works
PSD Particle Size Distribution
RCRA Resource Conservation and Recovery Act
SAP Sampling and Analysis Plan
SARA Superfund Amendments and Reauthorization Act
SERC State Emergency Response Center
SIC Standard Industrial Classification
SUSMP Standard Urban Stormwater Mitigation Plan
SWMP Stormwater Management Program
SWPCP Stormwater Pollution Control Plan
SWPPI Stormwater Pollution Prevention Initiative
TMDL Total Maximum Daily Load
TOC Total Organic Carbon
TSS Total Suspended Solids
USACE United States Army Corps of Engineers
USDA United States Department of Agriculture
USDOT United States Department of Transportation
USEPA United States Environmental Protection Agency
WEF Water Environment Federation

Section 5

BMP Implementation and Evaluation

5.1 Introduction

As noted in Section 1 each municipality regulated under stormwater NPDES permits, whether categorized as a Phase I or Phase II municipality, is required to implement a stormwater management program and to assess the effectiveness of the program. Although specific program requirements and the level of implementation required differ between Phase I and Phase II municipalities, both prohibit non-stormwater discharges into storm drains, and require controls to reduce the discharge of pollutants to the maximum extent practicable (MEP). As part of the program, the municipalities are required to address public agency (municipal) operations to reduce the discharge of pollutants and to assess these efforts. Section 2 provides information on some of the necessary elements and steps involved in identifying BMPs for municipal activities occurring at fixed facilities and in field programs, whereas this Section discusses the components necessary to successfully implement a BMP and evaluate its effectiveness.

5.2 BMP Implementation

Municipal employees perform numerous municipal activities that have the potential to discharge pollutants. Staff should consistently implement the procedures or BMPs applicable to these activities. Some municipal activities are contracted to other parties. For example, many municipalities contract out street sweeping or waste collection. Similarly, many municipalities lease city-owned facilities to other parties, at which activities take place that have the potential to discharge pollutants. To ensure measures are taken to reduce pollutants while contractors or lessees perform such activities, contract and lease language should explicitly specify requirements to comply with all BMP specifications. Sample contract/lease language is presented in Appendix D.

Successful implementation of a BMP is dependent on the following components:

Effective training of municipal and contract employees working in both fixed facilities and field programs.

Regular inspections of fixed facilities, field programs, and treatment controls.

Maintenance of treatment controls as needed to ensure proper functioning.

Periodic evaluation/monitoring of BMP performance consistent with NPDES permit requirements.

Follow-up action to correct deficiencies in BMP implementation noted during inspections.

Accurate record keeping to track training, inspections, monitoring, and BMP maintenance.

Submittal of an annual report to the applicable RWQCB regarding the effectiveness of the municipal efforts to reduce pollutants from fixed facilities and field programs. For Phase II Programs, documentation showing how the municipality has met its measurable goals, or revisions to those goals with supporting documentation.

5.3 Staff Training

Education and training is the key to the success of BMP implementation. Typically, municipalities provide annual training sessions. In addition to municipally sponsored training, staff may also attend local, regional, statewide, or national training seminars or workshops related to stormwater management and water quality conducted by other organizations.

In general, a municipality should consider a training program for employees working in fixed facilities and/or field programs. The training program should address the following subjects:

Maintenance Procedure Implementation and Inspection – In this training effort, proper procedures for performing municipal activities that may adversely affect stormwater quality are addressed. Maintenance procedures cover a wide range of municipal activities and the training may address either all maintenance procedures applicable to the municipality or a specific procedure (e.g. fertilizer and pesticide use). This training can be conducted in either a formal or a tailgate-style format.

Pollution Prevention/Spill Awareness – This training addresses the general techniques municipal staff may implement to prevent pollution, as well as to respond to spills once they have occurred. Training can be tailored to management and other municipal staff who oversee pollution prevention measures, to field staff conducting activities that may result in spills, or to field staff who may encounter spills or illicit discharges.

5.4 Site Inspections

Inspections of municipal fixed facilities and field programs should be performed to verify that BMPs are being implemented, that they are appropriate for that facility or program, and that they continue to reduce the discharge of pollutants. Inspections generally consist of the following:

Fixed Facilities – Inspections are typically performed by a combination of stormwater program staff and on-site fixed facility managers. The inspection of a fixed facility may include spot checks of the facility and activities being performed at the facility, and interviews with key line staff.

Field Programs– Inspections are typically performed by a combination of stormwater program staff and field program supervisors. The inspection of a field program may include spot checks of activities being performed, and interviews with key staff.
Contracted Activities – Inspections are typically performed by municipal staff to supplement and check on self-inspections and reporting by the management staff of the contract firm performing the activity. Performance should be checked against contract/lease language (see Appendix D).
Leased Facilities – Inspections are typically performed by municipal staff to supplement and check on self-inspections and reporting by the management staff of the lessor (see Appendix D).

Inspection Frequencies

Fixed facility or field program inspection frequency depends on the nature of the facility or program. Annual inspection is typical, with a more frequent schedule for facilities/activities that pose a greater threat to discharge pollutants (e.g. corporation yards). In the event of an observed problem, such as ineffective maintenance procedures or detected non-stormwater discharges, the inspection frequency should be increased as appropriate to facilitate correction of the problem.

Inspection Documentation Procedures

Inspection forms may be developed and used to properly document all inspections and gather the necessary information for record keeping and annual reporting. Examples include:

General Inspection Forms – These primary forms provide for a general characterization of the fixed facility or field program being inspected, including the type of facility or program, the reason for inspection, activities that may take place, and BMPs applicable for the facility. A general form for all inspections and a single fixed facility specific form should be completed.

Activity Specific Inspection Forms – These secondary forms include a series of questions or checklist items about specific activities taking place at a fixed facility or as part of a field program, as well as a list of suggested corrective action plans that can be implemented should a problem be found. All forms applicable to the activities being performed at a fixed facility or field program should be completed.

5.5 Analytical Monitoring

Although expensive, stormwater monitoring is a valuable way to assess long-term BMP effectiveness and cost-effectiveness of selected BMPs at reducing pollutants to the "maximum extent practicable". For Phase I municipalities, specific monitoring requirements depend on the individual NPDES permits issued. Phase II municipalities are covered by the Phase II General NPDES Permit and are not explicitly required to conduct

chemical monitoring. Monitoring activities can include source identification, and chemical characterization of effluent/runoff, and non-stormwater discharges.

It is beyond the scope of this handbook to describe specific sampling and analytical techniques. For guidance on conventional stormwater sampling techniques and protocol, the reader should refer to NPDES Stormwater Sampling Guidance Document, 1992, published by the USEPA, or Caltrans' Guidance Manual: Stormwater Monitoring Protocols, 2000.

5.6 Enforcement

To ensure proper BMP performance, enforcement procedures and mechanisms should be established for the municipal fixed facilities and field programs. Enforcement actions may occur as a result of a problem found during an inspection or in response to a complaint that is received. Several different types of enforcement mechanisms and penalties can be utilized to ensure compliance. The internal enforcement procedures, directed toward municipal staff, include initial verbal warnings, written warnings, and more serious disciplinary actions if verbal and written warnings do not result in appropriate action. External enforcement procedures which pertain to municipal contractors may be undertaken primarily by the municipality's inspectors, managers, and supervisors who possess enforcement authority through established policies and procedures or ordinances. Depending on the severity of the violation, enforcement could range from the issuance of a notice of noncompliance to the loss of a contract or lease, or a fine.

5.7 Recordkeeping

As applicable, the municipality should maintain records demonstrating successful implementation of BMPs. Recordkeeping may include training, site inspection and maintenance, and if applicable, monitoring.

Training and Workshops

Records of all training sessions provided to staff should be maintained to allow for:

Determining which staff requires which training;

Determining when training sessions must be conducted; and

Documenting training activities for enforcement and compliance purposes.

Municipal staff may attend training sessions or workshops sponsored by non-Permittees such as local or national organizations. For these sessions, the following information should be recorded:

Name of Workshop/Training

Sponsoring Organization

General Description of the Subject Matter

Location and Date

Attendee information (name, title, department, phone and/or email)

Site Inspection and BMP Maintenance

Inspection reports should be kept to track frequency and results of inspections, BMPs implemented, condition of BMPs inspected, and follow-up actions taken. It is also important to keep a record of maintenance activities or any other BMPs that are of an "action" nature. It is easy to demonstrate that a BMP that involves a physical change, such as berming or covering, has been accomplished. However, actions that relate to good housekeeping can only be demonstrated by recordkeeping. Besides demonstrating compliance, records can assist in BMP management. Keeping a record of catch basin cleaning, for example, also provides insight into how long it takes for the catch basin sump to refill.

Monitoring

Records of all stormwater monitoring information, inspections and visual observations, certifications, corrective actions and follow-up activities, and copies of all reports must be retained for a period of at least five years. These records shall include at a minimum, when applicable:

Date, place, and time of sampling, visual observations, and/or measurements.

Individual(s) who performed the sampling, visual observations, and or measurements.

Visual observation records for storm events.

Visual observations and inspections of non-stormwater discharges.

Calibration and maintenance records of on-site instruments used.

Visual observations and sample collection exception records.

Date and approximate time of analyses.

Individual who performed the analyses.

Analytical results, method detection limits, and the analytical techniques or methods used.

Quality assurance/quality control records and results.

Sampling and analysis exemption and reduction certifications and supporting documentation.

Records of any corrective actions and follow-up activities that resulted from the visual observations.

5.8 Reporting

Phase I municipalities are required to submit annual reports documenting BMP implementation, with due dates varying depending on individual NPDES permit requirements. Specific reporting requirements differ between individual permits. Typically, they include, but are not limited to, the following:

Program implementation status.

Summary of stormwater activities performed.

Stormwater monitoring results summary and analysis.

Assessment of the effectiveness of selected control measures or BMPs.

Changes or suggested changes to the BMP that will improve overall effectiveness of the program.

Phase II municipalities will be required under the Phase II General NDPES Permit, beginning in 2004, to submit annual reports to the Michigan Department of Environmental Quality on October 1 of each year, or as otherwise required. Specific reporting requirements will include:

Program implementation status.

Summary of stormwater activities performed.

Results of information collected, such as monitoring data.

Summary of proposed stormwater activities for the next reporting cycle.

Changes made in BMP selection.

Changes in stormwater management personnel.

Changes made in program or measurable goals.

Appendix A

Inventory of Municipal Operations

This appendix provides an example of an inventory database. The purpose of this example is to illustrate the types of data that should be collected for municipal operations and how these data can be organized into a database that can be used for other steps of a municipality's stormwater management program. Specifically, the information gathered in the inventory process should be used to assess municipal operations for BMP implementation (Appendix B) and for BMP selection (Appendix C).

The example provided here was adapted from the inventory database developed by the County of Orange Stormwater Program for fixed facilities. The field program inventory database should include similar information (see Section 2).

Step 1 Facility and Location

Facility Physical Address Information*										Watershed Identification		
Facility Name	Street Number	Street Name	Street Suffix	City	Zip	Business Phone Number	Business Fax Number	Facility Contact Name	Facility Size (Total Square Feet of Facility)	Watershed (Identify if possible)	Longitude (X)	Latitude (Y)
County Yard	1200	Pine	Road	Anaheim	92933	(714) 555-6363	(111) 222-3333	Ron Jones	400,000	E - Lower Santa Ana River	133.49.55	34.34.45
City Service Center	645	Main	Street	Brea	92821	(714) 555-1234	(123) 456-7890	Joe Smith	200,000	A - San Gabriel River/Coyote Creek	102.48.50	33.34.44

* Add facility mailing address information if different from physical address

Step 2 Potential Pollutant Generating Activities

Identify all activities that apply for each facility and associated pollutants											
Facility Name	Vehicle and Equipment Fueling	Vehicle and Equipment Washing & Steam Cleaning	Vehicle & Equipment Maintenance and Repair	Outdoor Loading/ Unloading of Materials	Outdoor Container Storage of Liquids	Outdoor Process Equipment Operations & Maintenance	Outdoor Storage of Raw Materials	Waste Handling and Disposal	Building and Grounds Maintenance	Parking/ Storage Area Maintenance	Over Water Activities
County yard	Metals, O&G, Org., Trash	Sed., Nut., Trash, Metals, O&G, Org.	Metals, O&G, Org.	Sed., Nut., Metals, O&G			Sed., Nut., Metals, O&G			Sed., Nut., Trash, Metals, Bact., O&G, Org., Oxy	
City Service Center	Metals, O&G, Org., Trash	Sed., Nut., Trash, Metals, O&G, Org.	Metals, O&G, Org.	Sed., Nut., Metals, O&G			Sed., Nut., Metals, O&G		Sed., Nut., Trash, Metals, Bact., O&G, Org., Pest., Oxy	Sed., Nut., Trash, Metals, Bact., O&G, Org., Oxy	

Appendix B

Assessment of Municipal Operations

This appendix provides an example assessment worksheet that can be used for evaluating fixed facilities to determine the level of BMP implementation. The results of this assessment process can then be used as the basis for BMP selection (see Appendix C).

WORKSHEET!

Faciliry Ns1m:Couury ysrd
Coot. :-t Nsme: Roo)O:!le$

Si:e Addres,;: 1200 Pioe Rd., Anabeitu, CA 92933
Phone: (I ll)222-3333

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m:dium por.:r.:i!. 3= fo'l\t j:« UJ

2.BAiP EFFECTIVENISS- b tbe „le towp:vdd.E .mef ti\ratblgu>iq ti"_.J.Vo'.'id:d:cale.

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3. TYPE AND QUAl'UITY OF 1\lUERIALS USED

{aterial	Typical Quantity/Frequency	Is Stored Material Likely to Generate Pollutants
Gasoline	250 galfdav	lyes
Motor oil	90 galfwk	lyes
Detereen"S	40 Jb!wk	DO

4. HISTORY OF SPILLS ,AD LEAKS

a) Is there a chronic hi-'tOI)'of ;pills and leoks? 'oin;;;rta:Ucfillacljii Deij'i=rJi W:!L!liRJ IL, ═══════

b) Is there no evidence of leaks and drips from :"luipmeut and macbinery? *drip oons fn place*

c) Is there a spill prevention and response team?_.'i's-,...,--,---,-----.,.,-...,-,-----,--,--.-,----,-..,.-,-

d) Arn appropriate spill ootaimuenand cleanup materials kept ou .site and iu oouveuient locations? *materjqh present but need ,o be placed near fiu:UJJg areas.*

e) Are cleaoup procedures for spills followed regularly and correctly?=;;j'' ';;lEllidJ,iillJ,f'k!iii:jii.mg[i!UQij— —

/) Arn used absorbent materials removed and disposed of in a timely tnallller? *stored spill clem1 up mia'e,rals obse';Ved 011-sfte prooor disvosal required.*

g) Are personnel regularly trained in the use of spill control materials?-''"'S--— — — — — — — — — — —

5. :'"!ON-STORMWATER DISCHARGES

a) Outfall directly observed dtuiug a'}ses.smen'— — '' o --,----.,-..,.--,,—-,- -..,..,--..,.-- –

b) Arn B.fi>s implemented to prevent .treat, or control non-stormwater discharges? *\'e:s but could use imp1'ovemenr fsee BAlP selec.tion "«.omme.ndations).*

c) Is there a po:eutial for non-stonuwater discharges (i.e. nou-stormwater sources obsened without B.fPs implemented) *ves (see B]1P selecHoll recommendanons]*

6. SIZE OF FACILTIY (incorporating ihe size of a facility serves as ru <tutogate mea<ure for flow)

a) Total area *400000 square feet.*

b) The impervious area (including parking lot) is *320000 squa,e feet (800/,; imooJvious)*

7. PROXIMITY TO RECEIVING WATER

Does the facility discharge directly or adjacent to a 303(d) water body or other environmentally seusitive area? *11o*

Appendix C

BMP Selection Process

The purpose of this appendix is to illustrate the process of selecting BMPs for an example fixed facility. Information necessary for this process includes use of the results from the inventory (Appendix A) and assessment (Appendix B) processes.

The BMPs listed in the example checklist below are the required measures to control the discharge of pollutants to the stormwater drainage system for the activities identified during the assessment process (Appendix B). The BMPs listed include both those that were currently being implemented at the site as well as recommended BMPs based on the facility assessment. The BMP fact sheets presented in Section 3 should be used to identify recommended BMPs for municipal operations, however, note that not all BMPs listed in the fact sheets may be applicable to a given facility. You are encouraged to employ additional BMPs if they will control pollutants in an effective manner.

Facility Name:____County Yard_____ Site Address:__1200 Pine Rd., Anaheim
Contact Name:_____Ron Jones_____ Phone:__(111) 222-3333_____

APPLICABLE BMPs

A. VEHICLE AND EQUIPMENT FUELING (Fact Sheet SC-3)

Current

- Employees trained in proper fueling and cleanup procedures.
- "Shut-off" valves installed on nozzles.
- "Topping off" of fuel tanks is discouraged.
- Adsorbent materials used on spills as opposed to hosing down.
- Drains labeled within the facility boundary, by stencil to indicate whether they flow to an oil/water separator, directly to the sewer, or to a storm drain.
- Fueling area designed to prevent storm water runoff and spills.
- Fueling area covered with an overhanging roof structure.

Recommended

- Spot clean" leaks and drips routinely. Leaks are not cleaned up until the absorbent is picked up and disposed of properly.
- Install covered spill kits next to fueling area.

B. VEHICLE AND EQUIPMENT WASHING/STEAM CLEANING (Fact Sheet SC-4)

Current

- Vehicles and equipment are washed at an off-site commercial washing location whenever possible.
- On-site washing area is clearly marked as a wash area.
- Signs are posted stating that only washing is allowed in wash area and that discharges to the storm drain are prohibited.
- Trash containers are provided in wash area.
- A map of on-site storm drain locations exists to avoid discharges to the storm drain system.

Recommended

- Use biodegradable, phosphate-free detergents for washing vehicles as appropriate.
- Consider washing vehicle equipment inside the building to control the targeted constituents by directing them to the sanitary sewer.

C. VEHICLE AND EQUIPMENT MAINTENANCE AND REPAIR (Fact Sheet SC-5)

Current

- Idle equipment is stored under cover.
- Drip pans are used for leaking vehicle/equipment.
- Vehicle maintenance area is designed to prevent storm water pollution (area contains berming and appropriate drainage routing).
- Signs are painted on storm drain inlets to indicate that they are not to receive liquid or solid wastes.
- The work area is covered to limit exposure to the rain.

Recommended

- Avoid hosing down your work areas; use dry sweeping.
- Post signs at sinks to remind employees not to pour hazardous wastes down drains.
- Clean yard storm drain inlets(s) regularly and especially after large storms.

D. OUTDOOR LOADING/UNLOADING OF MATERIALS (Fact Sheet SC-6) N/A

E. OUTDOOR CONTAINER STORAGE OF LIQUIDS (Fact Sheet SC-7) N/A

F. OUTDOOR PROCESS EQUIPMENT OPERATIONS AND MAINTENANCE (Fact Sheet SC-8) N/A

G. OUTDOOR STORAGE OF RAW MATERIALS (Fact Sheet SC-9)

Current

- Materials are stored inside when feasible.
- All outside storage areas are covered with a roof or enclosed to prevent stormwater contact.
- Outdoor storage containers are kept in good condition.
- Lids are secured on waste barrels and containers.
- Drums are stored in a secure area where unauthorized persons cannot gain access.

Recommended

- All materials stored outside should have some type of secondary containment system in case of spills or leaks.

H. WASTE HANDLING AND DISPOSAL (Fact Sheet SC-10) N/A

I. BUILDING AND GROUNDS MAINTENANCE (Fact Sheet SC-11) N/A

J. PARKING/STORAGE AREA MAINTENANCE (Fact Sheet SC-12)

Current

- Parking and storage areas are kept clean and orderly.
- Site is designed to allow sheet runoff to flow into biofilters (vegetated strip and swale) and/or infiltration devices.
- Rooftop drains are arranged to prevent drainage directly onto paved surfaces. Lot is designed to include semi-permeable hardscape.

Recommended

- Remove debris in a timely fashion.
- Utilize sand filters or oleophilic collectors for oily waste in low concentrations.

K. OVER WATER ACTIVITIES N/A

L. OTHER (describe):

Appendix D

Example Contract/Lease Language for BMP Implementation

Appendix D Example Contract/Lease Language for BMP Implementation

Example Lease Language for Fixed Facilities

Following is example language that can be inserted into municipal leases:

> The Michigan Department of Environmental Quality (MDEQ) has issued a permit that governs stormwater and non-stormwater discharges resulting from municipal activities performed by or for the City of _____. The MDEQ Permit is National Pollutant Discharge Elimination System (NPDES) Permit No. _____. Copy of the MDEQ Permit is available for review.
>
> In order to comply with the Permit requirements, the City has developed Best Management Practices (BMPs) that parties leasing municipal owned properties must adhere to. These BMPs contain pollution prevention and source control techniques to minimize the impact of those activities upon dry-weather urban runoff, stormwater runoff, and receiving water quality.
>
> Activities performed at the facility leased under this agreement shall conform to the Permit and BMPs, and must be performed as described within all applicable BMPs. The holder of this agreement shall fully understand the BMPs applicable to activities conducted at the facility leased under this agreement prior to conducting them and maintain copies of the BMPs at the leased facility throughout the agreement duration. The applicable BMPs are included as Exhibit ____of this agreement.
>
> Evaluation of activities subject to Permit performed at the facility leased under this agreement will be conducted by the city to verify compliance with BMP requirements and may be required through lessor self-evaluation as determined by the city.

Example Contract Language for Field Programs

Following is example language that can be inserted into municipal field program contracts:

> The Michigan Department of Environmental Quality (MDEQ) has issued a permit that governs stormwater and non-stormwater discharges resulting from municipal activities performed by or for the City of _____. The MDEQ Permit is National Pollutant Discharge Elimination System (NPDES) Permit No. _____. Copy of the MDEQ Permit is available for review.
>
> In order to comply with the Permit requirements, the City has developed Best Management Practices (BMPs) that parties leasing municipal owned properties must adhere to. These BMPs contain pollution prevention and source control techniques to minimize the impact of those activities upon dry-weather urban runoff, stormwater runoff, and receiving water quality.
>
> Work performed under this CONTRACT shall conform to the Permit requirements, and BMPS, and must be performed as described within all applicable BMPs. The CONTRACTOR shall fully understand the BMPs applicable to activities that being conducted under this CONTRACT prior to conducting them and maintain copies of the BMPs

throughout the CONTRACT duration. The applicable BMPs are included as Exhibit __of this CONTRACT.

Evaluation of activities subject to BMPs performed under this CONTRACT will be conducted to verify compliance with BMP requirements and may be required through CONTRACTOR self-evaluation as determined by the city.