Protecting Seattle's Waterways

Volume 4: Source Control

CITY OF SEATTLE STORMWATER MANUAL

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Table of Contents

CHAPTER 1 – Introduction 1-1

1.1. What Is the Purpose of This Volume? 1-1
1.2. How Does this Volume Apply to Businesses and Properties? 1-1
1.3. Which Pollutants Are Targeted in This Volume? 1-2
1.3.1. pH 1-2
1.3.2. Total Suspended Solids 1-2
1.3.3. Chemical and Biochemical Oxygen Demanding Substances 1-2
1.3.4. Metals 1-3
1.3.5. Bacteria and Viruses 1-3
1.3.6. Nutrients 1-3
1.3.7. Toxic Organic Compounds 1-3
1.3.8. Other Chemicals and Substances 1-3
1.4. What Are BMPs? 1-4
1.4.1. Source Control BMPs 1-4
1.4.2. Treatment BMPs 1-5
1.5. Already Implementing Best Management Practices? 1-5
1.6. Getting Started 1-5

CHAPTER 2 – Citywide Best Management Practices 2-1

2.1. Required Citywide Best Management Practices 2-1
2.1.1. BMP 1: Eliminate Illicit Connections 2-2
2.1.2. BMP 2: Perform Routine Maintenance 2-3
2.1.3. BMP 3: Dispose of Fluids and Wastes Properly 2-4
2.1.4. BMP 4: Proper Storage of Solid Wastes 2-5
2.1.5. BMP 5: Spill Prevention and Cleanup 2-6
2.1.6. BMP 6: Provide Oversight and Training for Staff 2-9
2.1.7. BMP 7: Site Maintenance 2-10

CHAPTER 3 – Commercial and Industrial Activity Best Management Practices 3-1

3.1. Cleaning or Washing 3-2
3.1.1. BMP 8: Cleaning or Washing 3-3
3.2. Transfer of Liquid or Solid Materials 3-6
3.2.1. BMP 9: Loading and Unloading of Liquid or Solid Material 3-7
3.2.2. BMP 10: Fueling at Dedicated Stations 3-11
3.2.3. BMP 11: Maintenance and Repair of Vehicles and Equipment 3-16
3.2.4. BMP 12: Mobile Fueling of Vehicles and Heavy Equipment 3-18
3.3. Production and Application 3-20
3.3.1. BMP 13: Concrete and Asphalt Mixing and Production 3-21
3.3.2. BMP 14: Concrete Pouring, Concrete/Asphalt Cutting, and Asphalt Application 3-23
3.3.3. BMP 15: Manufacturing and Post-processing of Metal Products 3-25
3.3.4. BMP 16: Processing and Storage of Treated Wood 3-27

3.3.5. BMP 17: Commercial Composting 3-29
3.3.6. BMP 18: Landscaping and Vegetation Management 3-31
3.3.7. BMP 19: Painting, Finishing, and Coating Activities 3-35
3.3.8. BMP 20: Commercial Printing Operations 3-37
3.3.9. BMP 21: Manufacturing Activities 3-38
3.4. Storage and Stockpiling 3-40
3.4.1. BMP 22: Storage or Transfer of Leachable or Erodible Materials 3-41
3.4.2. BMP 23: Temporary Storage or Processing of Fruits, Vegetables, or Grains 3-44
3.4.3. BMP 24: Recycling, Wrecking Yard, and Scrap Yard Operations 3-45
3.4.4. BMP 25: Portable Container Storage 3-47
3.4.5. BMP 26: Storage of Liquids in Aboveground Tanks 3-50
3.4.6. BMP 27: Lot Maintenance and Storage 3-52
3.5. Dust, Soil Erosion, and Sediment Control 3-53
3.5.1. BMP 28: Dust Control in Disturbed Land Areas and on Unpaved Roadways and Parking Lots 3-54
3.5.2. BMP 29: Dust Control at Manufacturing Sites 3-55
3.5.3. BMP 30: Soil Erosion and Sediment Control at Industrial Sites 3-56
3.6. Other Activities 3-57
3.6.1. BMP 31: Commercial Animal Care and Handling 3-58
3.6.2. BMP 32: Log Sorting and Handling 3-59
3.6.3. BMP 33: Boat Building, Mooring, Maintenance, and Repair 3-60
3.6.4. BMP 34: Cleaning and Maintenance of Pools, Spas, Hot Tubs, and Fountains 3-62
3.6.5. BMP 35: Deicing and Anti-icing Operations for Airports and Streets 3-63
3.6.6. BMP 36: Maintenance and Management of Roof and Building Drains at Manufacturing and Commercial Buildings 3-65
3.6.7. BMP 37: Maintenance and Operation of Railroad Yards 3-66
3.6.8. BMP 38: Maintenance of Public and Private Utility Corridors and Facilities 3-67
3.6.9. BMP 39: Maintenance of Roadside Ditches 3-69

CHAPTER 4 – References 4-1

Tables

Table 1. Worksheet for Identifying Applicable BMPs. 1-6

Figures

Figure 1. Covered Outdoor Storage of Solid Wastes..... 2-5
Figure 2. Waste Storage Area with Spill Kit and Posted Spill Plan..... 2-7
Figure 3. Car Wash Building with Drain to the Sanitary Sewer. 3-4
Figure 4. Schematic of Wash Pad with Sump..... 3-5
Figure 5. Temporary Containment Device Placed Under a Hose Connection. 3-8
Figure 6. Loading Docks with an Overhang to Prevent Material Contact with Stormwater.....3-10
Figure 7. Fueling Island Schematic. 3-12
Figure 8. Roof at Fueling Island to Prevent Stormwater Run-on.....3-13
Figure 9. Commercially Available Catch Basin Filter Sock.....3-22
Figure 10. Structure Used To Cover Manufacturing Activities.....3-39
Figure 11. Covered and Secured Storage Area for Bulk Solids. 3-42
Figure 12. Covered Storage Area for Erodible Material (gravel). 3-42
Figure 13. Covered and Secured Storage Area for Containers. 3-48
Figure 14. Containers Surrounded by a Berm in an Enclosed Area.....3-48
Figure 15. Aboveground Storage Tank with Secondary Containment. 3-51

CHAPTER 1 – INTRODUCTION

1.1. What Is the Purpose of This Volume?

This volume is designed to help businesses, individuals, responsible parties, and public agencies in Seattle implement best management practices (BMPs) for source control, to prevent pollutants from contaminating stormwater runoff and entering receiving waters, such as rivers, lakes, streams and Puget Sound. Polluted stormwater can pose risks to the health, safety, and welfare of humans and the environment. Source control is the practice of preventing pollution at its source.

This chapter provides a worksheet for use in determining which BMPs are required for specific activities, including activities planned for proposed development sites. As required by the Seattle Municipal Code (SMC), Chapters 22.800 – 22.808 (Stormwater Code), BMPs from this volume must be implemented to minimize contamination and discharge of stormwater from pollution generating activities.

See *Appendix A* for definitions of technical terms used in this manual.

1.2. How Does this Volume Apply to Businesses and Properties?

Some BMPs are required for all real property in Seattle (refer to *Chapter 2*). The implementation of additional BMPs for specific pollution generating activities applies to all businesses and public agencies in Seattle except those that drain to the public combined sewer (refer to *Chapter 3*).

The BMPs in this volume have been integrated from many documents, programs and regulations, including the following:

- Federal Clean Water Act
- Federal Coastal Zone Management Act
- Phase I National Pollutant Discharge Elimination System (NPDES) Municipal Stormwater General Permit
- Washington State Department of Ecology (Ecology) Stormwater Management Manual for Western Washington (SWMMWW)
- Puget Sound Action Agenda
- The City's Stormwater Code (SMC, Chapters 22.800 – 22.808)

Owners, operators, and occupants of property, and anyone causing or contributing to a violation of the City Code are each considered a "responsible party" for purposes of a Code violation (SMC, 22.801.190).

If a commercial property is owned, leased, or rented to tenants, the owner is also responsible for any pollution from the property and can be held responsible for water quality problems caused by tenants. Make sure tenants are informed of their responsibilities.

1.3. Which Pollutants Are Targeted in This Volume?

The following provides descriptions of typical pollutants targeted by the source control BMPs outlined in this manual, including explanations of why the pollutants can be harmful and some of the common sources of these pollutants.

1.3.1. pH

The pH value of a substance is a measurement of its acidity or alkalinity. The pH of a body of water is vitally important because most aquatic life survives within a relatively narrow range of pH values (6.5 to 8.5). A pH that is lower than 6.5 can be too acidic to support aquatic life. A pH that is higher than 8.5 can be too alkaline to support aquatic life. Some sources that can contribute to a change in the pH of stormwater and receiving waters are:

- Cement in poured concrete
- Cement dust
- Materials used in paving and recycling operations
- Solutions used in metal plating operations
- Chemicals from printing and other industrial processes
- Common cleaners such as bleaches and deck cleaners
- Calcium chloride

1.3.2. Total Suspended Solids

Total suspended solids can include particles such as sand, silt, soil, iron precipitates, and biological solids, all of which can increase the turbidity in receiving waters (make the water cloudy) and can settle out in streams as sediment. This can destroy fish habitat and other aquatic life because excess sediment has the potential to smother aquatic organisms, including developing fish eggs, and also coat them with toxic substances such as petroleum and metals, which can adhere to the sediment in receiving waters.

1.3.3. Chemical and Biochemical Oxygen Demanding Substances

Chemical wastes and degradable organic matter (such as landscaping waste and food waste) can drastically affect water quality if allowed to enter stormwater. As these substances are broken down by bacteria, the oxygen in the water is depleted. The resulting decrease in oxygen supply can stress or eventually kill fish and other aquatic species. Chemical oxygen demand (COD) and biological oxygen demand (BOD) are two parameters that indicate the amount of oxygen that is used up by various pollutants.

1.3.4. Metals

Metals are used in many products and include copper, lead, zinc and arsenic. Certain metals wear off vehicle brakes, tires, and galvanized surfaces, and are released from paint, scrap metal, and protective coatings used on buildings. Metals such as zinc can also be a component in products such as moss killers. These metals can be carried by stormwater runoff into receiving waters where they have been linked to severe health and reproductive problems in fish and other aquatic animals.

1.3.5. Bacteria and Viruses

Bacteria and viruses from animal wastes, wildlife, illicit connections, and leaking sewer lines can contaminate receiving waters and result in the closure of swimming and shellfish areas. Concentrations of bacteria called fecal coliform, —enterococci in marine water, and *Escherichia coli* in fresh water—are typically used as indicators of pollution.

1.3.6. Nutrients

In the context of water quality, the nutrients of concern are primarily compounds that contain nitrogen and phosphorus. Excess nutrients allowed to enter receiving waters can lead to overgrowth of algae, depletion of oxygen in the water, and channel clogging due to the overgrowth of vegetation. The water can also become unattractive for recreational use and unsuitable for fish and wildlife. Sources of nutrients include fertilizers, leaking trash containers, leaking sewer lines, yard waste, and animal waste.

1.3.7. Toxic Organic Compounds

A number of organic compounds are toxic to the aquatic environment. Many pesticides, herbicides, rodenticides, and fungicides contain organic compounds that can be deadly to aquatic life. The same is true of organic compounds included in antifreeze, wood preservatives, cleansers, and a host of other more exotic organic compounds that result from industrial operations or past industrial practices (such as phthalates, polychlorinated biphenyls [PCBs], dioxins, and chlordane). These toxic organic compounds can remain in the sediment for a long time.

1.3.8. Other Chemicals and Substances

There are many other chemicals and substances that can cause problems if they are allowed to enter the aquatic environment. Even compounds classified as “biodegradable” or “environmentally friendly” can have devastating effects on aquatic life. Some of the most common chemicals and substances that pollute stormwater are oils, greases, soaps, and detergents.

1.3.8.1. Oils and Greases

Oil and grease can be generated from either petroleum-based or food-based sources. Oils and greases conveyed in stormwater can accumulate in receiving waters and contaminate soil.

Petroleum-based oils and greases can be immediately toxic to fish and wildlife. Food-based oils and greases can coat insects and fish gills, leading to suffocation.

1.3.8.2. Soaps and Detergents

Vehicles and structures are commonly washed with soaps and other detergents mixed with water. If not managed properly, the resulting washwater can flow to an inlet/catch basin or ditch, which discharges the polluted water directly to the nearest stream or lake, or to Puget Sound. Soaps and detergents, even the biodegradable ones, can have immediate and long-term effects on aquatic life. Sediment and oil released when vehicles and structures are washed with soaps and detergents can also collect in the washwater, causing further harm to fish and other aquatic wildlife. Soaps used on roofs to treat moss can also result in soaps being discharged via roof drains to receiving waters.

The term "biodegradable" on a product label does not mean that the product is safe or environmentally friendly. The product may degrade faster than alternative products but can still be harmful to the environment.

1.4. What Are BMPs?

BMPs for managing stormwater are divided into two broad categories: source control BMPs and treatment BMPs.

1.4.1. Source Control BMPs

Source control BMPs prevent contaminants from entering stormwater runoff by controlling them at their source. Source control can include operational changes (such as sweeping or process changes) or structural changes (such as extending a roof or installing a treatment facility).

Source control requirements are based on the following goals:

1. Prevent stormwater pollution by eliminating pathways that may introduce pollutants into stormwater.
2. Protect soil, groundwater, and receiving waters by capturing acute releases, such as spills, to reduce chronic contamination of the environment.
3. Segregate stormwater and wastewater flows.
4. Direct wastewater discharges and areas with the potential for wastewater discharge (such as vehicle washing facilities) to the sanitary or combined sewer system.
5. Provide an approved method of containment and discharge for areas that have the potential for spills, and are not expected to regularly receive stormwater flow or require water use (such as covered fuel islands or covered containment areas).
6. Create a combination of structural controls and operational procedures to ensure sustainability of the BMPs.

1.4.2. Treatment BMPs

This volume also identifies specific treatment BMPs that apply to particular pollutant sources such as fueling stations, railroad yards, and the outdoor storage and transfer of materials, byproducts, or finished products. Examples of treatment BMPs are oil/water separators, wet vaults, and biofilters. After identifying the required treatment BMPs, refer to *Volume 3 — Project Stormwater Control* for additional information about treatment BMPs.

1.5. Already Implementing Best Management Practices?

Property owners and operators may already be implementing BMPs in accordance with other federal, state, or local requirements (e.g., businesses that have a National Pollutant Discharge Elimination System [NPDES] permit from Ecology). In some cases, the City's requirements may be in addition to, or more stringent than other applicable requirements. Anyone with questions about how to meet all of the source control requirements for stormwater should contact the City of Seattle Stormwater Source Control Unit via the Water Quality Hotline at (206) 684-7587. City inspectors will work with responsible parties to determine the applicable BMPs.

If it is determined that the BMPs being implemented are not effectively addressing the discharge of contaminants, additional BMPs may be required, including treatment and structural BMPs.

Entities that conduct specific industrial activities are required to obtain an Industrial NPDES Permit for their stormwater discharges. For more information about whether an entity needs an NPDES permit, refer to Ecology's website (www.ecy.wa.gov/programs/wq/stormwater/index.html) or call Ecology at (360) 407-6000.

1.6. Getting Started

To understand the source control requirements addressed by this volume, the first step is to determine if the property discharges to the combined sewer, drainage system, or receiving water. If the answer is not clear, call the Water Quality Hotline at (206) 684-7587 Option 3 and request assistance.

All real property in Seattle must implement the citywide BMPs outlined in *Chapter 2*.

In addition, businesses and public agencies, except those that discharge only to the public combined sewer, must implement the additional BMPs pertinent to site-specific activities outlined in *Chapter 3*.

The worksheet provided below (Table 1) is designed to help identify the appropriate BMPs required. The worksheet contains BMPs organized by the different activities that businesses and public agencies perform. If the listed activity is performed indoors and all discharges (e.g., process water, washwater, lubricants, solvents, fugitive dust, granular material, and blowdown waste) are controlled such that there is no exposure of stormwater to pollutants, then additional BMPs do not have to be implemented for that activity.

1. Complete all sections of the worksheet, checking the appropriate boxes for all activities that occur at the work place.
2. If any of the activities were checked as being performed outdoors (or inside in areas that might spill or flow outside), additional BMPs are required for that activity. Refer to the subsection of this volume identified in the first column of the worksheet for a description of the required BMPs.

Questions can be answered by leaving a message on the SPU Water Quality hotline at (206) 684-7587 or contacting the SPU Green Business Program at (206) 343-8505 or on the web at: (www.seattle.gov/util/ForBusinesses/GreenYourBusiness/index.htm).

Table 1. Worksheet for Identifying Applicable BMPs.

Section Reference	BMP Number and Name
SECTION 2.1 – REQUIRED CITYWIDE BEST MANAGEMENT PRACTICES	
2.1.1	BMP 1: Eliminate Illicit Connections
2.1.2	BMP 2: Perform Routine Maintenance
2.1.3	BMP 3: Dispose of Fluids and Wastes Properly
2.1.4	BMP 4: Proper Storage of Solid Wastes
2.1.5	BMP 5: Spill Prevention and Cleanup
2.1.6	BMP 6: Provide Oversight and Training for Staff
2.1.7	BMP 7: Site Maintenance
Does site drain only to the public combined sewer? • If yes, only *Chapter 2* BMPs are required. • If no, fill out the remainder of the worksheet to determine applicable BMPs for site activities per SMC 22.803.040. If unsure where the site discharges to, call the Water Quality Hotline at (206) 684-7587 for assistance.	

Section Reference	BMP Number and Name	Is activity conducted in an area that could impact the drainage system or receiving waters?
SECTION 3.1 – CLEANING OR WASHING		
3.1.1	BMP 8: Cleaning or Washing • Applies to all outdoor washing activities, including the following: • Cleaning or washing of tools, engines, manufacturing equipment, vents, filters, pots and pans, grills, and floor mats • Fleet vehicle yards, car dealerships, car washes, and maintenance facilities • Mobile washing, including carpet cleaning, pressure washing, truck washing, etc.	
SECTION 3.2 – TRANSFER OF LIQUID OR SOLID MATERIALS		
3.2.1	BMP 9: Loading and Unloading of Liquid or Solid Material • Applies to loading and unloading of liquid or solid materials	
3.2.2	BMP 10: Fueling at Dedicated Stations • Applies to gas stations, pumps at fleet vehicle yards or shops, and other privately owned pumps, including construction sites	
3.2.3	BMP 11: Maintenance and Repair of Vehicles and Equipment • Applies to vehicle maintenance operations and activities where fluids from vehicles and equipment are removed and replaced at permanent or temporary sites	
3.2.4	BMP 12: Mobile Fueling of Vehicles and Heavy Equipment • Applies to fleet fueling, wet fueling, and wet hosing	

Table 1 (continued). Worksheet for Identifying Applicable BMPs.

Section Reference	BMP Number and Name	Is activity conducted in an area that could impact the drainage system or receiving waters?
SECTION 3.3 – PRODUCTION AND APPLICATION ACTIVITIES		
3.3.1	BMP 13: Concrete and Asphalt Mixing and Production • Applies to mixing of raw materials on the site to produce concrete or asphalt or making concrete or asphalt products	
3.3.2	BMP 14: Concrete Pouring, Concrete/Asphalt Cutting, and Asphalt Application • Applies to construction sites, driveway and parking lot resurfacing, and cutting	
3.3.3	BMP 15: Manufacturing and Post-processing of Metal Products • Applies to machining, grinding, soldering, cutting, welding, quenching, rinsing, etc.	
3.3.4	BMP 16: Processing and Storage of Treated Wood • Applies to chemical preservative treatment of wood, as well as outdoor storage	
3.3.5	BMP 17: Commercial Composting • Applies to commercial composting facilities that operate outside without cover	
3.3.6	BMP 18: Landscaping and Vegetation Management • Applies to grading, storage of landscape materials, soil transfer, vegetation removal, pesticide and fertilizer applications, and watering	
3.3.7	BMP 19: Painting, Finishing, and Coating Activities • Applies to surface preparation and the application of paints, finishes, and/or coatings	
3.3.8	BMP 20: Commercial Printing Operations • Applies to materials used in the printing process	
3.3.9	BMP 21: Manufacturing Activities • Applies to manufacturing activities in outdoor areas	
SECTION 3.4 – STORAGE AND STOCKPILING ACTIVITIES		
3.4.1	BMP 22: Storage or Transfer of Leachable or Erodible Materials • Includes sand, topsoil, lumber, and other products	
3.4.2	BMP 23: Temporary Storage or Processing of Fruits, Vegetables, or Grains • Applies to storage of fruits, vegetables, or grains,; and processing activities at: wineries; breweries; fresh and frozen juice makers; and other food and beverage processing operations	
3.4.3	BMP 24: Recycling, Wrecking Yard, and Scrap Yard Operations • Applies to scrapped equipment, vehicles, construction materials, and assorted recyclables	

Table 1 (continued). Worksheet for Identifying Applicable BMPs.

Section Reference	BMP Number and Name	Is activity conducted in an area that could impact the drainage system or receiving waters?
SECTION 3.4 (continued) – STORAGE AND STOCKPILING ACTIVITIES		
3.4.4	BMP 25: Portable Container Storage • Applies to containers used for temporary and permanent storage	
3.4.5	BMP 26: Storage of Liquids in Aboveground Tanks • Applies to all liquids in aboveground tanks	
3.4.6	BMP 27: Lot Maintenance and Storage • Applies to public and commercial parking areas • Applies to storage of automobile parts, vehicles, or equipment	
SECTION 3.5 – DUST, SOIL EROSION, AND SEDIMENT CONTROL		
3.5.1	BMP 28: Dust Control in Disturbed Land Areas and on Unpaved Roadways and Parking Lots • Applies to dust control measures in disturbed land areas or on unpaved roadways and parking lots	
3.5.2	BMP 29: Dust Control at Manufacturing Sites • Applies to grain dust, sawdust, coal, gravel, crushed rock, cement, boiler fly ash, and other airborne polluting materials	
3.5.3	BMP 30: Soil Erosion and Sediment Control at Industrial Sites • Applies to industrial activities that take place on soil	
SECTION 3.6 – OTHER ACTIVITIES		
3.6.1	BMP 31: Commercial Animal Care and Handling • Applies to operations at kennels, fenced pens, veterinary clinics, and businesses and public agencies that board animals	
3.6.2 and Ecology Pub. 04-10-031	BMP 32: Log Sorting and Handling • Applies to log yards	
3.6.3	BMP 33: Boat Building, Mooring, Maintenance, and Repair • Applies to all types of maintenance, repair, and building operations at shipyards, ports, and marinas	
3.6.4	BMP 34: Cleaning and Maintenance of Pools, Spas, Hot Tubs, and Fountains • Applies to cleaning and maintenance of pools, spas, hot tubs, and fountains, including all commercial pool cleaners	
3.6.5	BMP 35: Deicing and Anti-icing Operations for Airports and Streets • Applies to highways, aircraft, runways and taxiways, and streets	
3.6.6	BMP 36: Maintenance and Management of Roof and Building Drains at Manufacturing and Commercial Buildings • Applies to maintenance and management of roofs and sides of manufacturing and commercial buildings	

Table 1 (continued). Worksheet for Identifying Applicable BMPs.

Section Reference	BMP Number and Name	Is activity conducted in an area that could impact the drainage system or receiving waters?
SECTION 3.6 (continued) – OTHER ACTIVITIES		
3.6.7	BMP 37: Maintenance and Operation of Railroad Yards • Applies to cleaning, maintenance, and repair of equipment and engines; fueling; waste disposal; and all other yard maintenance activities	
3.6.8	BMP 38: Maintenance of Public and Private Utility Corridors and Facilities • Applies to maintenance activities related to public and private utilities, including pipelines, pump stations, rights-of-way, and transmission corridors	
3.6.9	BMP 39: Maintenance of Roadside Ditches • Applies to activities related to the maintenance of roadside ditches	

Notes:

[a] If this activity could impact stormwater or receiving waters, refer to the corresponding section of this volume (identified in the first column) for BMP descriptions.

CHAPTER 2 – CITYWIDE BEST MANAGEMENT PRACTICES

2.1. Required Citywide Best Management Practices

All real property must implement and maintain the following source control BMPs to prevent or minimize pollutants from leaving a site or property (SMC, Section 22.803.030). Owners, operators, and occupants of property, and anyone causing or contributing to a violation of the Stormwater Code (Code) are each considered a "responsible party" relative to a Code violation (SMC, Section 22.801.190).

2.1.1. BMP 1: Eliminate Illicit Connections

Illicit connections include sanitary or process wastewater connections that are improperly discharging to a drainage system or receiving water. These improper connections allow a variety of pollutants to flow directly to receiving waters instead of the sanitary sewer or septic system. Frequently, such connections are not intentional, but can be very harmful to the environment and must be eliminated. Refer to *Volume 1, Section 3.11* for the minimum requirements to comply with the Seattle Side Sewer Code (SMC, Chapter 21.16).

Required elements of this BMP include:

- For all real properties, responsible parties must examine their plumbing systems to identify any potential illicit connections. A good place to start is with an examination of the site plans. Remodeling and tenant improvement projects are particularly susceptible to inadvertent illicit connections. If an illicit connection is suspected, perform a closed circuit television inspection (CCTV) or dye test with a nontoxic dye. These tests are typically best performed by qualified personnel such as a plumbing contractor. Notify Ecology's Northwest Regional Office at (425) 649-7000 and SPU at (206) 386-1800 prior to performing a dye test that may result in a discharge to a receiving water.
- If illicit connections are found, permanently plug or disconnect the connections.
- Obtain all necessary permits for altering or repairing side sewers and plumbing fixtures. Restrictions on certain types of discharges, particularly industrial process waters, may require pretreatment of discharges before they enter the sanitary sewer. It is the responsibility of the property owner or business operator to obtain the necessary permits and to replace the connection.
- The Stormwater Code allows the Director to require that a responsible party provide or create site drainage and sewer system maps with verified discharge points to aid in identifying illicit connections and/or to verify that illicit connections are eliminated.

2.1.2. BMP 2: Perform Routine Maintenance

Sediment and pollutants can accumulate over time in various components of drainage collection, conveyance, and treatment systems, such as catch basins, ditches, storm drains, and oil/water separators. When a storm event occurs, the excessive sediment and pollutants can become mobilized and carried into receiving waters. Performing routine maintenance is required and helps prevent sediment and pollutants from discharging downstream.

Required elements of this BMP include:

- Inspect all conveyance, detention and treatment systems at least annually and clean or repair structures whenever the condition thresholds described in *Appendix G* are triggered. Systems in industrial areas or areas that receive excessive sediment, foliage or debris may require more frequent inspection and maintenance. If leaves or woody debris accumulate on catch basins and inlets, clean as needed to prevent flooding.
- Clean catch basins when they are greater than 60 percent full of sediment, within 18 inches of the bottom of the lowest pipe, or there are obvious signs of pollution visible. At 60 percent capacity, there is not enough settling space to remove sediment from stormwater and they cease to function as designed.
- All catch basins are required to have outlet traps (downturned elbow) similar to City of Seattle Standard Plan No. 267. Outlet traps help to keep oil and other floatables from discharging to the public drainage system or receiving waters. Replace or repair outlet traps when missing or damaged.
- Properly dispose of all solids, polluted material, and stagnant water collected through system cleaning. Do not decant water back to the system. Do not jet material downstream into the system. In all systems, known or suspected contaminated material may need to be tested for additional disposal requirements.
- Consider posting “Dump No Waste” or other warning signs adjacent to inlets/catch basins where possible.

Several contractors offer cleaning services for drainage systems. A list of contractors can be found on the SPU website, online, or in the Yellow Pages under entries such as “Sewer Contractors.”

2.1.3. BMP 3: Dispose of Fluids and Wastes Properly

For all real properties, responsible parties must properly dispose of solid and liquid wastes and contaminated stormwater and sediment. There are generally four options for disposal, depending on the type of waste:

1. Recycling facilities
2. Municipal solid waste disposal facilities
3. Hazardous waste treatment, storage, and disposal facilities
4. Sanitary sewer

Some liquid wastes and contaminated stormwater (depending on the pollutants and associated concentrations) may be discharged to the sanitary sewer system, but are subject to approval by the City and King County. Restrictions on certain types of discharges may require pretreatment of discharges before they enter the sanitary sewer.

If wastes cannot be legally discharged to a sanitary sewer, one of the other three disposal options must be used. Sumps or holding tanks may be useful for storing liquid wastes temporarily. The contents must be disposed of properly.

Contaminated sediment must be handled following the Dangerous Waste Regulations (Washington Administrative Code [WAC], Chapter 173-303), if applicable. If testing determines materials are not dangerous waste but contaminants are present, consult with Public Health – Seattle & King County for disposal options.

Required elements of this BMP include:

- Dispose of wastes in accordance with applicable solid waste, dangerous waste, industrial waste, and other regulations.

2.1.4. BMP 4: Proper Storage of Solid Wastes

This BMP applies to properties that store solid wastes, including garbage, recyclables, and compostable materials outdoors. If improperly stored, these wastes can contribute a variety of pollutants to stormwater.

Required elements of this BMP include:

- Store all solid wastes in suitable containers (Figure 1).

Figure 1. Covered Outdoor Storage of Solid Wastes.

- Check storage containers for damage and replace them if they are leaking, corroded, or otherwise deteriorating.
- Ensure that storage containers have leak proof lids or are covered by some other means, and that lids are closed at all times.
- Sweep the waste storage area or clean frequently to collect all loose solids for proper disposal in a storage container. When washing the area, contain and properly dispose of washwater.
- Drain dumpsters, dumpster pads, and trash compactors to the sanitary sewer.
- Clean up leaks and spills as they occur.
- Do not allow accumulated waste to exceed the capacity of the storage container. If this occurs, obtain and use another storage container. Do not overfill containers.
- For containers stored in the right-of-way, label with owner information.

2.1.5. BMP 5: Spill Prevention and Cleanup

Leaks and spills can damage public infrastructure, interfere with sewage treatment and cause a threat to human health or the environment. Spills are often preventable if appropriate chemical and waste handling techniques are practiced effectively and the spill response plan is immediately implemented. Additional spill control requirements may be required based on the specific activity occurring on site.

A spill can be a one-time event, a continuous leak, or frequent small spills. All types must be addressed.

Businesses and real properties that load, unload, store, and manage liquids or other erodible materials must implement this BMP.

2.1.5.1. Spill Prevention

Implement the following practices and provide spill cleanup kits (*Section 2.1.5.3*) at activity locations where spills may occur:

- Clearly label all containers that contain potential pollutants.
- Store and transport liquid materials in appropriate containers with tight-fitting lids.
- Place drip pans underneath all containers, fittings, valves, and where materials are likely to spill or leak.
- Use tarpaulins, ground cloths, or drip pans in areas where materials are mixed, carried, and applied to capture any spilled materials.
- Train employees on the safe techniques for handling materials used on the site and to check for leaks and spills.

2.1.5.2. Spill Plan

- Develop and implement a spill plan and update it annually or whenever there is a change in activities or staff responsible for spill cleanup. Post a written summary of the plan at areas with a high potential for spills, such as loading docks, product storage areas, waste storage areas, and near a phone (Figure 2). The spill plan may need to be posted at multiple locations. Describe the facility, including the owner's name, address, and telephone number; the nature of the facility activity; and the general types of chemicals used at the facility.
- Designate spill response employees to be on the site during business activities. Provide a current list of the names, and telephone numbers (office and home) of designated spill response employee(s) who are responsible for implementing the spill plan.
- Provide a site plan showing the locations of storage areas for chemicals, inlets/catch basins, spill kits and other relevant infrastructure or materials information.
- Describe the emergency cleanup and disposal procedures. Note the location of the spill kit in the spill plan.
- List the names and telephone numbers of public agencies to contact in the event of a spill. Refer to *Section 2.1.5.4* for more information.

Figure 2. Waste Storage Area with Spill Kit and Posted Spill Plan.

2.1.5.3. Spill Cleanup Kit

Store spill cleanup kits near areas with a high potential for spills so that they are easily accessible in the event of a spill. The contents of the spill kit must be appropriate to the types and quantities of materials stored or otherwise used at the facility, and refilled when the materials are used. A spill kit may include the following items:

- Absorbent pads
- Sorbent booms or socks
- Absorbent granular material (such as kitty litter)
- Protective clothing (such as latex gloves and safety goggles)
- Thick plastic garbage bags
- Drain cover

2.1.5.4. Spill Cleanup and Proper Disposal of Material

In the event of a spill, implement the following procedures:

- Implement the spill plan immediately.
- Contact the designated spill response employee(s).
- Block off and seal nearby inlets/catch basins to prevent materials from entering the drainage system or combined sewer.
- Use an appropriate material to clean up spills. Do not use emulsifiers or dispersants such as liquid detergents or degreasers.
- Immediately report all spills, discharges, or releases that could impact a drainage system, a combined sewer, a sanitary sewer, or a receiving water to the SPU Operations Response Center at (206) 386-1800 This reporting requirement is in addition to, and not instead of, any other reporting requirements under federal, state or local laws. Other agencies may include Seattle Fire Department, Department of Ecology and the National Response Center.
- Do not wash absorbent material into interior floor drains or inlets/catch basins.
- Dispose of used spill control materials in accordance with the Seattle Solid Waste Collection Code (SMC, Chapter 21.36), Dangerous Waste Regulations (WAC, Chapter 173-303), and applicable laws.

The SPU Green Business Program is a free conservation program funded by SPU. The program offers free technical assistance, free spill kits, and assistance in developing a spill plan. They can be reached by calling (206) 343-8505 or on the web at: (www.seattle.gov/util/ForBusinesses/GreenYourBusiness).

2.1.6. BMP 6: Provide Oversight and Training for Staff

The key to sustaining BMPs is to ensure that staff are properly trained in their purpose and maintenance requirements. Assign source control maintenance as a job responsibility for staff.

For all businesses and public entities, required elements of this BMP include:

- Train all team members annually in the operation, maintenance, and inspection of BMPs. Keep training records on file.
- Train all team members annually in spill cleanup.
- Assign an employee to oversee implementation and management of stormwater source control best management practices.

The SPU Green Business Program is a free conservation program funded by SPU. The program offers free technical assistance and can assist with employee training. They can be reached by calling (206) 343-8505 or on the web at: (www.seattle.gov/util/ForBusinesses/GreenYourBusiness).

2.1.7. BMP 7: Site Maintenance

Good site maintenance reduces the potential for stormwater to come into contact with pollutants and can reduce maintenance intervals for the drainage system and combined sewer.

For all businesses and public entities, required elements of this BMP include:

- Where feasible, locate pollution generating activities away from stormwater pathways, such as inlets/catch basins, conveyance pipes, and ditches.
- Sweep paved areas used for loading and unloading of materials, outdoor production and manufacturing, and storage as needed to prevent pollutant transport off site or to the drainage system.
- Promptly contain and clean up solid and liquid leaks and spills (refer to BMP 5 for specific information on spill prevention and cleanup).
- Inspect areas used for loading and unloading, material/waste storage, and vehicle parking as needed to prevent pollutant transport off site or to the drainage system.
- Do not hose down or otherwise transport pollutants from any area to the ground, drainage system, combined sewer, or receiving water.

CHAPTER 3 – COMMERCIAL AND INDUSTRIAL ACTIVITY BEST MANAGEMENT PRACTICES

In addition to the citywide BMPs in *Chapter 2*, there are many additional source control BMPs that may be required depending on the specific commercial and industrial activities that occur or will occur on a site, except those the drain only to the combined sewer. Source control requirements are outlined in SMC, Section 22.803.040 (Minimum Requirements for Source Controls For All Businesses and Public Entities) and SMC, Section 22.805.020.K (Install Source Control BMPs).

Before reading this chapter, fill out the worksheet in *Section 1.6* to identify which site-specific activities require BMPs.

3.1. Cleaning or Washing

The cleaning or washing of vehicles, aircraft, vessels, engines, tools, cooking equipment, manufacturing equipment, and buildings are pollution generating activities when not conducted properly. When these activities are performed, the resulting washwater usually contains soap or detergents, and can contain a variety of pollutants that contaminate stormwater. The specific BMPs that apply to cleaning and washing are presented in this section.

Remember to also implement all required citywide BMPs from *Chapter 2*.

3.1.1. BMP 8: Cleaning or Washing

This BMP applies to cleaning, washing, and rinsing activities, including pressure washing and steam cleaning. The purpose of cleaning and washing activities is to remove pollutants from equipment, vehicles, boats and buildings; these pollutants should not be discharged to the public drainage system.

Description of Pollutants

Source pollutants include surfactants, petroleum hydrocarbons, toxic organic compounds, fats, oils and greases, soaps, detergents, nutrients, metals, pH, suspended solids, substances that increase biological oxygen demand (BOD), and substances that increase chemical oxygen demand (COD).

Required BMP Elements

The following BMPs or equivalent measures are required of all businesses and public agencies engaged in cleaning or washing activities:

- Implement all citywide BMPs (refer to *Chapter 2*).
- Provide training to employees regarding proper disposal of wastewater. This training must be documented.
- Outside drains discharge to the combined sewer or to the drainage system, depending on the location within Seattle. Directing washing activities to drains that discharge to the drainage system is not allowed. Identify the type of system on your property and train employees about required BMPs accordingly.
- For cleaning related to food service establishment equipment, wipe the equipment before cleaning/washing to remove excess pollutants.
- Sweep surfaces before cleaning/washing to remove excess sediment and other pollutants.
- Discharge wastewater from cleaning or washing activities into the sanitary or combined sewer at a site that is approved for discharge, into a process treatment system, or into a holding tank. It is illegal to discharge the dirty solution to the drainage system. A permit for discharge to the sanitary or combined sewer may be required. and pretreatment may be necessary. If using a holding tank, ensure it is properly sized and does not overfill.
- Cover and/or contain the activity or conduct the activity inside a building having a floor drain that discharges to the sanitary sewer.
- If roof equipment or hood vents are cleaned, ensure that no wastewater or process water is discharged to the roof drains or drainage system.
- Label all mobile cleaning equipment as follows: “Properly dispose of all wastewater. Do not discharge to an inlet/catch basin, ditch, stream, or on the ground.”

Ecology Publication WQ-R-95-056, Vehicle and Equipment Washwater Discharges: Best Management Practices Manual (Ecology 2012) can be used for guidance on sumps, holding tanks, and the prevention of runoff.

For wash pads discharging directly to the sanitary sewer:

- The uncovered portion of the wash pad must be no larger than 200 square feet or must have an overhanging roof (refer to Figure 3). This is to prevent excess stormwater from entering the sanitary sewer. Covering may be required in many situations.

Figure 3. Car Wash Building with Drain to the Sanitary Sewer.

- If the uncovered wash pad cannot be less than 200 square feet, a shut off valve may be installed which will direct washwater to the sanitary sewer when the washpad is in use, and stormwater to the drainage system when the wash pad is not in use (refer to Figure 4). The valve on the outlet may be manually operated; however, a pneumatic or electrical valve system is preferable. The valve may be on a timer circuit, where it is opened upon completion of a wash cycle. The timer would then close the valve after the sump or separator is drained. Signage and training is required for this system.
- If adjacent to a building or constructed over hazardous material storage areas, other regulations, including the Seattle Fire Code, may apply.

- Obtain all necessary permits for installing, altering or repairing onsite drainage and side sewers. Restrictions on certain types of discharges may require pretreatment before they enter the sanitary sewer.

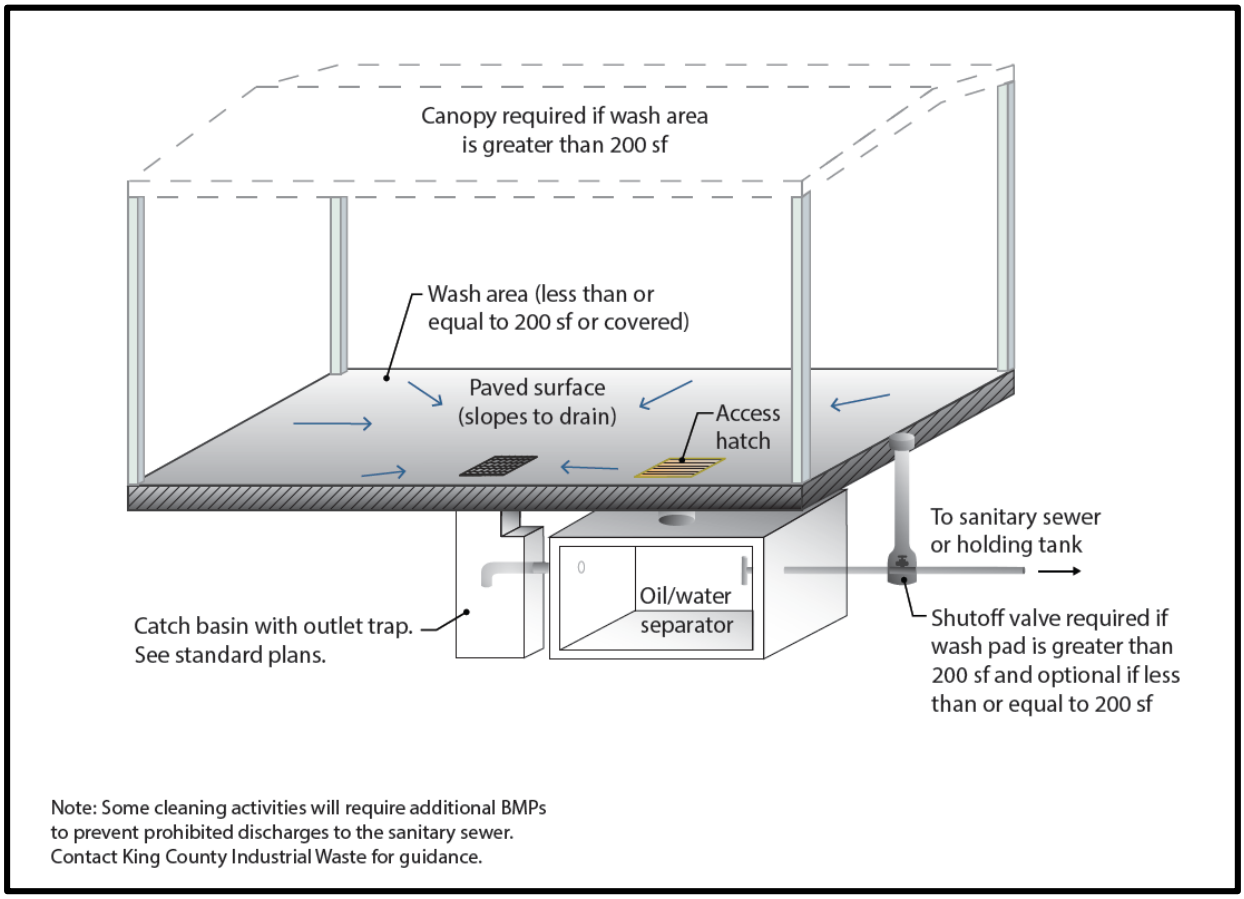

Figure 4. Schematic of Wash Pad with Sump.

Recommended BMPs

Although not required, the following BMPs can provide additional pollution control for washing activities that drain to the sanitary sewer. To reduce the potential overall pollution load to the sanitary sewer from washing operations for tools, vehicles, engines, and manufacturing equipment:

- Minimize water and detergent use in all washing operations.
- Use phosphate-free detergents when practical.
- Consider recycling the washwater by installing a closed-loop water recycling system.
- Use the least hazardous cleaning products available.
- For intermittent washing of vehicles, use a car wash that recycles washwater and discharges to the sanitary sewer.

3.2. Transfer of Liquid or Solid Materials

The transfer of liquid or solid materials, including the loading and unloading of such material, fueling of vehicles or equipment at mobile or designated locations, and vehicle and equipment repair and maintenance are activities that have a high risk for spills or leaks of toxic material. Both required and recommended BMPs can help prevent, minimize, and manage the effects of accidental spills or leaks. The specific BMPs that apply to the transfer of particular types of liquid and solid materials are presented in this section.

Remember to also implement all required citywide BMPs from *Chapter 2*.

3.2.1. BMP 9: Loading and Unloading of Liquid or Solid Material

This BMP applies to businesses and public agencies engaged in the loading and unloading of liquid or solid materials or the transfer of non-containerized bulk materials. Sources of pollution include loading docks, vehicles, and equipment involved in material handling. These activities are typically conducted at shipping and receiving areas, outside storage areas, and fueling areas.

Description of Pollutants

Leaks and spills of fuels, oils, powders, organic compounds, nutrients, metals, food products, salts, acids, and alkalis during transfer are potential sources of stormwater contamination. Spills from breaks in hydraulic lines and leaking forklifts are common problems at loading docks. Many inlets/catch basins in Seattle discharge directly to local streams and waterways and therefore spilled or leaked products can adversely affect water quality and harm both people and aquatic organisms that come in contact with the contaminated water. These pollutants must not be discharged to the drainage system or directly into receiving waters.

Required BMP Elements

The following BMPs or equivalent measures are required in all loading and unloading areas:

- Implement all citywide BMPs (refer to *Chapter 2*).
- Sweep as often as necessary to prevent material contact with stormwater and to remove accumulated debris and other material that could otherwise be washed off by stormwater. Do not sweep this debris into drainage infrastructure.
- Place drip pans or other appropriate temporary containment devices in locations where leaks or spills may occur, such as hose connections, hose reels, and filler nozzles (Figure 5).
- Always use drip pans when making and breaking connections. Clean drip pans after each use to remove any residual material. Dispose of any residual material in accordance with the Seattle Solid Waste Collection Code (SMC, Chapter 21.36) and the state Dangerous Waste Regulations (WAC, Chapter 173-303).
- Inspect loading and unloading areas after each delivery for leaks and spills and clean up immediately.
- Check material handling equipment such as valves, hoses, pumps, flanges, and connections regularly for leaks, and repair as needed. Document and keep all inspection records. Store contaminated equipment inside or under cover to prevent residual material from coming into contact with stormwater.
- Place curbs along the edge or slope the edge of the loading and unloading area such that stormwater can flow to an internal drainage system that leads to an approved treatment BMP. This will prevent contaminated stormwater from passing directly over paved surfaces and into the drainage system.

- Pave and slope loading and unloading areas to prevent the pooling of water. The use of catch basins and drain lines in the interior of the paved area should be minimized as they frequently become covered by material. Catch basins are preferred in designated "alleyways" that will not be covered by material, containers, or equipment.

Figure 5. Temporary Containment Device Placed Under a Hose Connection.

Consistent with the requirements of this volume of the Seattle Stormwater Manual and the Seattle Fire Code (SMC, Chapter 22.600) and to the extent practical, unload and load solids and liquids in a manufacturing building or under a roof, lean-to, or other appropriate cover.

The following BMPs or equivalent measures are required in areas of transfer from tanker trucks and railcars to aboveground or underground storage tanks:

- To minimize the risk of accidental spillage, prepare and follow an "Operations Plan" that describes procedures for loading/unloading. Train employees on the plan.
- For rail facilities, install and maintain a drip pan system within the rails to collect spills and leaks from tank cars, hose connections, hose reels, and filler nozzles.

The following BMPs or equivalent measures are required in areas of loading and unloading from or to marine vessels:

- Facilities and procedures for the loading or unloading of petroleum products must comply with U.S. Coast Guard requirements; refer to specifications in the (Stormwater Management Manual for Western Washington (SWMMWW), Volume IV, Appendix IV-D R.5 (Ecology 2014).

For requirements related to the transfer of small quantities from tanks and containers:

- Refer to BMP 25 for storage of portable containers of liquid or dangerous waste containers (*Section 3.4.4*) and BMP 26 for storage of liquids in aboveground tanks (*Section 3.4.5*).

Recommended BMPs

Although not required, the following BMPs can provide additional pollution protection:

- Whenever possible, conduct the activity indoors or under cover to minimize exposure to stormwater.
- Choose less toxic materials for use in facility operations.
- For the transfer of liquids in areas that cannot contain a catastrophic spill, install an automatic shutoff system in case of an unanticipated interruption in off-loading (e.g., a coupling break, hose rupture, or overfill).
- Install and maintain overhangs (Figure 6) or door skirts that enclose the trailer end to prevent contact with stormwater.

Figure 6. Loading Docks with an Overhang to Prevent Material Contact with Stormwater.

BMP 10 (*Section 3.2.2*) is recommended in areas of transfer from tanker trucks to aboveground or underground storage tanks, and includes:

- Pave the area on which the transfer takes place. If any transferred liquid, such as gasoline, is reactive with asphalt, pave the area with Portland cement concrete or equivalent.
- Construct a slope, berm, or dike to direct runoff from the transfer area to a dead-end sump, spill containment sump, a spill control oil/water separator, or other spill control device. The minimum spill retention time should be 15 minutes for the flow rate of the dispensing mechanism with the highest through-put rate, or at the peak flow rate of the 6-month, 24-hour storm event over the surface of the containment pad, whichever is greater. The volume of the spill containment sump should be a minimum of 50 gallons with an adequate grit sedimentation volume.

3.2.2. BMP 10: Fueling at Dedicated Stations

This BMP applies to businesses and public agencies that operate a facility used exclusively for the transfer of fuels from a stationary pumping station to vehicles or equipment. This type of fueling station includes aboveground or underground fuel storage facilities, which may be permanent or temporary. Fueling stations include facilities such as, but not limited to, commercial gasoline stations, 24-hour convenience stores, car washes, warehouses, manufacturing establishments, maintenance yards, port facilities, marinas and boatyards, construction sites, and private fleet fueling stations.

Description of Pollutants

Typically, stormwater contamination at fueling stations is caused by leaks or spills of fuels, lubrication oils, radiator coolants, fuel additives, and vehicle washwater. These materials contain organic compounds, oils and greases, and metals that can be harmful to humans and aquatic life. These pollutants must not be discharged to the drainage system or directly into receiving water.

A spill can be a one-time event, a continuous leak, or frequent small spills. All types must be addressed.

Required BMP Elements

All BMPs related to fueling at dedicated stations must be consistent with the requirements of the Seattle Fire Code (SMC, Chapter 22.600). The water quality requirements presented in this manual are separate from, and in addition to, the requirements of the Seattle Fire Code. These water quality requirements relate to fuel storage tanks, fuel dispensing equipment, area lighting, spill control and secondary containment, signage, maintenance, and operations. For current requirements, refer to the Seattle Fire Code.

New or substantially altered stations* require the following (refer to Figure 7):

*Substantial alteration of fueling stations includes replacing the canopy or relocating, replacing, or adding one or more fuel dispensers in such a way that the Portland cement concrete (or equivalent) paving in the fueling area is modified. Addition of fuel tanks to a site also triggers implementation of source control BMPs. For further guidance on determining the actions considered substantial remodeling, contact the Department of Planning and Development (DPD).

- Construct fueling stations on an impervious concrete pad under a roof to keep out rainfall and to prevent stormwater run-on. Pave the fueling island and containment pad with Portland cement concrete or equivalent. Asphalt is not considered an equivalent material.
- Use a treatment BMP for contaminated stormwater and wastewater in the fueling containment area with discharge to the sanitary sewer.

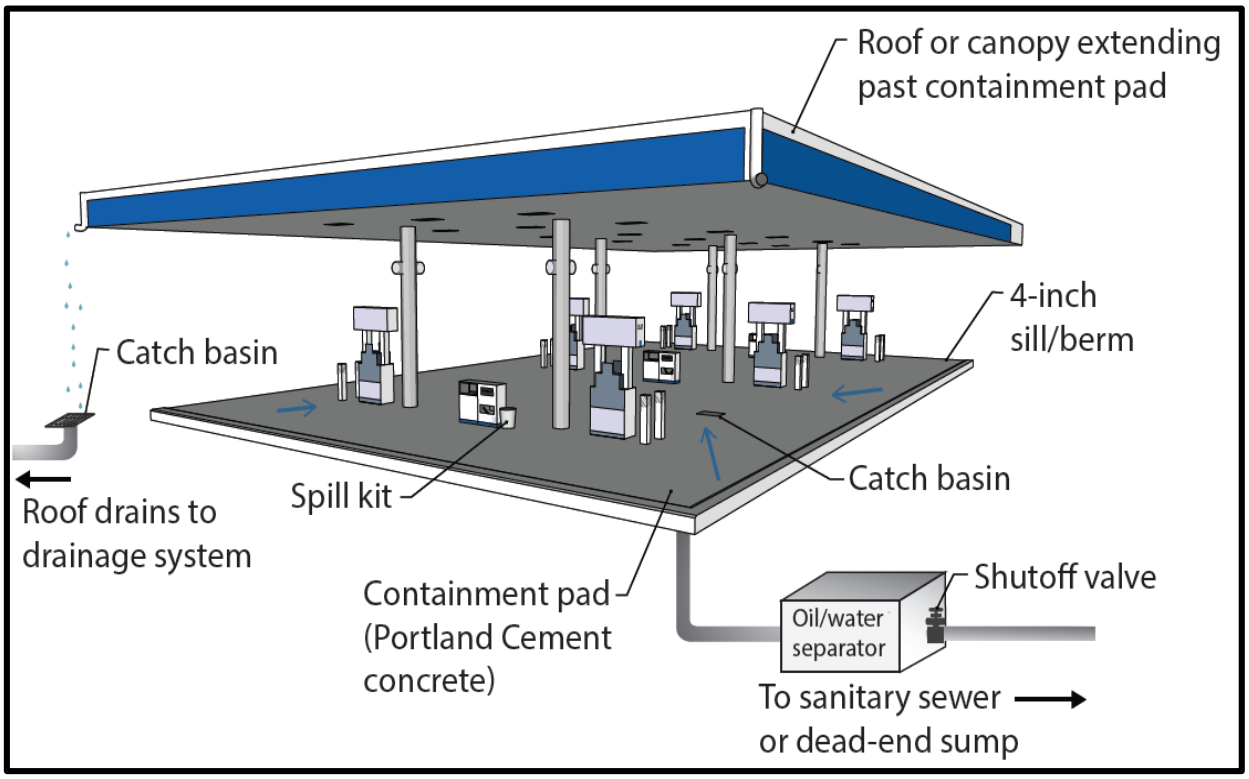

Figure 7. Fueling Island Schematic.

- Design the fueling island (Figure 8) to minimize stormwater contamination, to control spills, and to collect and direct contaminated stormwater and/or wastewater to a pretreatment facility that will achieve the required level of treatment. The fueling island must be designed in compliance with all applicable codes.
- Drains from the fueling island must discharge to the sanitary sewer.
- The fueling island spill containment pad must be designed with the following:
  - A sill/berm (or equivalent control) raised to a minimum of 4 inches to contain spilled liquids and to prevent the run-on of stormwater from the surrounding area
  - A concrete containment pad sloped around the fueling island toward the drains. The slope of the drains must not be less than 1 percent.
  - The fuel pad drain system must include trench drains, catch basins, a spill control separator, and/or a dead-end sump.
- Collect stormwater on the fuel island containment pad and convey it to either the sanitary sewer—if approved by SPU and/or King County—using an approved pre-treatment system such as an oil/water separator and a basic treatment BMP. Alternatively, collect stormwater on the fuel island containment pad and hold for proper offsite disposal.
  - Comply with pretreatment regulations prohibiting discharges that could cause a fire or explosion (WAC, Section 173-216-060).
  - For further requirements and guidance related to the storage of fuel-contaminated stormwater, refer to BMP 26 in *Section 3.4.5*.

- Install an automatic shutoff valve and spill control sump at the discharge point where drains convey contaminated stormwater to a treatment system. The discharge point must be closed in the event of a spill. The spill control sump must be sized in compliance with the Seattle Fire Code and the International Fire Code. For more information, contact the Seattle Fire Department (206) 386-1400.
- Construct a roof or canopy over the fueling island to prevent precipitation from falling directly onto the spill containment pad (Figure 8). The roof or canopy must:
  - At a minimum, cover the spill containment pad (within the grade break or fuel dispensing area) and preferably extend several additional feet to reduce the introduction of windblown rain.
  - Roofs and canopies 10 feet or less in height must have a minimum overhang of 3 feet on each side. The overhang must be measured relative to the berm or other hydraulic grade break.
  - Roofs or canopies greater than 10 feet in height must have a minimum overhang of 5 feet on each side.

Figure 8. Roof at Fueling Island to Prevent Stormwater Run-on.

- Convey runoff collected in roof or canopy drains to a drainage system or receiving water outside the fueling containment area. This will prevent the mixing of uncontaminated runoff from the roof with contaminated runoff from the fueling island.
- A roof or canopy may not be practical at fueling stations that regularly fuel vehicles 10 feet in height or more, particularly at industrial or transportation sites. Additional BMPs or equivalent measures are required. At these types of fueling facilities, the following BMPs apply, as well as all of the other required BMPs and fire prevention requirements (Seattle Fire Code and Uniform Fire Code):
    - The concrete fueling pad must be equipped with an emergency spill control device that includes a shutoff valve for drainage from the fueling area.
    - The shutoff valve must be closed in the event of a spill. An automatic shutoff valve is preferred to minimize the time lapse between spill and containment.

Obtain all necessary permits for installing, altering, or repairing side sewers. Restrictions on certain types of discharges may require pretreatment before they enter the sanitary sewer.

The following BMPs or equivalent measures are required for all fueling stations:

- Implement all citywide BMPs (refer to *Chapter 2*).
- Train employees on the proper use of fuel dispensers.
- Do not use dispersants to clean up spills or sheens.
- Post signs related to the operation of fuel dispensers in accordance with the Seattle Fire Code. For example, post “No Topping Off” signs near fuel dispensers (topping off gasoline tanks results in spillage and vents gasoline fumes to the air).
- Ensure that the person conducting the fuel transfer is present at the fueling dispenser/fueling pump during fuel transfer, particularly at unattended or self-service stations. Post “Stay with Vehicle during Fueling” signage near fuel dispensers.
- Ensure that the automatic shutoff on the fuel nozzle is functioning properly.
- Ensure that at least one designated trained person is available either on site or on call at all times to promptly and properly implement spill prevention and cleanup. If the fueling station is unattended, the spill plan must be visible to all customers using the station, and the spill kit must also be accessible and fully stocked at all times.
- Keep suitable cleanup materials, such as dry adsorbent materials, on site to enable employees to promptly clean up spills.
- Transfer the fuel from the delivery tank trucks to the fuel storage tank in impervious contained areas and ensure that appropriate overflow protection is used. Alternatively, cover nearby inlets/catch basins during the filling process and use drip pans under all hose connections.

The following additional BMPs or equivalent measures are required for fueling over open water, such as at marinas or boatyards:

- Have an employee supervise the fuel dock.
- Use automatic shut-off nozzles and promote the use of "whistles" and fuel/air separators on air vents or tank stems of inboard fuel tanks to reduce the amount of fuel spilled into receiving waters during fueling of boats.
- During fueling operations, visually monitor the liquid level indicator to prevent the tank from being overfilled.
- The maximum amount of product received must not exceed 95 percent capacity of the receiving tank.
- Spilled fuel and contaminated stormwater must be conveyed either to the sanitary sewer—if approved by SPU and/or King County—or to an oil removal treatment facility, such as an American Petroleum Institute (API) oil/water separator, coalescing plate oil/water separator, or equivalent treatment and then to a basic treatment facility (refer to *Volume 3 — Project Stormwater Control*).

Facilities and procedures for the loading or unloading of petroleum products must comply with U.S. Coast Guard requirements. Refer to specifications in the Stormwater Management Manual for Western Washington (SWMMWW), Volume IV, Appendix IV-D (Ecology 2014).

Recommended BMPs

- Provide information to all appropriate parties on collection and recycling programs for oil, oil absorbing pads, and oil filters.
- Direct all appropriate parties to the proper disposal of all used hydrocarbon products through the use of signs, mailings, and other means.

3.2.3. BMP 11: Maintenance and Repair of Vehicles and Equipment

This BMP applies to businesses and public agencies on whose premises oil, fuel, engine oil, and other fluids such as battery acid, coolants, and transmission and brake fluids are removed and replaced in vehicles and equipment. It also applies to mobile vehicle maintenance operations, such as those at construction sites.

Description of Pollutants

Pollutants of concern are total petroleum hydrocarbons, toxic organic compounds, oils and greases, pH, and metals. These pollutants must not be discharged to the drainage system or directly into receiving waters.

Required BMP Elements

The following BMPs or equivalent measures are required of all businesses and public agencies engaged in vehicle and equipment repair and maintenance activities:

- Implement all citywide BMPs (refer to *Chapter 2*).
- Inspect all incoming vehicles and equipment for leaks and spills. Clean up all leaks and spills as they occur. Drain all fluids that have the potential to leak from wrecked vehicles and from equipment when they arrive. Store and dispose of fluids properly.

A spill can be a one-time event, a continuous leak, or frequent small spills. All types must be addressed.

- Ensure that spill control materials that are appropriate to the type and quantity of materials being stored are kept readily accessible and stocked for ease of use. Soiled rags and other cleanup material must be properly disposed of or professionally cleaned and reused.
- Maintenance and repair activities must be conducted inside a building or other covered impervious containment area that is sloped to prevent run-on of uncontaminated stormwater and runoff of contaminated water.
- Do not use dispersants to clean up spills or sheens.
- Use drip pans or other containment devices beneath the vehicle or equipment to capture all spills and drips.
- Make sure all outside materials that have the potential to leach or spill to the drainage system are covered, contained, or moved to an indoor location.
- Maintenance and repair areas cannot be hosed down. Instead, they must be swept weekly or more often as needed to collect dirt. Spills must be wiped up with rags and other absorbent materials. If pressure washing is necessary, the wastewater must be collected and disposed of properly. It cannot be discharged to the drainage system.
- Do not pour or convey washwater, liquid waste, or other pollutants into the drainage system.

- Maintenance and repair shop floor drains must discharge to the sanitary sewer. Do not allow drains inside maintenance buildings to connect to the sanitary sewer without prior approval by SPU and/or King County.
- If extensive staining and oily sheen is present, absorbent pillows or booms must be used in or around catch basins and properly maintained to prevent oil from entering the drainage system.

3.2.4. BMP 12: Mobile Fueling of Vehicles and Heavy Equipment

This BMP applies to businesses and public agencies that fill fuel tanks of vehicles and equipment by means of tank trucks driven to sites where the vehicles are located (also known as mobile fueling, fleet fueling, wet fueling, or wet hosing). Mobile fueling is allowed only for diesel fuel. Mobile fueling for gasoline is prohibited.

Description of Pollutants

Typically, stormwater contamination at mobile fueling locations is caused by leaks or spills of fuels and automotive fluids. These materials contain organic compounds, oils and greases, and metals that can be harmful to humans and to the aquatic environment. These pollutants must not be discharged to the drainage system or directly into receiving waters.

Required BMP Elements

The following BMPs or equivalent measures are required of all businesses and public agencies engaged in mobile fueling of vehicles and heavy equipment:

- Implement all citywide BMPs (refer to *Chapter 2*).
- Mobile fueling operations must be permitted by the Seattle Fire Department and comply with both the Seattle Fire Code and Washington State Fire Code.
- In fueling locations near sensitive aquifers, designated wetlands, wetland buffers, or other receiving water, compliance with additional local requirements may be required.
- Ensure compliance with all 49 CFR 178 requirements for Department of Transportation (DOT) 406 cargo tankers. Documentation from a DOT Registered Inspector is required to provide proof of compliance.
- Train the driver/operator annually in spill prevention and cleanup. Make all employees aware of the significant liability associated with fuel spills. New employees must be trained upon hiring. Document and keep all training records.
- Develop and follow a written fuel operation plan that is:
    - Properly signed and dated by the responsible manager
    - Retained at headquarters and distributed to all operators, along with the spill plan
    - Made available in the event that an authorized government agency requests a review
- Ensure that the driver/operator is present and constantly observing and monitoring the fuel transfer location during fuel transfer. Implement the following procedures at fuel transfer locations:
    - To the extent practical, locate the point of fueling at least 25 feet from the nearest inlet/catch basin or inside an impervious containment area with a volumetric holding capacity equal to or greater than 110 percent of the fueling tank volume, or cover the inlet/catch basin to ensure there is no inflow of spilled

or leaked fuel. Before removing drain cover, check for sheen. Do not remove if sheen is present and properly dispose of contaminated material.

  - Place a drip pan or an absorbent pad under each fueling location prior to and during all dispensing operations. The pan must be water tight and must have a capacity of 5 gallons.
  - Handle and operate fuel transfer hoses and nozzles, drip pan(s), and absorbent pads to prevent fuel spills and leaks from reaching the ground, receiving water, and inlets/catch basins.
  - Avoid extending the fueling hoses across a traffic lane without a cone barrier and do not allow vehicles to drive over fuel hoses.

- Use automatic shutoff nozzles for dispensing the fuel. Replace automatic shutoff nozzles as recommended by the manufacturer.
- Inspect, maintain, and replace equipment on fueling vehicles, particularly hoses and nozzles, at established intervals to prevent failures. Document and keep all inspection records on file.
- Use an adequate lighting system at the filling point.
- Do not "top off" fuel tanks.
- At a minimum, maintain the following spill cleanup materials in a readily accessible location in all fueling vehicles:
  - Non-water-absorbent materials capable of absorbing 15 gallons of diesel fuel
  - An inlet/catch basin plug or cover
  - A non-water absorbent containment boom at least 10 feet long with a 12-gallon absorbent capacity
  - A non-spark generating shovel
  - Two 5-gallon buckets with lids
- Immediately remove and properly dispose of soils with visible surface contamination to prevent the spread of chemicals to groundwater or receiving water via stormwater runoff.
- Immediately notify the Seattle Fire Department (911), the Ecology Northwest Regional Office (425) 649-7000, and SPU (206) 386-1800 in the event of a spill. Establish a "call down list" to ensure the rapid and proper notification of management and government officials if any significant amount of product is discharged from the site. Keep the list in a protected but readily accessible location in the mobile fueling truck. The "call down list" should also identify spill response contractors available in the area to ensure the rapid removal of significant product spills into the environment.
- Do not use dispersants to clean up spills or sheens.

3.3. Production and Application

Production and application activities are associated with a high risk for spills or leaks of toxic material. Required and recommended BMPs can help to prevent, minimize, and manage accidental spills or leaks so that there are minimal environmental impacts. The specific BMPs that apply to particular types of production and application activities are presented in this section.

Remember to also implement all required citywide BMPs from *Chapter 2*.

3.3.1. BMP 13: Concrete and Asphalt Mixing and Production

This BMP applies to businesses and public agencies that mix raw materials onsite to produce concrete or asphalt. It also applies to subsequent uses such as making concrete or asphalt products. It includes ready mix and central mix facilities.

Description of Pollutants

Pollutants of concern include petroleum hydrocarbons, toxic organic compounds, oils and greases, metals, and pH. Not only can concrete pouring activities severely alter the pH of stormwater runoff, but slurry from aggregate washing can harden in drainage infrastructure, thereby reducing capacity, which can result in flooding. These pollutants must not be discharged to the drainage system or directly into receiving waters.

Required BMP Elements

The following BMPs or equivalent measures are required of all businesses and public agencies engaged in activities related to concrete and asphalt mixing and production at stationary sites:

- Implement all citywide BMPs (refer to *Chapter 2*).
- Cover production and pouring areas to protect them from contact with stormwater.
- Recycle all process water from production, pouring, and equipment cleaning or discharge it to a dead-end sump, process water treatment system, or the sanitary sewer. Obtain all necessary permits for discharge to the sanitary sewer.
- Never discharge washout from fresh concrete or concrete mixing into streets, sidewalks, drainage systems, or receiving waters.
- Segregate production areas from stormwater inputs. Any stormwater that mixes with production areas is considered process water and cannot be discharged to the drainage system or receiving waters. Obtain all necessary permits for discharge to the sanitary sewer.
- Establish a BMP maintenance schedule and educate employees annually about the need to prevent stormwater contamination through regular BMP maintenance. Document and keep all maintenance training records on hand.
- Use absorbent materials or catch basin filter socks (Figure 9) in and around inlets/catch basins to help filter out solids. If catch basin filter socks are used, maintain the filters regularly (weekly or as needed) to prevent plugging. Stormwater contaminated with concrete or asphalt must not enter the drainage system.

Catch basin filter socks only remove solids and do not provide treatment for other pollutants associated with concrete and asphalt mixing and production.

- Sweep the production and pouring area, driveways, gutters, and all other outdoor areas daily or more often as necessary to collect fine particles and aggregate for recycling or proper disposal.

Figure 9. Commercially Available Catch Basin Filter Sock.

- Do not wash or hose down areas that flow to the drainage system.
- Make sure all outside materials that have the potential to leach or spill to the drainage system are covered, contained, or moved to an indoor location.
- If operational controls do not prevent stormwater contamination, treatment BMPs may be necessary.

For information about water quality treatment BMPs for activities related to concrete and asphalt mixing and production at stationary sites, refer to *Volume 3 — Project Stormwater Control*. For a current list of proprietary and emerging water quality treatment technologies, refer to Ecology's website (www.ecy.wa.gov/programs/wq/stormwater/newtech/index.html).

Recommended BMPs

Although not required, the following BMPs are recommended to further prevent and minimize the contamination of stormwater resulting from concrete and asphalt mixing and production activities:

- Pave the mixing, production, and pouring areas. A sump drain in these areas is not advisable due to potential clogging problems, but could be used in a curing area. Sweep these areas to remove loose aggregate and recycle or dispose of the aggregate properly.
- Use catch basin covers or similarly effective containment devices to prevent runoff from entering the drainage system.

3.3.2. BMP 14: Concrete Pouring, Concrete/Asphalt Cutting, and Asphalt Application

This BMP applies to businesses and public agencies that apply asphalt or pour or cut concrete or asphalt for building construction and remodeling; road construction; repair and construction of sidewalks, curbs, and gutters; sealing of driveways and roofs; and other applications.

Description of Pollutants

Pollutants of concern include petroleum hydrocarbons, toxic organic compounds, oils and greases, metals, suspended solids, and pH. Not only can concrete pouring activities severely alter the pH of stormwater runoff, but slurry from aggregate washing can harden in stormwater pipes, thereby, reducing their capacity and resulting in flooding. These pollutants must not be discharged to the drainage system or directly into receiving waters.

Required BMP Elements

The following BMPs or equivalent measures are required of all businesses and public agencies engaged in activities related to concrete pouring and cutting and asphalt application:

- Implement all citywide BMPs (refer to *Chapter 2*).
- Sweep or shovel and collect loose aggregate chunks and dust for recycling or proper disposal at the end of each workday or as needed, especially at work sites such as streets, driveways, parking lots, sidewalks, curbs, and gutters where rain can readily pick up the loose material and carry it to the nearest stormwater conveyance system. Never hose down concrete or asphalt waste materials to an inlet/catch basin, ditch or receiving water.
- Place catch basin covers or similarly effective containment devices over all nearby drains at the beginning of each workday. Shovel or vacuum all slurry and remove from the site. All accumulated runoff and solids must be collected and properly disposed of at the end of each workday, or more often if necessary.
- Make sure all outside materials that have the potential to leach or spill to the drainage system are covered, contained, or moved to an indoor location.
- Use a mechanism for containment and collection of the discarded concrete slurry when performing exposed aggregate washing, where the top layer of unhardened concrete is hosed or scraped off to leave a rough finish. Dispose of the slurry properly.
- Use a catch basin filter sock to remove solid materials from inlets/catch basins. Maintain the filter regularly to prevent plugging. Stormwater contaminated with concrete or asphalt must not enter the drainage system.
- Perform cleaning of concrete application and mixing equipment or concrete delivery vehicles in a designated area where the rinse water can be controlled and properly disposed of.

- Collect, treat, and properly dispose of runoff that comes in contact with diesel or coatings used in asphalt applications.

For information about water quality treatment BMPs related to concrete and asphalt mixing and production activities, refer to *Volume 3 — Project Stormwater Contro*l. For a current list of proprietary and emerging water quality treatment technologies, refer to Ecology's website (www.ecy.wa.gov/programs/wq/stormwater/newtech/index.html).

Recommended BMPs

Although not required, the following BMPs are recommended to further prevent and minimize the contamination of stormwater resulting from concrete pouring and cutting and asphalt application at temporary sites:

- Avoid the activity when rain is falling or expected.
- If possible, portable asphalt mixing equipment should be covered by an awning, a lean-to, or other simple structure to avoid contact with rain.
- Recycle broken concrete and asphalt. Search for "Recycling Services" online or in the Yellow Pages of the telephone book to find a local recycler.

3.3.3. BMP 15: Manufacturing and Post-processing of Metal Products

This BMP applies to businesses and public agencies such as mills, foundries, and fabricators that manufacture or process metal products. A variety of activities such as machining, grinding, soldering, cutting, welding, quenching, etching, bending, coating, cooling, and rinsing may take place.

Description of Pollutants

Pollutants of concern include toxic organic compounds, metals, oils and greases, pH, suspended solids, and substances that increase COD. These pollutants must not be discharged to the drainage system or directly into receiving waters.

Required BMP Elements

The following BMPs or equivalent measures are required of all businesses and public agencies engaged in activities related to manufacturing and processing of metal products:

- Implement all citywide BMPs (refer to *Chapter 2*).
- Process wastewater (including contact cooling water, filter backwash, or cooling tower blowdown) from this activity and stormwater runoff from processing or production areas must be discharged to the sanitary sewer, holding tank, or process treatment system. If a holding tank is used for the storage of wastewater, the contents must be pumped out before the tank is full and disposed of appropriately to the sanitary sewer or process treatment system. Obtain all necessary permits for discharge to the sanitary sewer.
- Cover the activity area to prevent rain from contacting the process and to reduce the amount of runoff that may require treatment.
- Make sure all outside materials that have the potential to leach or spill to the drainage system are covered, contained, or moved to an indoor location.
- Sweep the activity area at the end of each workday or more often as needed to collect and properly dispose of metal fragments and product residues. Do not allow metal fragments, residues, or dust to accumulate in areas exposed to stormwater.
- Educate employees about controlling their work with metal products to minimize stormwater pollution. Document and keep all training records on hand.
- Businesses and public agencies who engage in these activities may be required to obtain a NPDES permit from Ecology.

Recommended BMPs

Although not required, the following BMPs are recommended to further prevent and minimize the contamination of stormwater resulting from the manufacturing and processing of metal products:

- Limit the amount of water used in quenching and rinsing. Recycle used water where possible.

- Use a catch basin filter to capture stray metal particles. Maintain the filter regularly (weekly or as needed) to prevent plugging.

For information about water quality treatment BMPs related to concrete and asphalt mixing and production activities, refer to *Volume 3 — Project Stormwater Control*. For a current list of proprietary and emerging water quality treatment technologies, refer to Ecology's website (www.ecy.wa.gov/programs/wq/stormwater/newtech/index.html).

3.3.4. BMP 16: Processing and Storage of Treated Wood

This BMP applies to businesses and public agencies that perform wood treatment including both anti-staining and preserving using pressure processes, dipping, or spraying. It also applies to businesses and public agencies who store or cut treated wood.

Description of Pollutants

Pollutant sources include drips of condensate or preservative after pressurized treatment, product washwater (in the treatment or storage areas), spills and leaks from process equipment and preservative tanks, fugitive emissions from vapors in the process, blowouts and emergency pressure releases, and kick-back from lumber (leakage of preservative as it returns to normal pressure).

Potential pollutants typically include wood treating chemicals, substances that increase biological oxygen demand (BOD), suspended solids, oils and greases, benzene, toluene, ethylbenzene, phenol, chlorophenols, nitrophenols, metals such as chromium and zinc, and polycyclic aromatic hydrocarbons (PAHs). Potential pollutants depend on the chemical additive used. Wood preservatives and antistaining chemical additives include creosote, creosote/coal tar, pentachlorophenol, copper naphthenate, arsenic trioxide, and inorganic arsenicals. These pollutants must not be discharged to the drainage system or directly into receiving waters.

Typically, wood-treatment facilities in Washington State are required to be covered under an NPDES permit. Contact Ecology's Northwest Regional Office at (425) 649-7000 for an NPDES permit application.

Required BMP Elements

The following BMPs or equivalent measures are required of all businesses and public agencies engaged in activities related to wood treatment:

- Implement all citywide BMPs (refer to *Chapter 2*).

Production Areas:

- Cover and/or enclose the following and contain with impervious surfaces:
  - All wood treatment areas
  - All treated wood
  - All associated wastes
- Segregate clean stormwater from process water. Convey all process water to an approved treatment system and discharge to the sanitary sewer. Obtain all necessary permits for discharge to the sanitary sewer.
- Dedicate equipment that is used for treatment activities to prevent the tracking of treatment chemicals to other areas on site.

- For areas around dip tanks, spray booths, and retorts:
  - Eliminate non-process traffic on the drip pad.
  - Scrub down non-dedicated lift trucks on the drip pad.
  - Construct a slope and direct the drainage in a manner that allows treatment chemicals to flow back to the wood treatment process.
  - Seal any holes or cracks in the asphalt areas subject to contamination with wood treatment chemicals.

Storage Areas:

- Cover and/or enclose storage areas for treated wood and contain with impervious surfaces.
- Immediately remove and properly dispose of soils with visible surface contamination to prevent the spread of chemicals to groundwater or another receiving water from stormwater runoff.

For Treated Wood Products:

- Elevate treated wood products to prevent contact with stormwater run-on and runoff.
- Place treated wood products over the dip tank or on an inclined ramp for a minimum of 30 minutes to allow excess chemicals to drip back to the dip tank.
- Place in a covered paved storage area for at least 24 hours before placement in outside storage. Use a longer storage period during cold weather unless the temporary storage building is heated. See storage requirements above for outdoor storage.
- Ensure that the wood is drip free and dry on the surface before it is moved.
- If any wood is observed to be contributing chemicals to the environment in the treated wood storage area, relocate it on a concrete chemical containment structure until the surface is clean and the wood is drip free and dry on the surface.

3.3.5. BMP 17: Commercial Composting

This BMP applies to commercial composting facilities that operate outside without cover. These facilities require large areas for the decomposition of waste and other feedstock.

Description of Pollutants

When stormwater is allowed to seep through active composting areas—including waste receiving and processing areas—it becomes leachate. Pollutants in leachate include nutrients, substances that increase biological oxygen demand (BOD), organic compounds, coliform bacteria, low (acidic) pH, color, and suspended solids. Runoff from areas at the facility that is not associated with active processing and curing, such as product storage areas, vehicle maintenance areas, and access roads, can also contain contaminants. These pollutants must not be discharged to the drainage system or directly into receiving waters.

Typically, composting facilities in Washington State are required to be covered under an NPDES permit. Contact Ecology's Northwest Regional Office at (425) 649-7000 for an NPDES permit application. Contact other federal and state agencies, SPU, and King County regarding environmental or zoning authority for applicable permit and regulatory information. For state regulations related to composting facilities, refer to WAC, Section 173-350-220.

Required BMP Elements

The following BMPs or equivalent measures are required of all businesses and public agencies engaged in commercial composting activities:

- Implement all citywide BMPs (refer to *Chapter 2*).
- Ensure that compost feedstock does not contain dangerous wastes regulated under WAC, Chapter 173-303, or hazardous products of a similar nature.
- Train employees to screen incoming wastes for undesirable materials. Document and keep all training records.
- Clean up and sweep debris from yard areas daily and more often as needed.
- Store finished compost in a manner to prevent contamination of stormwater.
- Convey all leachate to the sanitary sewer, holding tank, or an onsite treatment system that is designed to treat the leachate and remove suspended solids. If a holding tank is used for the storage of leachate, the contents must be pumped out before the tank is full and disposed of appropriately to a sanitary sewer or wastewater treatment system. For new and redeveloped facilities, prevent and minimize stormwater contamination by storing finished compost on a concrete pad that is:
    - Curbed to separate leachate from uncontaminated stormwater
    - Sloped sufficiently to direct leachate to the collection device
    - Designed with one or more sumps or catch basins capable of collecting all leachate generated by the design storm and conveying it to the leachate holding structure

- Ponds used to collect, store, or treat leachate and other contaminated waters associated with the composting process must be lined to prevent groundwater contamination. Apply All Known Available and Reasonable Methods of Prevention, Control, and Treatment (AKART) technologies to all pond liners, regardless of the construction materials.

Recommended BMPs

Although not required, the following BMPs are recommended to further prevent and minimize the contamination of stormwater resulting from commercial composting activities:

- Locate stored residues in areas designed to collect leachate and limit storage times to prevent degradation and generation of leachate.

3.3.6. BMP 18: Landscaping and Vegetation Management

This BMP applies to businesses and public agencies that perform landscaping, including grading, storage of landscape materials, soil transfer, vegetation removal, pesticide and fertilizer applications, and watering. Landscaping and vegetation management can include control of objectionable weeds, insects, mold, bacteria, and other pests by means of chemical pesticides and is conducted commercially at commercial, industrial, and residential sites. Examples of landscaping and lawn and vegetation management include weed control on golf courses, access roads, and utility corridors; treatment or removal of moss from rooftops, sidewalks, or driveways; killing of nuisance rodents; application of fungicides on patio decks; and residential lawn and plant care.

Description of Pollutants

Stormwater contaminants from landscaping and vegetation management activities include toxic organic compounds, metals, oils, suspended solids, pH, coliform bacteria, fertilizers, pesticides, and detergents.

Pesticides such as pentachlorophenol, carbonates, and organometallics can be released to the environment as a result of leaching and dripping from treated plants, container leaks, product misuse, and outside storage of pesticide-contaminated materials and equipment. Inappropriate management of vegetation and improper application of pesticides or fertilizers can result in stormwater contamination. These pollutants must not be discharged to the drainage system or directly into receiving waters, except as permitted by Ecology.

The Washington State Department of Agriculture regulates pesticide use and application.

Required BMP Elements

The following BMPs or equivalent measures are required of all businesses and public agencies engaged in landscaping and vegetation management activities:

- Implement all citywide BMPs (refer to *Chapter 2*).

Landscaping:

- Do not dispose of collected vegetation in drainage systems, waterways, receiving waters, or greenbelt areas. Take care to avoid contamination or site disturbance.
- Use mulch or other erosion control measures when soils or erodible materials are exposed for more than 1 week during the dry season (May 1 to September 30) or 2 days during the rainy season (October 1 to April 30).

Pesticides:

- Develop and implement an Integrated Pest Management (IPM) plan (refer to *Appendix I*). If pesticides or herbicides are used, they must be carefully applied in accordance with label instructions and the Federal Insecticide, Rodenticide and Fungicide Act (FIFRA) and applicable state laws.

- Choose the least toxic pesticide that is capable of reducing the infestation to acceptable levels.
- Conduct any pest control during the life stage when the pest is most vulnerable. For example, if it is necessary to use a *Bacillus thuringiensis* application to control tent caterpillars, it must be applied before the caterpillars form their cocoons or it will be ineffective. The pest control method should be site-specific rather than using generic methods.
- When necessary to use, apply pesticides according to the directions on the label and use the following BMPs:
  - Conduct spray applications according to specific label directions and the applicable local and state regulations.
  - Do not apply pesticides if it is raining or immediately before expected rain (unless the label directs such timing).
  - Ensure that the pesticide application equipment is capable of immediate shutoff in the event of an emergency.
  - Do not apply pesticides within 100 feet of receiving waters, including wetlands, ponds, streams, sloughs, or any ditch or channel conveyance that leads to receiving water, except when approved by Ecology or SPU. All critical areas including streams and wetlands must be flagged prior to spraying. Take care to avoid contamination or site disturbance during applications.
  - Never apply pesticides in quantities that exceed the manufacturer's instructions.
  - Mix pesticides and clean the application equipment under cover in an area where accidental spills will not enter groundwater or other receiving waters and will not contaminate the soil.

The Environmentally Critical Area (ECA) Ordinance (SMC, Chapter 25.09) also restricts certain described pesticide use within buffer zones of certain critical areas.

- Storage:
  - Store pesticides in enclosed or covered impervious containment areas.
  - Do not hose down the paved areas to an inlet/catch basin or ditch.
  - Keep pesticide-contaminated waste materials in designated covered and contained areas, and dispose of properly.
- Reuse rinsate generated from equipment cleaning and/or triple-rinse pesticide containers and reuse as product or recycle into product.

Vegetation Management:

- Fertilizer:
  - Apply all fertilizers using properly trained personnel. Document and keep all training records.
  - For commercial and industrial facilities, do not apply fertilizers to grass swales, filter strips, or buffer areas that drain to receiving waters.

Recommended BMPs

For more details on landscaping and vegetation management, refer to the Stormwater Management Manual for Western Washington (SWMMWW), Volume IV, Source Control, BMPs for Landscaping and Lawn/Vegetation Management (Ecology 2014).

Although not required, the following BMPs are recommended to further prevent and minimize the contamination of stormwater resulting from landscaping and lawn and vegetation management activities:

- If adjacent to a building or constructed over hazardous material storage areas, other regulations, including the Seattle Fire Code, may apply.
- Install engineered soil and landscape systems to improve the infiltration and regulation of stormwater in landscaped areas.
- Mulch and mow whenever practical.
- Dispose of grass clippings, leaves, sticks, and other collected vegetation by composting, where feasible.
- Till fertilizers into the soil where practical rather than dumping or broadcasting them onto the surface. Determine the proper fertilizer application for the types of soil and vegetation encountered.
- Till a topsoil mix or composted organic material into the soil to create a well-mixed transition layer that encourages deeper root systems and greater drought-tolerance.
- Use manual and/or mechanical methods of vegetation removal rather than applying herbicides, where practical.

Pesticides:

- Consider alternatives to the use of pesticides, such as covering or harvesting weeds, substituting other species, and manual weed control and moss removal.
- Consider the use of soil amendments, such as compost, that are known to control some common diseases in plants, such as root rot (caused by the pathogen *Pythium* spp.), ashy stem blight, and parasitic nematodes. The following are possible mechanisms for disease control by compost addition (U.S. EPA 1997):
    - Successful competition for nutrients by antibiotic production
    - Successful predation against pathogens by beneficial microorganisms
    - Activation of disease-resistant genes in plants by composts

An amended soil and landscape system can preserve both the plant system and the soil system more effectively. This type of approach can provide a soil and landscape system with adequate depth, permeability, and organic matter to sustain itself and continue working to effectively infiltrate stormwater and provide a sustainable nutrient cycle.

Vegetation Management:

- Material:
  - Use topsoil layer that is at least 8 inches thick and consists of at least 8 percent organic matter to provide a sufficient growing medium for the vegetation.
  - Select the appropriate turfgrass mixture for the applicable climate and soil type.
- Fertilizer:
  - Use slow-release fertilizer and organic materials for the best availability for turf grass.
  - Time the fertilizer application to periods of maximum plant uptake. Fertilizers should be applied in amounts appropriate for the target vegetation and at the time of year that minimizes loss to surface water and groundwater.
  - Do not fertilize during a drought or when the soil is dry.

3.3.7. BMP 19: Painting, Finishing, and Coating Activities

This BMP applies to businesses and public agencies that perform outdoor surface preparation and application of paints, finishes, and coatings to vehicles, boats, buildings, and equipment.

Description of Pollutants

Potential pollutants include organic compounds, oils and greases, metals, and suspended solids. These pollutants must not be discharged to the drainage system or directly into receiving waters.

Required BMP Elements

Activities associated with boatyard and shipyard operations may require an NPDES permit from Ecology. Contact Ecology's Northwest Regional Office at (425) 649-7000 to determine if the site activities trigger permit coverage.

The following BMPs or equivalent measures are required of all businesses and public agencies engaged in activities related to the painting, finishing, and coating of vehicles, boats, buildings, and equipment outside.

- Implement all citywide BMPs (refer to *Chapter 2*).

Preparation and Application:

- Train employees in the application and cleanup of paints, finishes, and coatings to reduce misuse and overspray. Document and keep all training records.
- Use ground cloths or drop cloths underneath outdoor painting, scraping, sandblasting work, and properly clean and temporarily store collected debris after each use.
- Use a catch basin cover, filter sock, or similarly effective runoff control device if dust, sediment or other pollutants may escape the work area. If catch basin filter socks are used onsite, maintain the filter regularly to prevent plugging. Stormwater contaminated with pollutants must not enter the drainage system.

Catch basin filter socks only remove solids and do not provide treatment for other pollutants associated with painting, finishing, and coating activities.

- Do not conduct spraying, blasting, or sanding activities over open water or where wind may blow paint into water. If windy conditions are present, use a curtain to contain the activity.
- While using a spray gun or conducting sand blasting, enclose and/or contain all work in compliance with applicable air pollution control requirements and those of the Occupational Safety and Health Administration (OSHA), the Washington Industrial Safety and Health Act, and the Puget Sound Clean Air Agency.

Cleanup:

- Wipe up spills with rags and other absorbent materials immediately. Do not hose down the area.
- On marine dock areas, sweep to collect debris. Do not hose down debris.
- Use a ground cloth, pail, drum, drip pan, tarpaulin, or other protective device for activities such as paint mixing and tool cleaning outside or where spills can contaminate stormwater. Whenever possible, conduct these activities inside or in an enclosed area.
- Clean paintbrushes and tools covered with water-based paints into drains connected to the sanitary sewer. Verify the discharge point before discharging.
- Collect solvents used to clean brushes and tools covered with non-water-based paints, finishes, or other materials. Safely and properly recycle or dispose of used solvents (e.g., paint thinner, turpentine, and xylol).

Material Storage and Disposal:

- Dispose of all waste properly and prevent all uncontrolled releases to the air, ground, or water.
- Store all paints, finishes, or solvents inside a building or in covered secondary containment.
- All containers must have tight fitting lids.

Recommended BMPs

Although not required, the following BMPs are recommended to further prevent and minimize the contamination of stormwater resulting from activities related to the painting, finishing, and coating of vehicles, boats, buildings, and equipment:

- Recycle paints, paint thinner, solvents, washwater from pressure washers, and any other recyclable materials.
- Use efficient spray equipment such as electrostatic, air-atomized, high-volume/low-pressure, or gravity-feed spray equipment.
- Purchase recycled paints, paint thinner, solvents, and other products where feasible.
- Dispose of unused paint promptly.

3.3.8. BMP 20: Commercial Printing Operations

This BMP applies to businesses and public agencies that perform commercial printing. Materials used in the printing process include inorganic and organic acids, resins, solvents, polyester film, developers, alcohol, vinyl lacquer, dyes, acetates, and polymers.

Description of Pollutants

Waste products from commercial printing processes may include waste inks and ink sludge, resins, photographic chemicals, solvents, acid and alkaline solutions, chlorides, chromium, zinc, lead, formaldehyde, silver, plasticizers, paper, dust, and used lubricating oils. These pollutants must not be discharged to the drainage system or directly into receiving waters.

Printing operations are conducted indoors; therefore, the likely points of potential contact with stormwater are outside storage areas and the external loading bays where chemicals are offloaded.

Required BMP Elements

The following BMPs or equivalent measures are required of all businesses and public agencies engaged in commercial printing activities:

- Implement all citywide BMPs (refer to *Chapter 2*).
- Sweep outdoor areas as necessary to prevent accumulation of dust and debris.
- Discharge process wastewater to the sanitary sewer if approved by SPU and/or King County, or to an approved process wastewater treatment system.
- Determine whether any generated wastes are dangerous wastes and accumulate and dispose of them accordingly.
- Store materials inside a building or in covered secondary containment.

3.3.9. BMP 21: Manufacturing Activities

This BMP applies to businesses and public agencies that perform any type of outdoor processing, fabrication, mixing, milling, or refining. This also includes areas where historical contamination may currently be contaminating stormwater.

Description of Pollutants

Pollutant sources from outside manufacturing operations include outside process areas, air pollution control equipment, and areas of historical manufacturing activity. Pollutants can include suspended solids, pH, metals, oils and greases, a variety of organic compounds, and substances that increase chemical oxygen demand (COD). These pollutants must not be discharged to the drainage system or directly into receiving waters.

Required BMP Elements

Outdoor activities associated with industrial manufacturing may require an NPDES permit from Ecology. Contact Ecology's Northwest Regional Office at (425) 649-7000 to determine if site activities trigger permit coverage.

The following BMPs or equivalent measures are required of all businesses and public agencies engaged in outdoor manufacturing activities:

- Implement all citywide BMPs (refer to *Chapter 2*).
- Move all or parts of the manufacturing activity into a building or cover (Figure 10), contain the activity, and connect floor drains to the sanitary sewer. Obtain all necessary permits for installing, altering, or repairing side sewers. Restrictions on certain types of discharges may require pretreatment of discharges before they enter the sanitary sewer. Construct a berm or a sloped floor as needed to prevent drainage of pollutants to outside areas and to prevent run-on of uncontaminated stormwater.
- Make sure all outside materials that have the potential to leach or spill to the drainage system are covered, contained, or moved to an indoor location. The cover must not contribute pollutants to the drainage system.
- Sweep paved areas daily or more often as needed to prevent contamination of stormwater.
- Consider modifying the activity to eliminate or minimize the contamination of stormwater.
- Isolate and segregate pollutants where feasible. Convey the segregated pollutants to a sanitary sewer, process treatment, or dead-end sump, depending on the available methods and applicable permit requirements.
- If operational BMPs are not sufficient to prevent stormwater contamination, structural controls must be implemented, including treatment or structural containment.

Figure 10. Structure Used To Cover Manufacturing Activities.

3.4. Storage and Stockpiling

Activities related to the storage and stockpiling of liquid or solid materials are potentially associated with a high risk for spillage, leakage, erosion, or leaching of pollutants. Both required and recommended BMPs can help to prevent, minimize, and manage the effects of accidental spills and leaks. The specific BMPs that apply to various types of storage and stockpiling activities are presented below.

Remember to also implement all required citywide BMPs from *Chapter 2*.

3.4.1. BMP 22: Storage or Transfer of Leachable or Erodible Materials

This BMP applies to businesses and public agencies on whose premises there will be storage and transfer of leachable and erodible materials, including, but not limited to: gravel, sand, salts, topsoil, compost, logs, sawdust, wood chips, lumber and other building materials, concrete, and non-coated galvanized metal or other leachable metal.

Description of Pollutants

If stormwater comes in contact with stockpiled materials, pollutants may be leached or erosion of the stored materials may occur. Potential pollutants include suspended solids, substances that increase biological oxygen demand (BOD), organic compounds, dissolved salts (e.g., sodium chloride, calcium chloride, and magnesium chloride), metals, and oils that may be attached to metal parts. These pollutants must not be discharged to the drainage system or directly into receiving waters. Even low levels of metals such as copper and zinc can have detrimental effects on aquatic life.

Required BMP Elements

The following BMPs or equivalent measures are required of all businesses and public agencies engaged in the storage or transfer of leachable or erodible materials:

- Implement all citywide BMPs (refer to *Chapter 2*).
- Store the material inside or cover and contain the material. The cover must fully prevent wind and weather contact with the polluting material. The cover must not contribute pollutants to the drainage system.
- Do not hose down the contained stockpile area to an inlet/catch basin, ditch, or to receiving waters.
- Sweep paved storage areas daily or more often as necessary to collect and dispose of loose solid materials.
- For stockpiles larger than 5 cubic yards, implement the following:
    - Store in a covered, paved area, preferably surrounded by a berm, as shown in Figure 11. The cover must fully prevent wind and weather contact with the polluting material. The cover must not contribute pollutants to the drainage system.
    - Place temporary plastic sheeting (polyethylene, polypropylene, Hypalon, or equivalent material) over the material as illustrated in Figure 12. Anchor sheeting to prevent contact with rainfall.
    - Pave the area and install a drainage system:
        - Place curbs or berms along the perimeter of the area to prevent the run-on of uncontaminated stormwater and to collect and convey runoff to a treatment system.
        - Slope the paved area in a manner that minimizes the contact between stormwater (e.g., pooling) and leachable materials.

Figure 11. Covered and Secured Storage Area for Bulk Solids.

Figure 12. Covered Storage Area for Erodible Material (gravel).

- For large stockpiles that cannot be covered:
  - Install containment devices such as a berm or a low wall around the perimeter of the site and at any catch basins as needed to prevent erosion of the stockpiled material, and to prevent discharge of leachate from the stockpiled material off site or to an inlet/catch basin.
  - Ensure that contaminated stormwater is not discharged directly to catch basins without being conveyed through a treatment BMP.
  - Inspect and maintain catch basins on a regular basis (weekly or more often as needed). Use catch basin filter socks to catch solids. Stormwater contaminated with pollutants must not enter the drainage system.

- Convey stormwater contaminated with solids from the stockpile area to a wet pond, wet vault, settling basin, media filter, catch basin filter sock, or other appropriate settling system. Maintain all settling systems regularly (weekly or as needed) to prevent plugging.

Recommended BMPs

The following BMPs are recommended to further prevent and minimize the contamination of stormwater resulting from activities related to the storage or transfer of leachable and erodible materials:

- Maintain drainage areas in and around storage areas of solid materials with a minimum slope of 2 percent to prevent pooling and minimize leachate formation. Slope storage areas to drain stormwater to a collection area at the perimeter of the storage area, or to internal drainage “alleyways” between storage areas, where material is not stockpiled.
- If and when feasible, collect and recycle materials and leachate to the stockpile.
- Stock cleanup materials, such as brooms, dustpans, and vacuum sweepers, near the storage area.
- Keep the minimum amount of stockpiled materials on site. Smaller piles minimize the loss of materials due to wind and rain and will make the piles more manageable to cover.
- Use waterproof liners to prevent leaks from the solid waste container.
- Whenever possible, store solid wastes inside.

3.4.2. BMP 23: Temporary Storage or Processing of Fruits, Vegetables, or Grains

This BMP applies to businesses and public agencies that temporarily store fruits, vegetables, and grains outdoors before processing or sale, or that crush, cut, or shred for wines, beer, frozen juices, or other food and beverage products.

Description of Pollutants

Activities involving the storage or processing of fruits, vegetables, and grains can potentially result in the delivery of pollutants to stormwater. Potential pollutants of concern from all fruit and vegetable storage and processing activities include nutrients, suspended solids, substances that increase biological oxygen demand (BOD), and color. These pollutants must not be discharged to the drainage system or directly into receiving waters.

Required BMP Elements

The following BMPs or equivalent measures are required of all businesses and public agencies engaged in the temporary storage or processing of fruits, vegetables, and grains:

- Implement all citywide BMPs (refer to *Chapter 2*).
- Do not allow water used to clean produce to enter the drainage system.
- Sweep paved storage areas daily or more often as needed. Inspect storage areas often and maintain good housekeeping.
- Make sure all outside materials that have the potential to leach or spill to the drainage system are covered, contained, or moved to an indoor location.
- Enclose the processing area in a building or shed, or cover the area with provisions for stormwater run-on prevention. Alternatively, pave and slope the area to drain to the sanitary sewer, holding tank, or process treatment system collection drain. Provide stormwater run-on protection for the processing area. If a holding tank is used for the storage of wastewater, pump out the contents before the tank is full and dispose of wastewater to a sanitary sewer or approved wastewater treatment system.

3.4.3. BMP 24: Recycling, Wrecking Yard, and Scrap Yard Operations

This BMP applies to businesses and public agencies that reclaim various materials for resale or for scrap, such as vehicles, parts of vehicles, equipment, construction materials, metals, beverage containers, electronic waste and papers. Activities that can generate pollutants include the following: transfer, dismantling, and crushing of vehicles and scrap metal; transfer and removal of fluids; maintenance and cleaning of vehicles, parts, and equipment; and storage of fluids, parts for resale, solid wastes, scrap parts, materials that are contaminated or contain fluids, equipment, and vehicles that contain fluids.

Description of Pollutants

Potential sources of pollutants include paper, plastic, metal scrap debris, engines, transmissions, radiators, batteries, and other materials that contain fluids or are contaminated with fluids. Other pollutant sources include leachate from metal components, contaminated soil, and eroded soil.

Potential pollutants typically found at vehicle recycling and scrap yards include oils and greases, ethylene glycol, propylene glycol, suspended solids, PCBs, phthalates, substances that increase biological oxygen demand (BOD), metals (including mercury), and low (acidic) pH.

Facilities may be subject to Ecology's Industrial Stormwater General Permit. If the business or public agency activity requires this permit, refer to Publication 94-146, *Vehicle and Metal Recyclers: A Guide for Implementing the Industrial Stormwater General National Pollutant Discharge Elimination System Permit Requirements* (Ecology 2011), for the selection of BMPs.

Required BMP Elements

At a minimum, the following BMPs or equivalent measures are required for activities related to recycling, wrecking yard, and scrap yard operations. Additional BMPs may be required for businesses and public agencies subject to Ecology's Industrial Stormwater General Permit.

- Implement all citywide BMPs (refer to *Chapter 2*).
- Drain all fluids upon arrival, prior to storage or disposal.
- Inspect all items for leakage or potential leaks. Use drip pans or other containment where necessary to prevent leaks from reaching the ground or drainage systems. Do not hose pollutants from any area to the ground or into drainage systems.
- Sweep paved storage areas daily or more often as needed to remove accumulated dust and pollutants. Inspect storage areas often and maintain good housekeeping.
- Make sure all outside materials that have the potential to leach or spill to the drainage system are covered, contained, or moved to an indoor location.
- Keep all containers, including dumpsters under cover or fit with a lid that must be kept closed when not in use.
- Develop and implement a BMP inspection log to be used daily. Keep all records on file.

- Areas used for processing material to be recycled should be designed to stop run-on and to contain all fluids that may be spilled or released. Use cover and containment options such as an enclosed building or roof, and berms or dikes. If there is a sump, dispose of waste properly or recycle accordingly.
- Store fluids in steel or plastic drums that are rigid and durable, resistant to corrosion from the weather and fluid content, water tight and equipped with a tight fitting lid. Place drums in covered impervious containment areas. Store batteries properly.
- Label all containers/tanks with their contents. Handle all dangerous and/or hazardous materials and waste in accordance with SPU, King County, and Ecology's requirements.
- Clean up all spills immediately upon discovery. Train staff to implement the site spill plan. Provide spill kits and ample spill materials that are well distributed at the site.
- Prevent track out from the site onto the adjacent roadway.
- If operational BMPs are not sufficient to prevent stormwater contamination, structural controls must be implemented, including treatment or structural containment.

3.4.4. BMP 25: Portable Container Storage

The BMPs specified below apply to businesses and public agencies that keep containers on premises that may include, but are not limited to: accumulated food wastes; vegetable or animal grease; used automotive fluids; liquid feedstock; cleaning compounds; chemicals; dangerous wastes (liquid or solid); and contaminated stormwater. It also includes solid waste and recycling containers.

Description of Pollutants

Leaks and spills during handling and storage of portable containers are the primary sources of pollutants. Potential pollutant constituents are oils and greases, low (acid) or high (alkaline) pH, surfactants, substances that increase biological oxygen demand (BOD), substances that increase chemical oxygen demand (COD), and toxic organic compounds.

Required BMP Elements

The following required BMPs apply to all portable containers:

- Implement all citywide BMPs (refer to *Chapter 2*).
- Wherever possible, store containers on a paved surface under a roof or other appropriate cover or in a building.
- Store materials in a leak-proof container with a tight-fitting lid.
- Label all containers to identify their contents. Position containers so labels are clearly visible. If the material is hazardous waste it should have a hazardous waste label.
- Ensure that spill kits are located near container storage areas.
- Place drip pans beneath all taps on mounted containers and at all potential drip and spill locations during the filling and unloading of containers.
- Inspect container storage areas regularly for corrosion, structural failure, spills, leaks, overfills, and failure of piping systems. Check containers daily for leaks and spills. Replace containers and replace and tighten bungs in drums as needed.
- Secure drums in a manner that prevents accidental spillage, pilferage, or any unauthorized use (Figure 13 and Figure 14).
- Place containers mounted for direct removal of a liquid chemical inside a containment area as described above. Use a drip pan during liquid transfer.
- For containers (such as drums) stored in the right-of-way, label with owner information.

Figure 13. Covered and Secured Storage Area for Containers.

Figure 14. Containers Surrounded by a Berm in an Enclosed Area.

The following BMPs or equivalent measures are required for activities related to hazardous or dangerous material containers stored outside:

- Provide covered secondary containment. Alternatively, cover and pave the storage area and install a berm or dike to surround the area. The dike must be high enough to hold a volume of either 10 percent of the total volume of the enclosed containers or 110 percent of the volume of the largest container, whichever is greater. If a single container, the dike must be able to hold 110 percent of the volume of that container. Slope the area to drain into a dead-end sump for the collection of leaks and small spills.
- Store containers that do not contain free liquids in a designated sloped area with the containers elevated or otherwise protected from stormwater run-on.
- Elevate metal drums to prevent corrosion and leakage.
- Ensure that the storage of reactive, ignitable, or flammable liquids complies with the Seattle Fire Code and Washington State Fire Code.

Recommended BMPs

The following BMPs are recommended to further prevent and reduce the contamination of stormwater resulting from the storage of liquid, hazardous, or dangerous waste containers:

- For containers containing liquids that are not dangerous or hazardous, provide secondary containment.
- Minimize inventory and waste accumulation to prevent excess storage of materials.

3.4.5. BMP 26: Storage of Liquids in Aboveground Tanks

This BMP applies to businesses and public agencies that have on their premises aboveground tanks that contain liquids (excluding uncontaminated water). These tanks may be equipped with a valved drain, vent, pump, and bottom hose connection. These include, but are not limited to: commercial aboveground heating oil tanks; cement silos; gasoline and diesel tanks; food products; or process water.

Description of Pollutants

Pollutant sources include leaks and spills that can occur at connections and during liquid transfer. Oils and greases, organic compounds, acids, alkalis, and metals in tank water and condensate drainage can also result in stormwater contamination.

Required BMP Elements

The following BMPs or equivalent measures are required for activities related to the storage of liquids in aboveground tanks:

- Implement all citywide BMPs (refer to *Chapter 2*).
- Do not discharge contaminated stormwater within the secondary containment area to the drainage system. Evidence of contamination can include the presence of visible sheen, color or turbidity in the runoff, or existing or historical operational problems at the facility. Check for acceptable pH ranges for areas subject to acid or alkaline contamination.
- For new and redeveloped sites, locate and design tanks to prevent and minimize stormwater contamination:
  - Locate permanent tanks in an impervious (Portland cement concrete or equivalent) secondary containment area.
  - Surround the secondary containment area with dikes (as illustrated in Figure 15) or provide double walled tanks approved by the Underwriters Laboratory (UL). Design the dike to be of sufficient height to provide a containment volume of either 10 percent of the total volume of the enclosed tanks or 110 percent of the volume of the largest tank, whichever is greater. If a single tank, the dike must be able to hold 110 percent of the volume of that tank.
  - Slope secondary containment to drain to a dead-end sump or equivalent for the collection of small spills.
  - If the tank containment area is not covered, equip the outlet from the spill-containment sump with a shutoff valve. The valve should only be opened to convey contaminated stormwater to an approved treatment system or disposal facility or to convey uncontaminated stormwater to the drainage system.
  - Evidence of contamination can include the presence of visible sheen, color or turbidity in the runoff, or existing or historical operational problems at the facility. Check for acceptable pH ranges for areas subject to acid or alkaline contamination. If contamination is present, discharge to the treatment system.

- Place adequately sized drip pans beneath all mounted taps and locations where drips and spills might occur during the filling and unloading of tanks.
- Include a tank overfill protection system to minimize the risk of spillage during loading.
- At petroleum tank farms, convey stormwater contaminated with floating oil or debris through an API oil/water separator, coalescing plate oil/water separator or other approved treatment system prior to discharge to the sanitary sewer.

Figure 15. Aboveground Storage Tank with Secondary Containment.

- Implement the following maintenance activities to prevent and minimize stormwater contamination:
  - Inspect tank containment areas regularly to identify problems (e.g., cracks, corrosion, leaks) with components such as fittings, pipe connections, and valves.
  - Replace or repair tanks that are leaking, corroded, or otherwise deteriorating. Document and keep all inspection records. A soundness evaluation by a Professional Engineer may be requested to confirm tank stability.
  - Sweep and clean the tank storage area regularly.

3.4.6. BMP 27: Lot Maintenance and Storage

This BMP applies to businesses and public agencies that own or operate public and commercial parking lots and sidewalks, such as those associated with retail stores, apartment buildings, fleet vehicles (including car rental lots and car dealerships), and equipment sale and rental facilities. It also includes properties where vehicles or equipment are stored outside.

Description of Pollutants

Potential pollutants produced by the parking and storage of vehicles and equipment include petroleum hydrocarbons and other organic compounds, oils and greases, metals, and suspended solids.

Required BMP Elements

The following BMPs or equivalent measures are required for activities related to the parking and storage of vehicles and equipment:

- Implement all citywide BMPs (refer to *Chapter 2*).
- Sweep or vacuum parking lots, storage areas, sidewalks, and driveways regularly to collect dirt, waste, and debris and dispose as solid waste.
- When washing a parking lot, follow guidelines for washing found in BMP 8.
- When storing materials other than vehicles, refer to applicable BMPs in this volume.
- Inspect the lot routinely for leaks and spills. Employ spill cleanup procedures (refer to BMP 5) when necessary. Pick up absorbents and properly dispose of them after use.
- An oil removal system such as an API oil/water separator, coalescing plate oil/water separator, catch basin filter sock, or equivalent BMP that is approved by SPU is required for parking lots that meet the threshold for vehicle traffic intensity of a high-use site. Refer to *Volume 3 — Project Stormwater Control* for information on traffic intensity thresholds. If a catch basin filter sock is used, maintain the filter regularly to prevent plugging.

3.5. Dust, Soil Erosion, and Sediment Control

Construction, manufacturing, and industrial activities have the potential to generate significant amounts of dust, soil, and sediment, which can pollute both air and stormwater. Control measures for dust, soil, and sediment are necessary to prevent pollution, but BMPs that are not properly implemented can be harmful to stormwater and the environment.

The required and recommended BMPs for these activities are presented below. First, prevent the production of dust, soil, and sediment. Then, implement BMPs to minimize their production. Finally, manage dust, soil, and sediment so that contaminated stormwater is not conveyed to the drainage system or receiving waters.

Remember to also implement all required citywide BMPs from *Chapter 2*.

3.5.1. BMP 28: Dust Control in Disturbed Land Areas and on Unpaved Roadways and Parking Lots

This BMP applies to businesses and public agencies that pursue dust control measures in disturbed land areas or on unpaved roadways and parking lots. All land-disturbing activity must comply with the erosion and sediment controls described in the Stormwater Code (SMC 22.800 – 22.808).

Description of Pollutants

Dust can result in air and water pollution, particularly at demolition sites, in disturbed land areas, and on unpaved roadways and parking lots. Chemicals applied to dust-prone areas to minimize dust production also have the potential to pollute stormwater and receiving waters if they are not properly selected or applied.

Required BMP Elements

The following BMPs or equivalent measures are required of all businesses and public agencies engaged in activities that generate dust:

- Implement all citywide BMPs (refer to *Chapter 2*).
- Protect inlets/catch basins during application of dust suppressants.
- Sprinkle or wet down soil or dust with water as long as it does not result in a discharge to inlets/catch basins or receiving waters.
- Only use local and/or state government approved dust suppressant chemicals, such as those listed in Publication 96-433, Techniques for Dust Prevention and Suppression (Ecology 2003).
- Avoid excessive and repeated application of dust suppression chemicals. Time the application of dust suppressants to avoid or minimize their wash off by rainfall or human activity (such as irrigation).
- Street gutters, sidewalks, driveways, and other paved surfaces in the immediate area of the activity must be swept regularly to collect and properly dispose of loose debris and garbage.
- Install catch basin filter socks on site and in surrounding catch basins to collect sediment and debris. Maintain the filters regularly to prevent plugging.

BMPs required for dust control, such as dust suppression by water spray, are provided in *Volume 2 — Construction Stormwater Control*.

3.5.2. BMP 29: Dust Control at Manufacturing Sites

This BMP applies to all businesses and public agencies, but particularly industrial and manufacturing facilities that have the potential to generate dust, including gravel, crushed rock, cement, fly ash, and other airborne pollutants.

Description of Pollutants

Industrial material handling activities can generate a considerable amount of dust, which is typically removed by means of exhaust systems. The exhaust systems can generate air emissions and can contaminate stormwater. Dust can be generated by mixing cement and concrete products and handling powdered materials. Particulate materials that can cause air pollution are sawdust, coal, boiler fly ash, and dust from grain, coal, gravel, crushed rock, and cement. Air emissions can contaminate stormwater if not properly managed and controlled.

Required BMP Elements

The following BMPs or equivalent measures are required of all businesses and public agencies engaged in activities that can generate dust:

- Implement all citywide BMPs (refer to *Chapter 2*).
- Clean accumulated dust and residue from powdered material handling equipment and vehicles as needed.
- Maintain onsite controls so that no vehicle track-out occurs.
- Regularly sweep areas of accumulated dust that can contaminate stormwater. Sweeping should be conducted with vacuum-filter equipment to minimize dust generation and ensure optimal dust removal.
- Maintain dust collection devices on a regular basis.
- Where feasible, periodically wash surfaces, such as roofs and yards to prevent buildup. Discharge washwater to the sanitary sewer or recover for proper off-site disposal.
- If operational BMPs are not sufficient to prevent stormwater contamination, structural controls must be implemented, including treatment or structural containment.

Facility operations that create or have the potential to create air pollution are regulated by the Puget Sound Clean Air Agency. For more information on necessary permits, contact the Puget Sound Clean Air Agency at (800) 552-3565.

3.5.3. BMP 30: Soil Erosion and Sediment Control at Industrial Sites

This BMP applies to business and public agency industrial facilities that operate in or near areas with exposed or disturbed soils, areas with steep grades, or as deemed necessary to prevent sediment transport. For information on construction related soil erosion and sediment control, refer to *Volume 2 — Construction Stormwater Control*.

Description of Pollutants

Industrial activities in areas with exposed or disturbed soils or areas with steep grades can be sources of sediment that can contaminate stormwater runoff. Pollutants include suspended solids, oils and greases, metals, and other industrial contaminants leaching from onsite activities.

Required BMP Elements

The following BMPs or equivalent measures are required of all businesses and public agencies to deal with soil erosion and sediment control:

- Implement all citywide BMPs (refer to *Chapter 2*).
- Limit the exposure of erodible soil.
- Stabilize or cover erodible soil to prevent erosion.
- Stabilize entrances/exits to prevent track-out.
- Install one or more of the following cover practices:
  - Vegetative cover, such as grass, trees, or shrubs, in erodible soil areas
  - Covering with mats, such as clear plastic, jute, or synthetic fiber
  - Preservation of natural vegetation, including grass, trees, shrubs, and vines
- If operational BMPs are not sufficient to prevent stormwater contamination, structural controls must be implemented, including treatment or structural containment, which may include paving.

Washington State Water Quality Standards have specific limits on turbidity discharges. For specific information, reference WAC, Chapter 173–201A.

3.6. Other Activities

Several activities that do not fall into the previously described categories have a high risk for generating pollutants and contaminating stormwater and receiving waters. The required and recommended BMPs for these activities are presented as follows, according to the type of activity and the potential pollutants. Regardless of the activity, an overall approach to pollutant control should first emphasize pollution prevention, then the minimization of pollution, followed by pollution management.

Remember to also implement all required citywide BMPs from *Chapter 2*.

3.6.1. BMP 31: Commercial Animal Care and Handling

This BMP applies to businesses and public agencies that perform animal care and handling including the management of animals at racetracks, kennels, day kennels, fenced pens, and veterinary offices and hospitals. It encompasses businesses or public agencies that provide boarding services for horses, dogs, cats, and other animals.

Description of Pollutants

Examples of animal handling activities that can generate pollutants are the cleanup of manure deposits and animal washing. Potential pollutants include fecal coliform bacteria, nutrients, soap, substances that increase biological oxygen demand (BOD) and suspended solids.

Required BMP Elements

The following source control BMPs or equivalent measures are required for all commercial animal handling activities:

- Implement all citywide BMPs (refer to *Chapter 2*).
- Regularly sweep and clean animal-keeping areas to collect and properly dispose of droppings, uneaten food, and other potential stormwater contaminants. Do not discharge pollutants associated with these activities to the drainage system.
- If inlets/catch basins are in areas where animals are concentrated, close these drains and redirect stormwater to an appropriate treatment area, or cover area to prevent contact with stormwater.
- Do not hose down areas that contain potential stormwater contaminants if the water will drain to inlets/catch basins or receiving waters. Do not allow washwater to be discharged to inlets/catch basins or receiving waters without proper treatment.
- If animals are not leashed or in cages, the animal-keeping area must be surrounded by a fence or other means of preventing animals from moving out of the controlled area where BMPs are used.
- For outside surface areas that must be disinfected, use an unsaturated mop to spot clean the area. Do not allow wastewater runoff to enter the drainage system.

Recommended BMPs

Areas where animals are kept or exercised should be located where runoff will infiltrate and will not flow to catch basins or street drains.

3.6.2. BMP 32: Log Sorting and Handling

This BMP applies to businesses and public agencies with paved or unpaved areas where logs are transferred, sorted, debarked, cut, and stored to prepare them for shipment; or for the production of dimensional lumber, plywood, chips, poles, or other products. Log yards are generally maintained at sawmills, shipping ports, and pulp mills.

Industries with log yards are required to obtain an NPDES Industrial Stormwater General Permit from Ecology for discharges of stormwater associated with industrial activities to receiving water. Required and recommended source control and treatment BMPs are described in detail in Publication 04-10-031, Industrial Stormwater General Permit Implementation Manual for Log Yards (Ecology 2004; currently under revision).

Refer to S413 – BMPs for Log Sorting and Handling in the Stormwater Management Manual for Western Washington (SWMMWW), Volume IV (Ecology 2014) for a description of the pollutants associated with this activity and the required BMP elements.

3.6.3. BMP 33: Boat Building, Mooring, Maintenance, and Repair

This BMP applies to businesses and public agencies that perform activities related to boat and shipbuilding and their repair and maintenance at boatyards, shipyards, ports, and marinas. Activities that can generate pollutants include pressure washing, surface preparation, paint removal, sanding, painting, engine maintenance and repairs, and material handling and storage. If conducted outdoors, all of these activities are associated with a high risk for contaminating receiving water.

Description of Pollutants

Potential pollutants include spent abrasive grits, solvents, oils, ethylene glycol, washwater, paint overspray, cleaners and detergents, anticorrosion compounds, paint chips, scrap metal, welding rods, resins, glass fibers, dust, and miscellaneous trash. Pollutant constituents include suspended solids, oils and greases, organic compounds, copper, lead, tin, and zinc.

Required BMP Elements

Activities associated with boatyard and shipyard operations may require an NPDES permit from Ecology. Contact Ecology's Northwest Regional Office at (425) 649-7000 to determine if site activities trigger permit coverage.

The following BMPs or equivalent measures are required for boat and ship building, maintenance, and repair activities:

- Implement all citywide BMPs (refer to Chapter 2).
- In addition to the citywide spill control requirement, include a marine containment boom in spill kits for shipyards, boatyards, and marinas.
- Locate spill kits on all piers or docks.
- Immediately clean up any spills on dock, boat, or ship deck areas and dispose of the wastes properly.
- Immediately repair or replace leaking connections, valves, pipes, hoses, and equipment that can result in the contamination of stormwater.
- Relocate maintenance and repair activities onshore if feasible to reduce the potential for direct pollution of receiving waters.
- Perform paint and solvent mixing, fuel mixing, and similar handling of liquids onshore or in a location with proper containment so that nothing can spill directly into receiving waters.
- All liquids stored over water or on docks must have covered secondary containment.
- Store all batteries and oily parts in a covered container with a tight-fitting lid.
- Store materials such as paints, tools, and ground cloths indoors or in a covered area when not in use.
- Collect spent abrasives regularly and contain or store them under cover until they can be disposed of properly.

- Sweep and clean yard areas, docks, and boat ramps at least once each week or more often as needed. Do not hose them down. Properly dispose of the collected materials. Sweep dry docks before flooding.
- When washing, do not allow any pollutants, including soap, to enter the drainage system or receiving water.
- Use fixed platforms with appropriate plastic or tarpaulin barriers as work surfaces and for containment when work is performed on a vessel in the water to prevent material or overspray from contacting stormwater or receiving water. Use of the platform approach should be kept to a minimum. Only work that is done in compliance with NPDES requirements should be done over water.

The following BMPs or equivalent measures are required for boat and ship blasting and spray painting activities:

- Move the activity indoors or enclose, cover, and contain the activity. Prohibit outside spray painting, blasting, or sanding activities during windy conditions that render containment ineffective.
- Store materials such as paints, tools, and ground cloths indoors or in a covered area when not in use.
- Contain blasting and spray painting activities by hanging tarpaulins to block the wind and prevent dust and overspray from escaping. Do not perform uncontained spray painting, blasting, or sanding activities over open water without proper protection (e.g., overspray collection, drop clothes, booms).
- Use plywood and/or plastic sheeting to cover open areas between decks when sandblasting.
- Use ground cloths to collect drips and spills during painting and finishing operations, paint chips, and used blasting sand during sand blasting.
- Do not paint or use spray guns on or above the deck.

In the event of an accidental discharge of oil or hazardous material into receiving water or onto land if there is a potential for entry into receiving water, the responsible party must meet all notification requirements including, but not limited to, notifying the yard, port, or marina owner or manager; Ecology's Northwest Regional Office at (425) 649-7000; and the National Response Center at (800) 424-8802 (24-hour). If the spill can reach or has reached marine water, call the U.S. Coast Guard at (206) 217-6232.

Recommended BMPs

Although not required, the following BMPs are encouraged to further reduce the potential for stormwater contamination:

- Select the least toxic antifouling paint available.
- Routinely clean boat interiors and properly dispose of collected materials so that accumulated water, which must be drained from the boat, does not become contaminated.

3.6.4. BMP 34: Cleaning and Maintenance of Pools, Spas, Hot Tubs, and Fountains

This BMP applies to all public and commercial swimming pools and spas, hot tubs, and fountains that use chemicals and/or are heated. Pools and spas at hotels, motels, apartments, and condominium complexes are also covered.

Description of Pollutants

Pollutants of concern include nutrients, suspended solids, chlorine, pH, and substances that increase chemical oxygen demand (COD).

Required BMP Elements

The following BMPs or equivalent measures are required for all pool, spa, hot tub, and fountain cleaning and maintenance activities:

- Implement all citywide BMPs (refer to Chapter 2).
- Discharge wastewater from backwashing and other maintenance activities related to cleaning to the sanitary sewer. Obtain all necessary permits for discharge to the sanitary sewer.
- For pool, spa, hot tub, and fountain draining, discharge to the sanitary sewer is the preferred method. Obtain all necessary permits for discharge to the sanitary sewer.
- If discharging to the ground, the discharge must comply with Ecology's Groundwater Quality Standards (WAC, Chapter 173-200). Discharge must be moderated to allow infiltration of all water into the ground and not produce surface runoff.
- If discharge to the sanitary sewer or ground is not possible for draining a pool, spa, hot tub, or fountain, water may be discharged to a ditch or drainage system, provided that the following conditions have been met:
    - Dechlorinated/debrominated to 0.1 part per million (ppm) or less
    - Adjusted to a pH between 6.5 and 8.5
    - Adjusted to a temperature and dissolved oxygen concentration that will prevent an increase in temperature or a decrease in dissolved oxygen concentration in the downstream receiving water
    - Released at a controlled flow rate to prevent erosion and high flow impacts in the drainage ditch or downstream receiving water
    - Free of any coloration, dirt, suds, algae, filter media, or acid cleaning wastes

Guidance on dechlorination is provided in the Department of Health's Water System Design Manual, Publication 331-123 (DOH 2009). The Department of Health manual further references the American Water Works Association (AWWA) Standard for Disinfecting Water Mains (C651) and Standard for Disinfecting Water Storage Facilities (C652). Contact AWWA for more information. Contact a pool chemical supplier to obtain the neutralizing chemicals needed.

3.6.5. BMP 35: Deicing and Anti-icing Operations for Airports and Streets

This BMP applies to businesses and public agencies that perform deicing and anti-icing operations used on highways, streets, airport runways, and aircraft to control ice and snow.

Description of Pollutants

Typically ethylene glycol and propylene glycol are used on aircraft as deicers. The deicers commonly used on highways and streets include calcium magnesium acetate, calcium chloride, magnesium chloride, sodium chloride, urea, and potassium acetate.

Deicing and anti-icing chemicals become pollutants when they are conveyed to inlets/catch basins or to receiving water after application. Leaks and spills of these chemicals can also occur during their handling and storage.

Discharges of spent glycol in aircraft application areas are process wastewaters regulated under the Ecology NPDES permit. (Contact the Ecology Northwest Regional Office for details at (425) 649-7000.) BMPs for aircraft deicers and anti-icers must be consistent with aviation safety requirements and the operational needs of the aircraft operator.

Required BMP Elements

The following BMPs or equivalent measures are required for deicing and anti-icing activities related to aircraft:

- Implement all citywide BMPs (refer to *Chapter 2*).
- Conduct aircraft deicing and anti-icing applications in impervious containment areas. Collect spent deicing liquids (e.g., ethylene glycol) and anti-icing chemicals (e.g., urea) that drain from aircraft in deicing or anti-icing application areas and convey them to a sanitary sewer, treatment facility, or other approved disposal or recovery method. Divert runoff of deicing chemicals from paved gate areas to appropriate collection areas or conveyances for proper treatment or disposal.
- Do not allow spent deicing and anti-icing chemicals or contaminated stormwater to be discharged directly or indirectly from application areas, including gate areas, to a receiving water or groundwater.
- Transfer deicing and anti-icing chemicals on an impervious containment pad, or an equivalent spill/leak containment area, and store them in secondary containment areas.

The following BMPs or equivalent measures are required for deicing and anti-icing activities related to runways and taxiways:

- Avoid excessive application of de/anti-icing chemicals, which could contaminate stormwater.
- Store and transfer de/anti-icing materials on an impervious containment pad or an equivalent containment area.

The following BMPs or equivalent measures are required for deicing and anti-icing activities related to streets and highways:

- Select deicers and anti-icers that result in the least adverse environmental impact. Apply only as needed using minimum quantities.
- Where feasible and practical, use roadway deicers, such as calcium magnesium acetate, potassium acetate, or similar materials that cause less adverse environmental impact than urea and sodium chloride.
- Store and transfer deicing and anti-icing materials on an impervious containment pad.
- Sweep or clean up accumulated deicing and anti-icing materials and grit from roads as soon as possible after the road surface clears.
- Increase maintenance of stormwater structures as necessary.

Recommended BMPs

Although not required, the following BMPs are recommended to further reduce the potential for the contamination of stormwater and receiving waters:

Aircraft:

- Establish a centralized aircraft deicing and anti-icing facility, if feasible and practical, or conduct deicing and anti-icing in designated areas of the tarmac equipped with separate collection drains for the spent deicing liquids.
- Consider installing a recovery system for aircraft deicing and anti-icing chemicals, or contract with a chemical recycler, if practical.

Airport Runways and Taxiways:

- Include limits on toxic materials and phosphorus in the specifications for deicers and anti-icers, where applicable.
- Consider using anti-icing materials rather than deicers if they will result in less adverse environmental impact.
- Select cost-effective deicers and anti-icers that cause the least adverse environmental impact.

Streets and Highways:

- Intensify roadway cleaning in early spring to help remove particulates from road surfaces.
- Include limits on toxic metals in the specifications for deicers and anti-icers.

3.6.6. BMP 36: Maintenance and Management of Roof and Building Drains at Manufacturing and Commercial Buildings

This BMP applies to businesses and public agencies where the roofs and sides of manufacturing and commercial buildings can be sources of pollutants when stormwater runoff results in the leaching of roofing materials, materials from building vents, air emissions, flashing, cleaning agents, and applied moss killers. Flaking paint and caulking can also be sources of pollutants.

Description of Pollutants

Vapors and entrained liquid and solid droplets and particles have been identified as potential pollutants in roof and building runoff. The pollutants identified include metals, solvents, low (acidic) and high (alkaline) pH, substances that increase biological oxygen demand (BOD), and organic compounds. Flaking paint or caulking may be a source of metals and organic compounds.

Required BMP Elements

The following BMPs or equivalent measures are required for all commercial and manufacturing buildings to prevent and reduce stormwater pollution:

- Implement all citywide BMPs (refer to *Chapter 2*).
- If leachates or emissions from buildings are suspected sources of stormwater pollutants, sample and analyze the stormwater draining from the building or sediment from nearby catch basins.
- If a roof or building is identified as a source of stormwater pollutants, implement appropriate source control measures, such as air pollution control equipment, selection of materials, operational changes, material recycling, or process changes, remediation or treatment.
- Sweep areas routinely to remove pollutant residues.
- If operational methods do not prevent or reduce pollution, paint/coat the galvanized surfaces as described in Publication 08-10-025, Suggested Practices to Reduce Zinc Concentrations in Industrial Stormwater Discharges (Ecology 2008) or treat the stormwater runoff.
- If operational BMPs are not sufficient to prevent stormwater contamination, structural controls must be implemented, including treatment or structural containment.

3.6.7. BMP 37: Maintenance and Operation of Railroad Yards

This BMP applies to businesses and public agencies that perform activities at railroad yards not otherwise covered in this manual, including cleaning, maintenance, and repair of equipment and engines; fueling; waste disposal (including human waste); and all other yard maintenance activities (including vegetation management).

Description of Pollutants

Pollutant sources include litter; cleaning areas for locomotives, rail cars, and equipment; fueling areas; rail cargo; human waste disposal; outside material storage areas; erosion and loss of soil particles from the railroad bed; maintenance and repair activities at railroad terminals, switching yards, and maintenance yards; and herbicides used for vegetation management. Potential pollutants include oils and greases, suspended solids, substances that increase biological oxygen demand (BOD), fecal coliform, organic compounds, pesticides, and metals.

Required BMP Elements

The following BMPs or equivalent measures are required for railroad yards:

- Implement all citywide BMPs (refer to *Chapter 2*).
- Implement the applicable BMPs in this volume specific to the activity that is occurring.
- Do not allow discharge from toilets to outside areas. Pump-out facilities should be used to service these units.
- Use drip pans at hose and pipe connections during liquid transfer and other leak-prone areas.
- During maintenance, do not discard debris or waste liquids along the tracks or in railroad yards.
- In areas subject to leaks or spills of oils or other chemicals, convey the contaminated stormwater to an appropriate treatment system such as the sanitary sewer, if approved by SPU and/or King County, or to an API oil/water separator, coalescing plate oil/water separator for floating oils, or an appropriate treatment facility (see *Volume 3 — Project Stormwater Control*).

3.6.8. BMP 38: Maintenance of Public and Private Utility Corridors and Facilities

This BMP applies to businesses and public agencies that maintain utility corridors and associated equipment at petroleum product pipelines, natural gas pipelines, water pipelines, pump stations, electrical power transmission corridors, and rights-of-way.

Description of Pollutants

Corridors and facilities can be sources of pollutants, such as herbicides used for vegetation management and eroded soil particles generated from unpaved access roads. At pump stations, waste materials generated during maintenance activities are often temporarily stored outside, and thus can be a source of pollution into inlets/catch basins and receiving waters.

Additional potential pollutant sources include the leaching of preservatives from wood utility poles, polychlorinated biphenyls (PCBs) in older transformers, water that is removed from underground transformer vaults, and leaks or spills from petroleum pipelines. Potential pollutants are oils and greases, suspended solids, substances that increase biological oxygen demand (BOD), organic compounds, polychlorinated biphenyls, pesticides, and metals.

Required BMP Elements

The following BMPs or equivalent measures are required for activities related to the maintenance of public and utility corridors and facilities:

- Implement all citywide BMPs (refer to *Chapter 2*).
- Implement BMPs for Landscaping and Vegetation Management (BMP 18), including integrated pest management (IPM).
- When water or sediments are removed from electric transformer vaults, determine whether contaminants are present before disposing of the water and sediments.
    - This includes inspecting for the presence of oil or oil sheen and determining from records or testing whether the transformers contain or contained polychlorinated biphenyls (PCBs).
    - If records or tests indicate that the sediment or water could contain PCBs at concentrations greater than the allowable levels, manage the sediment or water in accordance with applicable federal and state regulations, including the federal rules for polychlorinated biphenyls (Code of Federal Regulations, Title 40, Part 761) and the state Model Toxics Control Act cleanup regulations (WAC, Chapter 173-340).
    - Water removed from the vaults can be discharged in accordance with the Code of Federal Regulations, Title 40, Section 761.79, and state regulations (Washington Administrative Code, Chapters 173-201A and 173-200), or via the sanitary sewer if the requirements, including applicable permits, for such a discharge are met.

- Provide maintenance practices to prevent stormwater from accumulating and draining across and/or onto roadways. Stormwater should be conveyed through roadside ditches and culverts. The road should be crowned, outsloped, water barred, or otherwise left in a condition that is not conducive to erosion.
- Maintain ditches and culverts at an appropriate frequency to prevent plugging and flooding across the roadbed, with resulting overflow erosion.
- Apply the appropriate BMPs in this volume for the storage of waste materials that can contaminate stormwater.
- Within utility corridors, prepare maintenance procedures to minimize the erosion of soil. An implementation schedule may provide for a vegetative, gravel, or equivalent cover that minimizes thinly vegetated ground surfaces within the corridor.

Recommended BMPs

Although not required, the following BMPs can further prevent and minimize stormwater contamination:

- Maintain vegetation in roadside ditches that discharge to receiving waters to remove some pollutants associated with sediments carried by stormwater.
- When selecting utility poles for a specific location, consideration should be given to the potential environmental effects of the pole or poles during their storage, handling, and end use.
- If a wood product treated with chemical preservatives is used, it should be made in accordance with generally accepted industry standards such as the American Wood Preservers Association Standards.
- If the pole or poles will be placed in or near a drinking water well or a critical area, consider alternative materials or technologies. These include poles made of material(s) other than wood, such as fiberglass composites, metal, or concrete.
- Consider the use of other technologies and materials, such as sleeves or caissons for wood poles, when they are determined to be practical and available.
- As soon as practical, remove all litter from wire cutting and replacement operations.

3.6.9. BMP 39: Maintenance of Roadside Ditches

This BMP applies to businesses and public agencies that perform activities related to the maintenance of roadside ditches, which can present a high risk of polluting stormwater because the ditches in which work is performed flow into the drainage system.

Description of Pollutants

Common road debris including particles from tire wear, dripped oil and other fluids; chemicals used in deicing; pesticides; herbicides; eroded or contaminated soil; and metals can be sources of stormwater pollutants.

Required BMP Elements

The following BMPs or equivalent measures are required for activities related to the maintenance of roadside ditches:

- Implement all citywide BMPs (refer to *Chapter 2*).
- Implement BMPs for Landscaping and Vegetation Management (BMP 18), including integrated pest management (IPM).
- Inspect roadside ditches regularly, as needed to identify sediment accumulations and areas of localized erosion.
- Clean ditches on a regular basis, as needed:
  - Keep ditches free of rubbish and debris.
  - Conduct ditch maintenance (seeding, fertilizer application, and harvesting) when most effective, usually in late spring and/or early fall and avoid maintenance during heavy rainfall.
  - Do not apply fertilizer unless needed to maintain vegetative growth.
  - Do not leave material from the ditch cleaning on roadway surfaces.
  - Sweep and remove dirt and debris that remains on the pavement at the completion of ditch cleaning operations.
  - Segregate clean materials from suspect or contaminated materials. Non-contaminated soils may be handled as “clean soils” and non-contaminated vegetative matter can be composted or disposed of in a municipal waste landfill, if permitted. Suspected contaminated or contaminated material removed from ditches must be tested and handled according to the Dangerous Waste Regulations (WAC, Chapter 173-303) unless testing indicates that it is not dangerous waste.
- Vegetation in ditches often prevents erosion and cleanses runoff:
  - Remove vegetation only when flow is blocked or excess sediments have accumulated.
  - Use grass vegetation, unless specified otherwise by SPU.
  - Establish vegetation from the edge of the pavement if possible or at least from the top of the slope of the ditch.
  - Use temporary erosion and sediment control measures or re-vegetate as necessary to prevent erosion during ditch reshaping.

- Diversion ditches on top of cut slopes that are constructed to prevent slope erosion by intercepting surface drainage must be maintained to retain their diversion shape and capability.
- Inspect culverts on a regular basis for scour or sedimentation at the inlet and outlet, and repair as necessary. Give priority to culverts that are conveying perennial or salmon-bearing streams and to culverts near streams in areas of high sediment load, such as those near subdivisions during construction. Maintain trash racks to avoid damage, blockage or erosion of culverts.
- Waste generated from ditch maintenance, i.e., spoils and debris, may be contaminated and require specialized disposal. Refer to BMP 3 for waste disposal guidelines.
- Note that work in wet areas may be regulated by local, state or federal law which impose obligations on the responsible party.

CHAPTER 4 – REFERENCES

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