



MUNICIPAL STORMWATER OPERATIONS AND MAINTENANCE (O&M) PROGRAM

2015

TABLE OF CONTENTS

PURPOSE, GOAL, AND APPROACH	1
OVERVIEW	1
STORMWATER FACILITIES	2
STREETS	3
PARKS	4
BUILDING MAINTENANCE	5
GENERATED MATERIAL	5
TRAINING	8
REVIEW AND RECORDKEEPING	8

APPENDICES

- A. Table of Stormwater Facilities
- B. Facility Maintenance Standards
- C. Source Control Best Management Practices
- D. Shop Guide for Dangerous Waste Management
- E. Street Waste Disposal

TABLE OF REVISIONS AND REVIEWS

DATE	COMMENTS
1/30/15	Updated to comply with 2012 SWMMWW and the 2013-2018 Phase II Municipal Stormwater NPDES Permit – Otak, Inc.

PURPOSE, GOAL, AND APPROACH

PURPOSE

The Municipal Stormwater Operations and Maintenance (O&M) Program (Program) was written to comply with the 2013-2018 Phase II Municipal Stormwater NPDES Permit (Permit) for Western Washington, sections S4.C and D and S5.C.5 to prevent or reduce pollutant runoff from municipal operations.

GOAL

Conduct municipal operations and maintenance programs in a manner that reduces the discharge of pollutants to the maximum extent practicable (MEP) using all known, available, and reasonable methods of prevention, control, and treatment (AKART).

APPROACH

- A. This Program is a supporting document to the City's Stormwater Management Program (SWMP).
- B. It shall be reviewed at least once per Permit cycle by Engineering and Operations Division (Operations) staff, and updated as necessary.
- C. This Program outlines the inspections and maintenance procedures to be performed by staff in Engineering, Parks & Recreation Division (Parks), and Operations.
- D. It incorporates the 2012 Stormwater Management Manual for Western Washington (SWMMWW) Volumes IV and V into City operations and maintenance practices.

OVERVIEW

The City of Kelso has a population of almost 12,000 people located along Interstate 5. The Coweeman and Cowlitz rivers flow through the city, and it borders the Columbia River. City operations that potentially impact stormwater include Operations and Parks. Additionally, Engineering has responsibility for related inspections and compliance activities.

Operations Division

Operations provides services from its Operations Maintenance Facility (Facility) at 2300 Parrott Way, and the Facility operates under its own Stormwater Pollution Prevention Plan (SWPPP). The Facility includes heavy equipment and a storage yard. The SWPPP is used to prevent and control pollution to waters of the state and to comply with the requirements of the Permit. Water, sewer, stormwater and roadway maintenance services are based out of the Facility.

Parks and Recreation Division

The Parks and Recreation Division (Parks) manages eight parks with more than 50 acres of parkland. It conducts operations out of its facility located at Tam O'Shanter Way next to the City's largest park, Tam O'Shanter Park. Parks activities include maintenance at the City parks.

Both Operations and Parks work under the guidance of other programs such as the *Nutrient, Integrated Pest Management and Herbicide Plan*, and the *Illicit Discharge Detection and Elimination (IDDE) Program*. All City employees who work in the field and, as part of their regular duties, may observe illicit discharges or connections or who may impact water quality receive training on illicit discharges and spills.

Engineering

Engineering provides inspection of stormwater treatment and flow control facilities, trains staff, and keeps records of some compliance activities.

STORMWATER FACILITIES

The City's municipal separate storm sewer system (MS4) includes four runoff detention and/or treatment facilities, which are listed below. The *Stormwater Facilities Manual* contains all relevant information about these facilities; copies are kept with Engineering. The stormwater drainage system includes about 55 miles of storm sewer pipes from 4- to 60-inches in diameter. The system also includes 1,353 catch basins and 652 manholes documented in a geodatabase, as well as approximately 150 catch basins and manholes that are yet to be documented.

Stormwater treatment and flow control facilities include the following:

- CDS unit at 1st Avenue and North Pacific Avenue
- Stormceptor System at 3rd Avenue and Oak Street City parking lot
- Flow control structure and oil/water separator at east end of Allen Street Bridge
- Flow control structure, oil/water separator and pond with outlet control structure at west end of Allen Street Bridge

Table 1 in Appendix A lists components of each above-listed stormwater facility and summarizes each facility's maintenance requirements and schedule. Engineering will perform regular inspections of stormwater treatment and flow control facilities, and Operations will perform any required maintenance. Operations will inspect and maintain catch basins and manholes, with Engineering providing analysis of inspection results.

Standards

The maintenance standards from Chapter 4 in Volume V of the 2005 SWMMWW are required by this Program until 6/30/2017. After 6/30/2017, maintenance standards from the current version of the SWMMWW are required. Updated standards for selected facility types are included as Appendix B.

Compliance with Standards

Maintenance will be performed promptly as necessary to remain compliant with standards. When an inspection identifies an exceedance of the maintenance standard, maintenance will be performed as follows:

Stormwater Municipal Operations and Maintenance Program

- Within 1 year for typical maintenance of facilities, except catch basins,
- Within 6 months for catch basins,
- Within 2 years for maintenance that requires capital construction of less than \$25,000, or
- As otherwise documented in the Permit per S5.C.5.a.ii.

Inspection Frequency

1. Annually for municipally owned or operated permanent stormwater treatment and flow control BMPs/facilities.
2. Spot check municipally owned or operated permanent stormwater treatment and flow control BMPs/facilities after major storm events (24-hour storm event with a 10-year or greater recurrence interval). Operations will also spot check known flooding trouble spots after storms.
3. Inspection frequency for catch basins and manholes will change during the Permit cycle. In 2015, inspect 40% of catch basins. If this rate is found to be sustainable, then continue with this rate in 2016 and then inspect no catch basins in 2017. If not, then adjust the rate to 20% annually and conduct inspections in both 2016 and 2017, ensuring that 100% of catch basins are inspected before August 1, 2017 (measured from inspections that began in calendar year 2013). In 2018, begin inspecting 50% of catch basins per year, as required by the Permit.

Records and Performance

Records of all inspections are kept in Engineering. Compliance during this Permit cycle shall be determined by documenting the established inspection program and achieving an annual rate of at least 95% of inspections specified above.

Further guidance for inspection and maintenance is provided in *BMPs for Maintenance of Stormwater Drainage and Treatment Systems* found in Appendix C.

STREETS

Street Sweeping

Operations sweeps all curbed streets in the City of Kelso. Street sweeping is performed using an Elgin Crosswind J regenerative air street sweeper. The sweeper has vacuum and sweeping capabilities for efficient removal of sediment, debris and other pollutants. Debris build-up is at its most during the months of October through December. The City coordinates sweeping with other activities that generate higher than normal loading. An example is in areas of heavy leaf build-up during the fall, when street sweeping is performed after crews remove the majority of leaves with heavy equipment. The City performs the sweeping on an as-needed basis and as much as staff time allows. Refer to *BMPs for Urban Streets* found in Appendix C for further guidance.

Deicing

Operations performs de-icing of city streets using ZEP Super D-Ice that is an ice melt compound composed of calcium chloride anhydrous beads. Application of the ZEP is only

performed when needed to protect the health and safety of the travelling public. Refer to the *BMPs for Deicing and Anti-Icing Operations – Airports and Streets* in Appendix C for further guidance.

Dust Emissions

The City has unpaved streets and alleys that are re-graded and re-rocked periodically to control erosion and potholing. Dust problems are uncommon. If dust emissions become significant the City will consider dust control practices. These could include re-rocking with a cleaner grade of rock and using approved dust suppressant chemicals such as those listed in Ecology Publication #96-433 (revised March 2003), “Techniques for Dust Prevention and Suppression.” For further guidance refer to the *BMPs for Dust Control at Disturbed Areas and Unpaved Roadways and Parking Lots* in Appendix C.

Utility Corridors and Facilities

The City has pervious surfaces outside of the streets and sidewalks but still within the right of way. For these areas, the City will follow its *Nutrient, Integrated Pest Management and Herbicide Plan* and the *BMPs for Maintenance of Public and Private Utility Corridors and Facilities* found in Appendix C.

Roadside Ditches

Roadside ditches are maintained to preserve the condition and capacity for which they were originally constructed, and to minimize bare or thinly vegetated ground surfaces. Maintenance practices should provide for erosion and sediment control as needed. Further guidance can be found in the *BMPs for Maintenance of Roadside Ditches* found in Appendix C.

Road Repair and Resurfacing

Regular municipal street repair and maintenance activities, such as pavement marking, pavement grinding, repair, patching, resurfacing, sealing and right-of-way maintenance, can generate a range of stormwater pollutants, including metals, chlorides, hydrocarbons (e.g. benzene, toluene, ethylbenzene, xylene), nutrients, sediment and trash.

The City will employ pollution prevention and good housekeeping efforts such as protecting inlets, keeping the street clean, and installing erosion and sediment control BMPs to ensure final stabilization of disturbed soils. For further guidance, see SWMMWW Volumes IV, Source Control, and II, Construction Stormwater Pollution Prevention.

Pavement Striping Maintenance:

Only DOT-approved paint is used and it is applied to WSDOT standards.

PARKS

The City Operations Division has policies and practices for application of fertilizers, pesticides, and herbicides on City managed facilities such as parks. City park classifications include regional park, neighborhood park, neighborhood play lot, neighborhood open spaces, trails, and undeveloped open spaces. The City has developed a nutrient management and an

integrated pest management plan, *Nutrient, Integrated Pest Management and Herbicide Plan 2015*, to guide these activities.

BUILDING MAINTENANCE

Exterior Painting

The City is responsible for maintaining the building exteriors of City Hall, the Operations & Maintenance Facility at 2300 Parrott Way, and any other City owned and operated buildings. Surface preparation and the application of paints to buildings outdoors can be a source of pollutants. Potential pollutants resulting from painting buildings include organic compounds, oils and greases, heavy metals, and suspended solids. Refer to *BMPs for Painting/Finishing/Coating of Vehicles/Boats/Buildings/Equipment* found in Appendix C for guidance on work space set-up, paint application, and clean-up methods.

Exterior Washing

Operations maintains City owned and operated buildings by washing the building exterior. If the washwater contains oils, soaps, or detergents, it should be collected and conveyed to appropriate treatment such as a sanitary sewer system. If the washwater does not contain oils, soaps, or detergents (in this case only a low pressure, clean, cold water rinse is allowed) then it could drain to soils that have sufficient natural attenuation capacity for dust and sediment. Further guidance can be found in the *BMPs for Washing and Steam Cleaning Vehicles/Equipment/Building Structures* found in Appendix C.

Roof Drains

On City buildings where roofs are galvanized, roof drains should be evaluated for potential sources of stormwater pollutants and source control BMPs applied where feasible. Further guidance can be found in the *BMPs for Roof/Building Drains at Manufacturing and Commercial Buildings* found in Appendix C.

GENERATED MATERIAL

The City will manage materials generated by municipal operations using appropriate BMPs to reduce and prevent potential pollutants from being mixed with stormwater runoff.

When generating material, Operations and Parks will be responsible for implementing BMPs in the Facility SWPPP and in this Program.

A. APPLICABLE REGULATIONS

The City will comply with all applicable local, state, and Federal laws and regulations, including but not limited to:

- State (Ecology): [WAC 173-303](#) – Dangerous Waste Regulations;
- Local (Cowlitz County Health Dept.) according to the Minimum Functional Standards for Solid Waste Management ([WAC 173-304](#)) and Municipal Landfill Standard ([WAC 173-351](#)), Cowlitz County Health Department.

B. WASTE HANDLING AND DISPOSAL

This section addresses the generally applicable stormwater runoff pollution prevention BMPs. Street wastes are discussed in this section because they are specifically discussed in the 2013-2018 Phase II Municipal Stormwater NPDES Permit.

BMPs for Storage of Liquid, Food Waste, or Dangerous Waste (see Appendix C)

- Clean-up leaks and spills.
- Store containers in impervious containment under a roof.
- *Liquids* – Use tight fitting lids or bungees; use of drip pans; inspect containers for damage and leaks. *Solids* – Elevate or otherwise protect from stormwater.
- If generating “dangerous waste,” contact the Stormwater Manager (x3377) for assistance and Follow Ecology’s “Shop Guide for Dangerous Waste Management.” (See Appendix D).
- Comply with Uniform Fire Code if waste is flammable, reactive, or explosive.
- Cover trash cans and dumpsters.

BMPs for Storage or Transfer (outside) of Solid Raw Materials, By-products, or Finished Products (see Appendix C)

- Provide [impervious where necessary] containment with berms, dikes, etc. and/or cover to prevent run-on and discharge of leachate pollutants, and TSS.
- The storage area should have a minimum 1.5% slope to prevent run-on and to minimize contact (pooling) between stormwater and any leachable materials.
- Do not hose down materials/product to the stormwater system.
- Protect catch basins or other entry points nearest to the pile.
- Sweep regularly.
- Treat runoff, where it has a pathway to the storm sewer or surface waters.

Dangerous or Special Wastes

- These waste materials typically contain hazardous substances, oils, or exhibit hazardous characteristics such as corrosivity, ignitability, reactivity, toxicity, or environment persistence.
- State regulations require anyone handling and managing these waste including but not limited to waste designation, packaging, labeling, preparing shipping documents, and transporting be trained in the duties they perform. See WAC 173-303-330.

Selected Waste Related Definitions

➤ *Dangerous Waste*: Means those solid waste designated in WAC 173-303-70 through 173-303-100 as dangerous, or extremely hazardous or mixed waste. Characterization is a three-step process:

1. Is the material a waste?
2. Is it a listed waste substance?
3. Does it exhibit any dangerous waste characteristics (ignitability, corrosivity, reactivity, or toxicity).

No person without appropriate training should perform this task.

➤ *Special Waste*: Means any state-only dangerous waste that is solid only (non-liquid, non-aqueous, non-gaseous), that is: Corrosive, toxic (Category D toxicity only), selective PCB waste, or persistent waste that is not extremely hazardous waste. [Exclusion: Any solid waste regulated by the EPA cannot be a special waste].

Stormwater Municipal Operations and Maintenance Program

- City staff are not trained in the handling and managing of dangerous or special wastes, such as hazardous waste operations and emergency response (HAZWOPER) training. Spills that include dangerous wastes materials are forwarded on to 911 for response.

Street Wastes

- Street wastes generated by street sweeping or cleaning of catch basins, etc. will be managed according to “Street Waste Disposal”, which is Appendix 6 of the Permit (see Appendix E of this Program).
- Vactor truck wastes are taken to the shop and disposed of at the leaf/waste bin. The wastes are tested for metals three times per year at ALS Environmental in Kelso. Metals tested are arsenic, barium, cadmium, chromium, lead, mercury, selenium, and silver. Results typically are non-detect for the metals. Wastes that pass testing are shipped to either the City’s fill site at 2514 Talley Way or the Cowlitz County landfill.
- In the future, vactor waste from cleaning the stormwater drainage system will be delivered to a decant facility at the Three Rivers Regional Wastewater Plant. The facility is expected to be complete in 2015. The facility will be maintained by Cowlitz County and will be equipped with a decant bay, a grit chamber, and a coalescing plate oil/water separator. The final effluent will be discharged to the sanitary sewer and treated at the Three Rivers Regional Wastewater Plant.

Spills

- Operations and Parks staff have been trained on spill response through Illicit Discharge Detection and Elimination (IDDE) training. Spill response basics are described below.
- For major spills that can not be controlled or cleaned up using spill kits available on City vehicles or at the Facility, call 911 for assistance. For minor spills respond as detailed below.
- Notify the Operations Supervisor or the Stormwater Manager for spills on municipal

Hydraulic Oil Spill Example

1. Absorb the hot spot area of free liquid with sorbent material (preferably with sorbent pads or if needed with Amerisorb, floor dry, soil, or sand).
2. Place the material in a heavy duty plastic bag and label on it the date, City of Kelso, spill source (e.g. equipment #), and the phrase “Non-Regulated Material, Solid” followed by the specific sorbent type then “Hydraulic Oil”.

8/16/11

City of Kelso

Spill from 38-500

Non-Regulated Material, Solid – Sorbent pads and Hydraulic Oil

3. Take the bagged material to the designated storage container for disposal and notify your supervisor and the Stormwater Manager of the quantity of waste generated from the spill.

Note: Alternatively, if sanding is the only feasible option, then a street sweeper can sweep the area when ready (preferably when empty). The sweeper operator will write down the above label information plus the total estimated quantity in volume and submit the information to the Operations Supervisor.

4. Any remaining residual oil that cannot be absorbed on street surfaces may need sand spread over for traction purposes. Place motorcycle-related warning signs as needed until street sweepers are ready to sweep up the sand. This sand can be combined with normal street sweeping material.

Stormwater Municipal Operations and Maintenance Program

streets and alleys for internal reporting, assistance, and/or direction for traffic safety, street surface damage, and/or cleanup assistance.

- When responding to liquid spills, the best practice to manage waste from cleanup activities is to first clean up the hotspot areas (those with free liquids on the surface) separately from residual stains. Sand or sorbents applied on residual stains can usually be characterized and managed separately, which provides cost savings to the City.
- Further guidance can be found in the *BMPs for Spills of Oil and Hazardous Substances* found in Appendix C.

TRAINING

Operations and Parks staff are trained at least once per Permit cycle on the importance of protecting water quality, the requirements of the 2013-2018 Phase II Municipal Stormwater NPDES Permit, operation and maintenance standards, selecting appropriate BMPs, inspection procedures, ways to perform their job activities to prevent or minimize impacts to water quality, and procedures for reporting water quality concerns, including potential illicit discharges.

REVIEW AND RECORDKEEPING

This Program is reviewed at least once per Permit cycle by the Stormwater Manager, the Operations Supervisor and the Stormwater Lead.

Records of training, inspection, and maintenance (or repair) activities are kept in order to document in the annual report required by the Permit.

APPENDICES

- A. Table of Stormwater Facilities
- B. Facility Maintenance Standards
- C. Source Control Best Management Practices
- D. Shop Guide for Dangerous Waste Management
- E. Street Waste Disposal

Appendix A

Table 1 - Stormwater Facility Maintenance

Count	Facility	Location	Maintenance Items Needed	Inspection Schedule
1	Water quality pond	SW corner of Allen Street Bridge	Mow lawn and pick up trash	Annually & after 10-year, 24-hour storm event or greater
2	Water quality pond Outlet Control Structure	Within pond at SW corner of Allen Street Bridge	Vactor debris and sediment. Traffic control needed	Annually & after 10-year, 24-hour storm event or greater
3	West Oil/Water Separator	SW end of Allen St Bridge; feeds pond	Vactor oil and wastewater (contracted). Traffic control needed	Annually & after 10-year, 24-hour storm event or greater
4	East Oil/Water Separator	NE end of Allen St Bridge	Vactor oil and wastewater (contracted). Traffic control needed	Annually & after 10-year, 24-hour storm event or greater
5	West By-Pass Flow Control Structure	SW end of Allen St Bridge; feeds pond	Vactor debris and sediment. Traffic control needed	Annually & after 10-year, 24-hour storm event or greater
6	East By-Pass Flow Control Structure	NE end of Allen St Bridge	Vactor debris and sediment. Traffic control needed	Annually & after 10-year, 24-hour storm event or greater
7	CDS manhole	North Pacific Ave.	Vactor debris and sediment. Traffic control needed	Annually & after 10-year, 24-hour storm event or greater
8	Stormceptor	Oak St. parking lot	Vactor debris and sediment	Annually & after 10-year, 24-hour storm event or greater
9	Stormceptor Control Manhole	Oak St. parking lot	Vactor debris and sediment	Annually & after 10-year, 24-hour storm event or greater

Appendix B

Maintenance Standards

This appendix is comprised of selected pages
of Volume V of the 2012 SWMMWW.
Pages are not contiguous.

4.6 Maintenance Standards for Drainage Facilities

The facility-specific maintenance standards contained in this section are intended to be conditions for determining if maintenance actions are required as identified through inspection. They are not intended to be measures of the facility's required condition at all times between inspections. In other words, exceedence of these conditions at any time between inspections and/or maintenance does not automatically constitute a violation of these standards. However, based upon inspection observations, the inspection and maintenance schedules shall be adjusted to minimize the length of time that a facility is in a condition that requires a maintenance action.

Table 4.5.2 Maintenance Standards

No. 1 – Detention Ponds

Maintenance Component	Defect	Conditions When Maintenance Is Needed	Results Expected When Maintenance Is Performed
General	Trash & Debris	Any trash and debris which exceed 1 cubic feet per 1,000 square feet. In general, there should be no visual evidence of dumping. If less than threshold all trash and debris will be removed as part of next scheduled maintenance.	Trash and debris cleared from site.
	Poisonous Vegetation and noxious weeds	Any poisonous or nuisance vegetation which may constitute a hazard to maintenance personnel or the public. Any evidence of noxious weeds as defined by State or local regulations. (Apply requirements of adopted IPM policies for the use of herbicides).	No danger of poisonous vegetation where maintenance personnel or the public might normally be. (Coordinate with local health department) Complete eradication of noxious weeds may not be possible. Compliance with State or local eradication policies required
	Contaminants and Pollution	Any evidence of oil, gasoline, contaminants or other pollutants (Coordinate removal/cleanup with local water quality response agency).	No contaminants or pollutants present.
	Rodent Holes	Any evidence of rodent holes if facility is acting as a dam or berm, or any evidence of water piping through dam or berm via rodent holes.	Rodents destroyed and dam or berm repaired. (Coordinate with local health department; coordinate with Ecology Dam Safety Office if pond exceeds 10 acre-feet.)

No. 1 – Detention Ponds

Maintenance Component	Defect	Conditions When Maintenance Is Needed	Results Expected When Maintenance Is Performed
	Beaver Dams	Dam results in change or function of the facility.	Facility is returned to design function. (Coordinate trapping of beavers and removal of dams with appropriate permitting agencies)
	Insects	When insects such as wasps and hornets interfere with maintenance activities.	Insects destroyed or removed from site. Apply insecticides in compliance with adopted IPM policies
	Tree Growth and Hazard Trees	Tree growth does not allow maintenance access or interferes with maintenance activity (i.e., slope mowing, silt removal, vactoring, or equipment movements). If trees are not interfering with access or maintenance, do not remove If dead, diseased, or dying trees are identified (Use a certified Arborist to determine health of tree or removal requirements)	Trees do not hinder maintenance activities. Harvested trees should be recycled into mulch or other beneficial uses (e.g., alders for firewood). Remove hazard Trees
Side Slopes of Pond	Erosion	Eroded damage over 2 inches deep where cause of damage is still present or where there is potential for continued erosion. Any erosion observed on a compacted berm embankment.	Slopes should be stabilized using appropriate erosion control measure(s); e.g., rock reinforcement, planting of grass, compaction. If erosion is occurring on compacted berms a licensed civil engineer should be consulted to resolve source of erosion.
Storage Area	Sediment	Accumulated sediment that exceeds 10% of the designed pond depth unless otherwise specified or affects inletting or outletting condition of the facility.	Sediment cleaned out to designed pond shape and depth; pond reseeded if necessary to control erosion.
	Liner (If Applicable)	Liner is visible and has more than three 1/4-inch holes in it.	Liner repaired or replaced. Liner is fully covered.
Pond Berms (Dikes)	Settlements	Any part of berm which has settled 4 inches lower than the design elevation. If settlement is apparent, measure berm to determine amount of settlement. Settling can be an indication of more severe problems with the berm or outlet works. A licensed civil engineer should be consulted to determine the source of the settlement.	Dike is built back to the design elevation.
	Piping	Discernable water flow through pond berm. Ongoing erosion with potential for erosion to continue. (Recommend a Geotechnical engineer be called in to inspect and evaluate condition and recommend repair of condition.	Piping eliminated. Erosion potential resolved.

No. 1 – Detention Ponds

Maintenance Component	Defect	Conditions When Maintenance Is Needed	Results Expected When Maintenance Is Performed
Emergency Overflow/ Spillway and Berms over 4 feet in height.	Tree Growth	<p>Tree growth on emergency spillways creates blockage problems and may cause failure of the berm due to uncontrolled overtopping.</p> <p>Tree growth on berms over 4 feet in height may lead to piping through the berm which could lead to failure of the berm.</p>	Trees should be removed. If root system is small (base less than 4 inches) the root system may be left in place. Otherwise the roots should be removed and the berm restored. A licensed civil engineer should be consulted for proper berm/spillway restoration.
	Piping	<p>Discernable water flow through pond berm. Ongoing erosion with potential for erosion to continue.</p> <p>(Recommend a Geotechnical engineer be called in to inspect and evaluate condition and recommend repair of condition.</p>	Piping eliminated. Erosion potential resolved.
Emergency Overflow/ Spillway	Emergency Overflow/ Spillway	<p>Only one layer of rock exists above native soil in area five square feet or larger, or any exposure of native soil at the top of out flow path of spillway.</p> <p>(Rip-rap on inside slopes need not be replaced.)</p>	Rocks and pad depth are restored to design standards.
	Erosion	See "Side Slopes of Pond"	

No. 2 – Infiltration

Maintenance Component	Defect	Conditions When Maintenance Is Needed	Results Expected When Maintenance Is Performed
General	Trash & Debris	See "Detention Ponds" (No. 1).	See "Detention Ponds" (No. 1).
	Poisonous/Noxious Vegetation	See "Detention Ponds" (No. 1).	See "Detention Ponds" (No. 1).
	Contaminants and Pollution	See "Detention Ponds" (No. 1).	See "Detention Ponds" (No. 1).
	Rodent Holes	See "Detention Ponds" (No. 1).	See "Detention Ponds" (No. 1)
Storage Area	Sediment	Water ponding in infiltration pond after rainfall ceases and appropriate time allowed for infiltration. Treatment basins should infiltrate Water Quality Design Storm Volume within 48 hours, and empty within 24 hours after cessation of most rain events. (A percolation test pit or test of facility indicates facility is only working at 90% of its designed capabilities. Test every 2 to 5 years. If two inches or more sediment is present, remove).	Sediment is removed and/or facility is cleaned so that infiltration system works according to design.
Filter Bags (if applicable)	Filled with Sediment and Debris	Sediment and debris fill bag more than 1/2 full.	Filter bag is replaced or system is redesigned.
Rock Filters	Sediment and Debris	By visual inspection, little or no water flows through filter during heavy rain storms.	Gravel in rock filter is replaced.
Side Slopes of Pond	Erosion	See "Detention Ponds" (No. 1).	See "Detention Ponds" (No. 1).
Emergency Overflow Spillway and Berms over 4 feet in height.	Tree Growth	See "Detention Ponds" (No. 1).	See "Detention Ponds" (No. 1).
	Piping	See "Detention Ponds" (No. 1).	See "Detention Ponds" (No. 1).
Emergency Overflow Spillway	Rock Missing	See "Detention Ponds" (No. 1).	See "Detention Ponds" (No. 1).
	Erosion	See "Detention Ponds" (No. 1).	See "Detention Ponds" (No. 1).
Pre-settling Ponds and Vaults	Facility or sump filled with Sediment and/or debris	6" or designed sediment trap depth of sediment.	Sediment is removed.

No. 4 – Control Structure/Flow Restrictor

Maintenance Component	Defect	Condition When Maintenance is Needed	Results Expected When Maintenance is Performed
General	Trash and Debris (Includes Sediment)	Material exceeds 25% of sump depth or 1 foot below orifice plate.	Control structure orifice is not blocked. All trash and debris removed.
	Structural Damage	Structure is not securely attached to manhole wall.	Structure securely attached to wall and outlet pipe.
		Structure is not in upright position (allow up to 10% from plumb).	Structure in correct position.
		Connections to outlet pipe are not watertight and show signs of rust.	Connections to outlet pipe are water tight; structure repaired or replaced and works as designed.
		Any holes--other than designed holes--in the structure.	Structure has no holes other than designed holes.
Cleanout Gate	Damaged or Missing	Cleanout gate is not watertight or is missing.	Gate is watertight and works as designed.
		Gate cannot be moved up and down by one maintenance person.	Gate moves up and down easily and is watertight.
		Chain/rod leading to gate is missing or damaged.	Chain is in place and works as designed.
		Gate is rusted over 50% of its surface area.	Gate is repaired or replaced to meet design standards.
Orifice Plate	Damaged or Missing	Control device is not working properly due to missing, out of place, or bent orifice plate.	Plate is in place and works as designed.
	Obstructions	Any trash, debris, sediment, or vegetation blocking the plate.	Plate is free of all obstructions and works as designed.
Overflow Pipe	Obstructions	Any trash or debris blocking (or having the potential of blocking) the overflow pipe.	Pipe is free of all obstructions and works as designed.
Manhole	See "Closed Detention Systems" (No. 3).	See "Closed Detention Systems" (No. 3).	See "Closed Detention Systems" (No. 3).
Catch Basin	See "Catch Basins" (No. 5).	See "Catch Basins" (No. 5).	See "Catch Basins" (No. 5).

No. 5 – Catch Basins

Maintenance Component	Defect	Conditions When Maintenance is Needed	Results Expected When Maintenance is performed
General	Trash & Debris	Trash or debris which is located immediately in front of the catch basin opening or is blocking inletting capacity of the basin by more than 10%.	No Trash or debris located immediately in front of catch basin or on grate opening.
		Trash or debris (in the basin) that exceeds 60 percent of the sump depth as measured from the bottom of basin to invert of the lowest pipe into or out of the basin, but in no case less than a minimum of six inches clearance from the debris surface to the invert of the lowest pipe.	No trash or debris in the catch basin.
		Trash or debris in any inlet or outlet pipe blocking more than 1/3 of its height.	Inlet and outlet pipes free of trash or debris.
		Dead animals or vegetation that could generate odors that could cause complaints or dangerous gases (e.g., methane).	No dead animals or vegetation present within the catch basin.
	Sediment	Sediment (in the basin) that exceeds 60 percent of the sump depth as measured from the bottom of basin to invert of the lowest pipe into or out of the basin, but in no case less than a minimum of 6 inches clearance from the sediment surface to the invert of the lowest pipe.	No sediment in the catch basin
	Structure Damage to Frame and/or Top Slab	Top slab has holes larger than 2 square inches or cracks wider than 1/4 inch (Intent is to make sure no material is running into basin).	Top slab is free of holes and cracks.
		Frame not sitting flush on top slab, i.e., separation of more than 3/4 inch of the frame from the top slab. Frame not securely attached	Frame is sitting flush on the riser rings or top slab and firmly attached.
	Fractures or Cracks in Basin Walls/ Bottom	Maintenance person judges that structure is unsound.	Basin replaced or repaired to design standards.
		Grout fillet has separated or cracked wider than 1/2 inch and longer than 1 foot at the joint of any inlet/outlet pipe or any evidence of soil particles entering catch basin through cracks.	Pipe is regouted and secure at basin wall.
	Settlement/ Misalignment	If failure of basin has created a safety, function, or design problem.	Basin replaced or repaired to design standards.
	Vegetation	Vegetation growing across and blocking more than 10% of the basin opening.	No vegetation blocking opening to basin.
		Vegetation growing in inlet/outlet pipe joints that is more than six inches tall and less than six inches apart.	No vegetation or root growth present.
	Contamination and Pollution	See "Detention Ponds" (No. 1).	No pollution present.

No. 5 – Catch Basins

Maintenance Component	Defect	Conditions When Maintenance is Needed	Results Expected When Maintenance is performed
Catch Basin Cover	Cover Not in Place	Cover is missing or only partially in place. Any open catch basin requires maintenance.	Catch basin cover is closed
	Locking Mechanism Not Working	Mechanism cannot be opened by one maintenance person with proper tools. Bolts into frame have less than 1/2 inch of thread.	Mechanism opens with proper tools.
	Cover Difficult to Remove	One maintenance person cannot remove lid after applying normal lifting pressure. (Intent is keep cover from sealing off access to maintenance.)	Cover can be removed by one maintenance person.
Ladder	Ladder Rungs Unsafe	Ladder is unsafe due to missing rungs, not securely attached to basin wall, misalignment, rust, cracks, or sharp edges.	Ladder meets design standards and allows maintenance person safe access.
Metal Grates (If Applicable)	Grate opening Unsafe	Grate with opening wider than 7/8 inch.	Grate opening meets design standards.
	Trash and Debris	Trash and debris that is blocking more than 20% of grate surface inletting capacity.	Grate free of trash and debris.
	Damaged or Missing.	Grate missing or broken member(s) of the grate.	Grate is in place and meets design standards.

No. 6 – Debris Barriers (e.g., Trash Racks)

Maintenance Components	Defect	Condition When Maintenance is Needed	Results Expected When Maintenance is Performed
General	Trash and Debris	Trash or debris that is plugging more than 20% of the openings in the barrier.	Barrier cleared to design flow capacity.
Metal	Damaged/ Missing Bars.	Bars are bent out of shape more than 3 inches.	Bars in place with no bends more than 3/4 inch.
		Bars are missing or entire barrier missing.	Bars in place according to design.
		Bars are loose and rust is causing 50% deterioration to any part of barrier.	Barrier replaced or repaired to design standards.
	Inlet/Outlet Pipe	Debris barrier missing or not attached to pipe	Barrier firmly attached to pipe

No. 15 – Manufactured Media Filters)

Maintenance Component	Defect	Condition When Maintenance is Needed	Results Expected When Maintenance is Performed
Below Ground Vault	Sediment Accumulation on Media.	Sediment depth exceeds 0.25-inches.	No sediment deposits which would impede permeability of the compost media.
	Sediment Accumulation in Vault	Sediment depth exceeds 6-inches in first chamber.	No sediment deposits in vault bottom of first chamber.
	Trash/Debris Accumulation	Trash and debris accumulated on compost filter bed.	Trash and debris removed from the compost filter bed.
	Sediment in Drain Pipes/Clean-Outs	When drain pipes, clean-outs, become full with sediment and/or debris.	Sediment and debris removed.
	Damaged Pipes	Any part of the pipes that are crushed or damaged due to corrosion and/or settlement.	Pipe repaired and/or replaced.
	Access Cover Damaged/Not Working	Cover cannot be opened; one person cannot open the cover using normal lifting pressure, corrosion/deformation of cover.	Cover repaired to proper working specifications or replaced.
	Vault Structure Includes Cracks in Wall, Bottom, Damage to Frame and/or Top Slab	Cracks wider than 1/2-inch or evidence of soil particles entering the structure through the cracks, or maintenance/inspection personnel determine that the vault is not structurally sound.	Vault replaced or repairs made so that vault meets design specifications and is structurally sound.
		Cracks wider than 1/2-inch at the joint of any inlet/outlet pipe or evidence of soil particles entering through the cracks.	Vault repaired so that no cracks exist wider than 1/4-inch at the joint of the inlet/outlet pipe.
	Baffles	Baffles corroding, cracking warping, and/or showing signs of failure as determined by maintenance/inspection person.	Baffles repaired or replaced to specifications.
Access Ladder Damaged	Ladder is corroded or deteriorated, not functioning properly, not securely attached to structure wall, missing rungs, cracks, and misaligned.	Ladder replaced or repaired and meets specifications, and is safe to use as determined by inspection personnel.	
Below Ground Cartridge Type	Media	Drawdown of water through the media takes longer than 1 hour, and/or overflow occurs frequently.	Media cartridges replaced.
	Short Circuiting	Flows do not properly enter filter cartridges.	Filter cartridges replaced.

No. 16 – Baffle Oil/Water Separators (API Type)

Maintenance Component	Defect	Condition When Maintenance is Needed	Results Expected When Maintenance is Performed
General	Monitoring	Inspection of discharge water for obvious signs of poor water quality.	Effluent discharge from vault should be clear with out thick visible sheen.
	Sediment Accumulation	Sediment depth in bottom of vault exceeds 6-inches in depth.	No sediment deposits on vault bottom that would impede flow through the vault and reduce separation efficiency.
	Trash and Debris Accumulation	Trash and debris accumulation in vault, or pipe inlet/outlet, floatables and non-floatables.	Trash and debris removed from vault, and inlet/outlet piping.
	Oil Accumulation	Oil accumulations that exceed 1-inch, at the surface of the water.	Extract oil from vault by vactoring. Disposal in accordance with state and local rules and regulations.
	Damaged Pipes	Inlet or outlet piping damaged or broken and in need of repair.	Pipe repaired or replaced.
	Access Cover Damaged/Not Working	Cover cannot be opened, corrosion/deformation of cover.	Cover repaired to proper working specifications or replaced.
	Vault Structure Damage - Includes Cracks in Walls Bottom, Damage to Frame and/or Top Slab	See "Catch Basins" (No. 5)	Vault replaced or repairs made so that vault meets design specifications and is structurally sound.
		Cracks wider than 1/2-inch at the joint of any inlet/outlet pipe or evidence of soil particles entering through the cracks.	Vault repaired so that no cracks exist wider than 1/4-inch at the joint of the inlet/outlet pipe.
	Baffles	Baffles corroding, cracking, warping and/or showing signs of failure as determined by maintenance/inspection person.	Baffles repaired or replaced to specifications.
Access Ladder Damaged	Ladder is corroded or deteriorated, not functioning properly, not securely attached to structure wall, missing rungs, cracks, and misaligned.	Ladder replaced or repaired and meets specifications, and is safe to use as determined by inspection personnel.	

No. 17 – Coalescing Plate Oil/Water Separators

Maintenance Component	Defect	Condition When Maintenance is Needed	Results Expected When Maintenance is Performed
General	Monitoring	Inspection of discharge water for obvious signs of poor water quality.	Effluent discharge from vault should be clear with no thick visible sheen.
	Sediment Accumulation	Sediment depth in bottom of vault exceeds 6-inches in depth and/or visible signs of sediment on plates.	No sediment deposits on vault bottom and plate media, which would impede flow through the vault and reduce separation efficiency.
	Trash and Debris Accumulation	Trash and debris accumulated in vault, or pipe inlet/outlet, floatables and non-floatables.	Trash and debris removed from vault, and inlet/outlet piping.
	Oil Accumulation	Oil accumulation that exceeds 1-inch at the water surface.	Oil is extracted from vault using vactoring methods. Coalescing plates are cleaned by thoroughly rinsing and flushing. Should be no visible oil depth on water.
	Damaged Coalescing Plates	Plate media broken, deformed, cracked and/or showing signs of failure.	A portion of the media pack or the entire plate pack is replaced depending on severity of failure.
	Damaged Pipes	Inlet or outlet piping damaged or broken and in need of repair.	Pipe repaired and or replaced.
	Baffles	Baffles corroding, cracking, warping and/or showing signs of failure as determined by maintenance/inspection person.	Baffles repaired or replaced to specifications.
	Vault Structure Damage - Includes Cracks in Walls, Bottom, Damage to Frame and/or Top Slab	Cracks wider than 1/2-inch or evidence of soil particles entering the structure through the cracks, or maintenance/inspection personnel determine that the vault is not structurally sound.	Vault replaced or repairs made so that vault meets design specifications and is structurally sound.
		Cracks wider than 1/2-inch at the joint of any inlet/outlet pipe or evidence of soil particles entering through the cracks.	Vault repaired so that no cracks exist wider than 1/4-inch at the joint of the inlet/outlet pipe.
Access Ladder Damaged	Ladder is corroded or deteriorated, not functioning properly, not securely attached to structure wall, missing rungs, cracks, and misaligned.	Ladder replaced or repaired and meets specifications, and is safe to use as determined by inspection personnel.	

No. 18 – Catchbasin Inserts

Maintenance Component	Defect	Conditions When Maintenance is Needed	Results Expected When Maintenance is Performed
General	Sediment Accumulation	When sediment forms a cap over the insert media of the insert and/or unit.	No sediment cap on the insert media and its unit.
	Trash and Debris Accumulation	Trash and debris accumulates on insert unit creating a blockage/restriction.	Trash and debris removed from insert unit. Runoff freely flows into catch basin.
	Media Insert Not Removing Oil	Effluent water from media insert has a visible sheen.	Effluent water from media insert is free of oils and has no visible sheen.
	Media Insert Water Saturated	Catch basin insert is saturated with water and no longer has the capacity to absorb.	Remove and replace media insert
	Media Insert-Oil Saturated	Media oil saturated due to petroleum spill that drains into catch basin.	Remove and replace media insert.
	Media Insert Use Beyond Normal Product Life	Media has been used beyond the typical average life of media insert product.	Remove and replace media at regular intervals, depending on insert product.

Appendix C

Source Control Best Management Practices

This appendix is comprised of selected pages
of Volume V of the 2012 SWMMWW.
Pages are not contiguous.

Applicable Structural Source Control BMP: Store raw materials or waste materials that could contaminate stormwater in covered and contained areas.

Recommended Additional BMPs:

- Train all employees in pollution prevention, spill response, and environmentally acceptable materials handling procedures.
- Store materials in proper, appropriately labeled containers. Identify and label all chemical substances.
- Regularly inspect all stormwater management devices and maintain as necessary.
- Try to use press washes without listed solvents, and with the lowest VOC content possible. Don't evaporate ink cleanup trays to the outside atmosphere.
- Place cleanup sludges into a container with a tight lid and dispose of as dangerous waste. Do not dispose of cleanup sludges in the garbage or in containers of soiled towels.

For additional information on pollution prevention, Ecology recommends the following Washington Department of Ecology publications: [A Guide for Screen Printers](#), Publication #94-137 and [A Guide for Lithographic Printers](#), Publication #94-139.

S405 BMPs for Deicing and Anti-Icing Operations - Airports and Streets

Refer to 40 CFR Part 449 for [EPA effluent limitations guidelines and new source performance standards to control discharges of pollutants from airport deicing operations](#)

Description of Pollutant Sources: Operators use deicing and/or apply anti-icing compounds on highways, streets, airport runways, and on aircraft to control ice and snow. Typically, ethylene glycol and propylene glycol are deicers used on aircraft. Deicers commonly used on highways and streets include calcium magnesium acetate (CMA), calcium chloride, magnesium chloride, sodium chloride, urea, and potassium acetate. The deicing and anti-icing compounds become pollutants when conveyed to storm drains or to surface water after application. Leaks and spills of these chemicals can also occur during their handling and storage.

BMPs for Airport De/anti-icing Operations

Pollutant Control Approach for Aircraft: Spent glycol discharges in aircraft application areas are regulated process wastewaters under Ecology's Industrial Stormwater General Permit. BMPs for aircraft de/anti-icers must be consistent with aviation safety and the operational needs of the aircraft operator.

Applicable BMPs for Aircraft:

Conduct aircraft deicing or anti-icing applications in impervious containment areas. Collect aircraft deicer or anti-icer spent chemicals, such as glycol, draining from aircraft in deicing or anti-icing application areas and convey to a sanitary sewer, treatment, or other approved disposal or recovery method. Divert deicing runoff from paved gate areas to appropriate collection areas or conveyances for proper treatment or disposal.

Do not discharge spent deicer or anti-icer chemicals or stormwater contaminated with aircraft deicer or anti-icer chemicals from application areas, including gate areas into storm drains. No discharge to surface water, or ground water, directly or indirectly should occur.

Transfer deicing and anti-icing chemicals on an impervious containment pad, or equivalent spill/leak containment area, and store in secondary containment areas. (See Storage of Liquids in Aboveground Tanks)

Note this applicable containment BMP of aircraft de/anti-icing applications, and applicable treatment BMPs for de/anti-icer spent chemicals such as glycols.

Recommended Additional BMPs for Aircraft:

Establish a centralized aircraft de/anti-icing facility, if practicable, or in designated areas of the tarmac equipped with separate collection drains for the spent deicer liquids.

Consider installing an aircraft de/anti-icing chemical recovery system, or contract with a chemical recycler.

Applicable BMPs for Airport Runways/Taxiways:

Avoid excessive application of all 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 and/or under cover in accordance with [*BMP Storage or Transfer \(Outside\) of Solid Raw Materials, By-Products, or Finished Products*](#). Consider other material storage and transfer approaches only if, the de/anti-icer material will not contaminate stormwater.

Recommended Additional BMPs for Airport Runways/Taxiways:

Include limits on toxic materials and phosphorous in the specifications for de/anti-icers, where applicable.

Consider using anti-icing materials rather than deicers if it will result in less adverse environmental impact.

Select cost-effective de/anti-icers that cause the least adverse environmental impact.

S406 BMPs for Streets/ Highways

Applicable BMPs:

- Select de and anti-icers that cause the least adverse environmental impact. Apply only as needed using minimum quantities.
- Where practicable 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 de and anti-icing materials on an impervious containment pad in accordance with [BMP Storage or Transfer \(Outside\) of Solid Raw Materials, By-Products, or Finished Products](#) in this volume.
- Sweep/clean up accumulated de and anti-icing materials and grit from roads as soon as possible after the road surface clears.

Recommended Additional BMPs

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

S407 BMPs for Dust Control at Disturbed Land Areas and Unpaved Roadways and Parking Lots

Description of Pollutant Sources: Dust can cause air and water pollution problems particularly at demolition sites and in arid areas where reduced rainfall exposes soil particles to transport by air.

Pollutant Control Approach: Minimize dust generation and apply environmentally friendly and government approved dust suppressant chemicals, if necessary.

Applicable Operational BMPs:

- Sprinkle or wet down soil or dust with water as long as it does not result in a wastewater discharge.
- Use only local and/or state government approved dust suppressant chemicals such as those listed in Ecology Publication #96-433, [Techniques for Dust Prevention and Suppression](#).
- Avoid excessive and repeated applications of dust suppressant chemicals. Time the application of dust suppressants to avoid or minimize their wash-off by rainfall or human activity such as irrigation.
- Apply stormwater containment to prevent the conveyance of sediment into storm drains or receiving waters.

- Ecology prohibits the use of motor oil for dust control. Take care when using lignin derivatives and other high BOD chemicals in areas susceptible to contaminating surface water or ground water.
- Consult with Ecology and the local permitting authority on discharge permit requirements if the dust suppression process results in a wastewater discharge to the ground, ground water, storm drain, or surface water.

Recommended Additional Operational BMPs for Roadways and Other Trafficked Areas:

- Consider limiting use of off-road recreational vehicles on dust generating land.
- Consider graveling or paving unpaved permanent roads and other trafficked areas at municipal, commercial, and industrial areas.
- Consider paving or stabilizing shoulders of paved roads with gravel, vegetation, or local government approved chemicals.
- Encourage use of alternate paved routes, if available.
- Vacuum sweep fine dirt and skid control materials from paved roads soon after winter weather ends or when needed.
- Consider using pre-washed traction sand to reduce dust emissions.

Additional Recommended Operational BMPs for Dust Generating Areas:

- Prepare a dust control plan. Helpful references include: Control of Open Fugitive Dust Sources (EPA-450/3-88-088), and Fugitive Dust Background Document and Technical Information Document for Best Available Control Measures (EPA-450/2-92-004).
- Limit exposure of soil (dust source) as much as feasible.
- Stabilize dust-generating soil by growing and maintaining vegetation, mulching, topsoiling, and/or applying stone, sand, or gravel.
- Apply windbreaks in the soil such as trees, board fences, tarp curtains, bales of hay, etc.

S408 BMPs for Dust Control at Manufacturing Areas

Description of Pollutant Sources: Industrial material handling activities can generate considerable amounts of dust that is typically removed using exhaust systems. Mixing cement and concrete products and handling powdered materials can also generate dust. Particulate materials that can cause air pollution include grain dust, sawdust, coal, gravel, crushed rock, cement, and boiler fly ash. Air emissions can contaminate stormwater. The objective of this BMP is to reduce the stormwater pollutants caused by dust generation and control.

- Convey unpermitted discharges to a sanitary sewer if allowed by the local sewer authority, or to other approved treatment.
- Obtain appropriate state and local permits for these discharges.

Recommended Additional Operational BMPs: At commercial and industrial facilities, conduct a survey of wastewater discharge connections to storm drains and to surface water as follows:

- Conduct a field survey of buildings, particularly older buildings, and other industrial areas to locate storm drains from buildings and paved surfaces. Note where these join the public storm drain(s).
- During non-stormwater conditions inspect each storm drain for non-stormwater discharges. Record the locations of all non-stormwater discharges. Include all permitted discharges.
- If useful, prepare a map of each area. Show on the map the known location of storm sewers, sanitary sewers, and permitted and unpermitted discharges. Aerial photos may be useful. Check records such as piping schematics to identify known side sewer connections and show these on the map. Consider using smoke, dye, or chemical analysis tests to detect connections between two conveyance systems (e.g., process water and stormwater). If desirable, conduct TV inspections of the storm drains and record the footage on videotape.
- Compare the observed locations of connections with the information on the map and revise the map accordingly. Note suspect connections that are inconsistent with the field survey.
- Identify all connections to storm sewers or to surface water and take the actions specified above as applicable BMPs.

S411 BMPs for Landscaping and Lawn/ Vegetation Management

Description of Pollutant Sources: Landscaping can include grading, soil transfer, vegetation removal, pesticide and fertilizer applications, and watering. Stormwater contaminants include toxic organic compounds, heavy metals, oils, total suspended solids, coliform bacteria, fertilizers, and pesticides.

Lawn and vegetation management can include control of objectionable weeds, insects, mold, bacteria, and other pests with pesticides. Examples include weed control on golf course lawns, access roads, and utility corridors and during landscaping; sap stain and insect control on lumber and logs; rooftop moss removal; killing nuisance rodents; fungicide application to patio decks, and residential lawn/plant care. It is possible to release toxic pesticides such as pentachlorophenol, carbamates, and organometallics to the environment by leaching and dripping from treated parts, container leaks, product misuse, and outside storage of pesticide contaminated materials and equipment. Poor management of the

vegetation and poor application of pesticides or fertilizers can cause appreciable stormwater contamination.

Pollutant Control Approach: Control of fertilizer and pesticide applications, soil erosion, and site debris to prevent contamination of stormwater.

Develop and implement an Integrated Pest Management Plan (IPM) and use pesticides only as a last resort. Carefully apply pesticides/ herbicides, in accordance with label instructions. Maintain appropriate vegetation, with proper fertilizer application where practicable, to control erosion and the discharge of stormwater pollutants. Where practicable grow plant species appropriate for the site, or adjust the soil properties of the subject site to grow desired plant species.

Applicable Operational BMPs for Landscaping:

- Install engineered soil/landscape systems to improve the infiltration and regulation of stormwater in landscaped areas.
- Do not dispose of collected vegetation into waterways or storm sewer systems.

Recommended Additional Operational BMPs for Landscaping:

- Conduct mulch-mowing whenever practicable
- Dispose of grass clippings, leaves, sticks, or other collected vegetation, by composting, if feasible.
- Use mulch or other erosion control measures on soils exposed for more than one week during the dry season or two days during the rainy season.
- Store and maintain appropriate oil and chemical spill cleanup materials in readily accessible locations when using oil or other chemicals. Ensure that employees are familiar with proper spill cleanup procedures.
- Till fertilizers into the soil rather than dumping or broadcasting onto the surface. Determine the proper fertilizer application rate 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 drought-resistant plants.
- Use manual and/or mechanical methods of vegetation removal rather than applying herbicides, where practical.

Applicable Operational BMPs for the Use of Pesticides:

- Develop and implement an IPM (See section on IPM in [Applicable Operational BMPs for Vegetation Management](#)) and use pesticides only as a last resort.
- Implement a pesticide-use plan and include at a minimum: a list of selected pesticides and their specific uses; brands, formulations, application methods and quantities to be used; equipment use and maintenance procedures; safety, storage, and disposal methods; and monitoring, record keeping, and public notice procedures. All procedures shall conform to the requirements of [Chapter 17.21 RCW](#) and [Chapter 16-228 WAC](#) ([Appendix IV-D R.7](#)).
- Choose the least toxic pesticide available that is capable of reducing the infestation to acceptable levels. The pesticide should readily degrade in the environment and/or have properties that strongly bind it to the soil. Conduct any pest control activity at 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, apply it to the material before the caterpillars cocoon or it will be ineffective. Any method used should be site-specific and not used wholesale over a wide area.
- Apply the pesticide according to label directions. Do not apply pesticides in quantities that exceed manufacturer's instructions.
- Mix the pesticides and clean the application equipment in an area where accidental spills will not enter surface or ground waters, and will not contaminate the soil.
- Store pesticides in enclosed areas or in covered impervious containment. Do not discharge pesticide contaminated stormwater or spills/leaks of pesticides to storm sewers. Do not hose down the paved areas to a storm sewer or conveyance ditch. Store and maintain appropriate spill cleanup materials in a location known to all near the storage area.
- Clean up any spilled pesticides. Keep pesticide contaminated waste materials in designated covered and contained areas.
- The pesticide application equipment must be capable of immediate shutoff in the event of an emergency.
- Do not spray pesticides within 100 feet of open waters including wetlands, ponds, and streams, sloughs and any drainage ditch or channel that leads to open water except when following approval of Ecology or the local jurisdiction. Flag all sensitive areas including wells, creeks, and wetlands prior to spraying.
- Post notices and delineate the spray area prior to the application, as required by the local jurisdiction or by Ecology.

- Conduct spray applications during weather conditions as specified in the label direction and applicable local and state regulations. Do not apply during rain or immediately before expected rain.

Recommended Additional Operational BMPs for the use of pesticides:

- Consider alternatives to the use of pesticides such as covering or harvesting weeds, substitute vegetative growth, and manual weed control/moss removal.
- Consider the use of soil amendments, such as compost, that are known to control some common diseases in plants, such as Pythium root rot, ashy stem blight, and parasitic nematodes. The following are three possible mechanisms for disease control by compost addition (USEPA Publication 530-F-9-044):
 1. Successful competition for nutrients by antibiotic production;
 2. Successful predation against pathogens by beneficial microorganism; and
 3. Activation of disease-resistant genes in plants by composts.

Installing an amended soil/landscape system can preserve both the plant system and the soil system more effectively. This type of approach provides a soil/landscape system with adequate depth, permeability, and organic matter to sustain itself and continue working as an effective stormwater infiltration system and a sustainable nutrient cycle.

- Once a pesticide is applied, evaluate its effectiveness for possible improvement. Records should be kept showing the effectiveness of the pesticides considered.
- Develop an annual evaluation procedure including a review of the effectiveness of pesticide applications, impact on buffers and sensitive areas (including potable wells), public concerns, and recent toxicological information on pesticides used/proposed for use. If individual or public potable wells are located in the proximity of commercial pesticide applications, contact the regional Ecology hydrogeologist to determine if additional pesticide application control measures are necessary.
- Rinseate from equipment cleaning and/or triple-rinsing of pesticide containers should be used as product or recycled into product.

For more information, contact the Washington State University (WSU) Extension Home-Assist Program, (253) 445-4556, or Bio-Integral Resource Center (BIRC), P.O. Box 7414, Berkeley, CA.94707, or EPA to obtain a publication entitled “Suspended, Canceled, and Restricted Pesticides” which lists all restricted pesticides and the specific uses that are allowed.

Applicable Operational BMPs for Vegetation Management:

- Use at least an eight-inch "topsoil" layer with at least 8 percent organic matter to provide a sufficient vegetation-growing medium. Amending existing landscapes and turf systems by increasing the percent organic matter and depth of topsoil can substantially improve the permeability of the soil, the disease and drought resistance of the vegetation, and reduce fertilizer demand. This reduces the demand for fertilizers, herbicides, and pesticides. Organic matter is the least water-soluble form of nutrients that can be added to the soil. Composted organic matter generally releases only between 2 and 10 percent of its total nitrogen annually, and this release corresponds closely to the plant growth cycle. Return natural plant debris and mulch to the soil, to continue recycling nutrients indefinitely.
- Select the appropriate turfgrass mixture for the climate and soil type. Certain tall fescues and rye grasses resist insect attack because the symbiotic endophytic fungi found naturally in their tissues repel or kill common leaf and stem-eating lawn insects. However, they do not, repel root-feeding lawn pests such as Crane Fly larvae, and are toxic to ruminants such as cattle and sheep. The fungus causes no known adverse effects to the host plant or to humans. Endophytic grasses are commercially available; use them in areas such as parks or golf courses where grazing does not occur. Local agricultural or gardening resources such as Washington State University Extension office can offer advice on which types of grass are best suited to the area and soil type.
- Use the following seeding and planting BMPs, or equivalent BMPs to obtain information on grass mixtures, temporary and permanent seeding procedures, maintenance of a recently planted area, and fertilizer application rates: *Temporary and Permanent Seeding*, *Mulching*, *Plastic Covering*, and *Sodding* as described in Volume II.
- Adjusting the soil properties of the subject site can assist in selection of desired plant species. For example, design a constructed wetland to resist the invasion of reed canary grass by layering specific strata of organic matters (e.g., composted forest product residuals) and creating a mildly acidic pH and carbon-rich soil medium. Consult a soil restoration specialist for site-specific conditions.
- Aerate lawns regularly in areas of heavy use where the soil tends to become compacted. Conduct aeration while the grasses in the lawn are growing most vigorously. Remove layers of thatch greater than ¾-inch deep.
- Mowing is a stress-creating activity for turfgrass. Grass decreases its productivity when mown too short and there is less growth of roots and rhizomes. The turf becomes less tolerant of environmental stresses, more disease prone and more reliant on outside means such as

pesticides, fertilizers, and irrigation to remain healthy. Set the mowing height at the highest acceptable level and mow at times and intervals designed to minimize stress on the turf. Generally mowing only 1/3 of the grass blade height will prevent stressing the turf.

Irrigation:

- The depth from which a plant normally extracts water depends on the rooting depth of the plant. Appropriately irrigated lawn grasses normally root in the top 6 to 12 inches of soil; lawns irrigated on a daily basis often root only in the top 1 inch of soil. Improper irrigation can encourage pest problems, leach nutrients, and make a lawn completely dependent on artificial watering. The amount of water applied depends on the normal rooting depth of the turfgrass species used, the available water holding capacity of the soil, and the efficiency of the irrigation system. Consult with the local water utility, Conservation District, or Cooperative Extension office to help determine optimum irrigation practices.

Fertilizer Management:

- Turfgrass is most responsive to nitrogen fertilization, followed by potassium and phosphorus. Fertilization needs vary by site depending on plant, soil, and climatic conditions. Evaluation of soil nutrient levels through regular testing ensures the best possible efficiency and economy of fertilization. For details on soils testing, contact the local Conservation District, a soils testing professional, or a Washington State University Extension office.
- Apply fertilizers in amounts appropriate for the target vegetation and at the time of year that minimizes losses to surface and ground waters. Do not fertilize when the soil is dry. Alternatively, do not apply fertilizers within three days prior to predicted rainfall. The longer the period between fertilizer application and either rainfall or irrigation, the less fertilizer runoff occurs.
- Use slow release fertilizers such as methylene urea, IDBU, or resin coated fertilizers when appropriate, generally in the spring. Use of slow release fertilizers is especially important in areas with sandy or gravelly soils.
- Time the fertilizer application to periods of maximum plant uptake. Ecology generally recommends application in the fall and spring, although Washington State University turf specialists recommend four fertilizer applications per year.
- Properly trained persons should apply all fertilizers. Apply no fertilizer at commercial and industrial facilities, to grass swales, filter strips, or buffer areas that drain to sensitive water bodies unless approved by the local jurisdiction.

- Slope, berm, or dike 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 at the greater flow rate of the highest fuel dispenser nozzle through-put rate, or the peak flow rate of the 6-month, 24-hour storm event over the surface of the containment pad, whichever is greater. The capacity of the spill containment sump should be a minimum of 50 gallons with adequate additional volume provided for grit sedimentation.

S413 BMPs for Log Sorting and Handling

Description of Pollutant Sources: Log yards are 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. Typical pollutants include oil and grease, BOD, settleable solids, total suspended solids (including soil), high and low pH, heavy metals, pesticides, wood-based debris, and leachate

The following are pollutant sources:

- Log storage, rollout, sorting, scaling, and cutting areas
- Log and liquid loading areas
- Log sprinkling
- Debarking, bark bin and conveyor areas
- Bark, ash, sawdust and wood debris piles, and solid wastes
- Metal salvage areas
- Truck, rail, ship, stacker, and loader access areas
- Log trucks, stackers, loaders, forklifts, and other heavy equipment
- Maintenance shops and parking areas
- Cleaning areas for vehicles, parts, and equipment
- Storage and handling areas for hydraulic oils, lubricants, fuels, paints, liquid wastes, and other liquid materials
- Pesticide usage for log preservation and surface protection
- Application of herbicides for weed control
- Contaminated soil resulting from leaks or spills of fluids

Ecology's Baseline General Permit Requirements:

Industries with log yards are required to obtain coverage under the Industrial Stormwater General Permit for discharges of stormwater associated with industrial activities. The permit requires preparation and on-site retention of an Industrial Stormwater Pollution Prevention Plan

(SWPPP). Required and recommended operational, structural source control, and treatment BMPs are presented in detail in Ecology's Guidance Document: [Industrial Stormwater General Permit Implementation Manual for Log Yards](#), Publication # 04-10-031. Ecology recommends that all log yard facilities obtain a copy of this document.

S414 BMPs for Maintenance and Repair of Vehicles and Equipment

Description of Pollutant Sources: Pollutant sources include parts/vehicle cleaning, spills/leaks of fuel and other liquids, replacement of liquids, outdoor storage of batteries/liquids/parts, and vehicle parking.

Pollutant Control Approach: Control of leaks and spills of fluids using good housekeeping and cover and containment BMPs.

Applicable Operational BMPs:

- Inspect all incoming vehicles, parts, and equipment stored temporarily outside for leaks.
- Use drip pans or containers under parts or vehicles that drip or that are likely to drip liquids, such as during dismantling of liquid containing parts or removal or transfer of liquids.
- Remove batteries and liquids from vehicles and equipment in designated areas designed to prevent stormwater contamination. Store cracked batteries in a covered non-leaking secondary containment system.
- Remove liquids from vehicles retired for scrap.
- Empty oil and fuel filters before disposal. Provide for proper disposal of waste oil and fuel.
- Do not pour/convey washwater, liquid waste, or other pollutants into storm drains or to surface water. Check with the local sanitary sewer authority for approval to convey water to a sanitary sewer.
- Do not connect maintenance and repair shop floor drains to storm drains or to surface water.
- To allow for snowmelt during the winter, install a drainage trench with a sump for particulate collection. Use the drainage trench for draining the snowmelt only and not for discharging any vehicular or shop pollutants.

Applicable Structural Source Control BMPs:

- Conduct all maintenance and repair of vehicles and equipment in a building, or other covered impervious containment area that is sloped to prevent run-on of uncontaminated stormwater and runoff of contaminated water.

- Operators may conduct maintenance of refrigeration engines in refrigerated trailers in the parking area. Exercise due caution to avoid the release of engine or refrigeration fluids to storm drains or surface water.
- Park large mobile equipment, such as log stackers, in a designated contained area.

Additional applicable BMPs:

- [S409 BMPs for Fueling at Dedicated Stations](#)
- [S410 BMPs for Illicit Connections to Storm Drains](#)
- [S412 BMPs for Loading and Unloading Areas for Liquid or Solid Material](#)
- [S426 BMPs for Spills of Oil and Hazardous Substances](#)
- [S427 BMPs Storage of Liquid, Food Waste, or Dangerous Waste Containers](#)
- [S428 BMPs for Storage of Liquids in Permanent Aboveground Tanks](#)
- [S429 BMPs for Storage or Transfer \(Outside\) of Solid Raw Materials, By-Products, or Finished Products](#)
- [S431 BMPs for Washing and Steam Cleaning Vehicle/Equipment/Building Structures](#)

Note this applicable treatment BMP for contaminated stormwater.

Applicable Treatment BMPs: Convey contaminated stormwater runoff from vehicle staging and maintenance areas to a sanitary sewer, if allowed by the local sewer authority, or to an API or CP oil and water separator followed by a basic treatment BMP (See Volume V), applicable filter, or other equivalent oil treatment system.

Recommended Additional Operational BMPs:

- Store damaged vehicles inside a building or other covered containment, until successfully removing all liquids.
- Clean parts with aqueous detergent based solutions or non-chlorinated solvents such as kerosene or high flash mineral spirits, and/or use wire brushing or sand blasting whenever practicable. Avoid using toxic liquid cleaners such as methylene chloride, 1,1,1-trichloroethane, trichloroethylene or similar chlorinated solvents. Choose cleaning agents that can be recycled.
- Inspect all BMPs regularly, particularly after a significant storm. Identify and correct deficiencies to ensure that the BMPs are functioning as intended.
- Avoid hosing down work areas. Use dry methods for cleaning leaked fluids.

- Recycle greases, used oil, oil filters, antifreeze, cleaning solutions, automotive batteries, hydraulic fluids, transmission fluids, and engine oils (see [Appendix IV-C](#)).
- Do not mix dissimilar or incompatible waste liquids stored for recycling.

S415 BMPs for Maintenance of Public and Private Utility Corridors and Facilities

Description of Pollutant Sources: Passageways and equipment at petroleum product, natural gas, and water pipelines, and electrical power transmission corridors and rights-of-way can be sources of pollutants such as herbicides used for vegetation management, and eroded soil particles from unpaved access roads. At pump stations, waste materials generated during maintenance activities may be temporarily stored outside. Additional potential pollutant sources include the leaching of preservatives from wood utility poles, PCBs in older transformers, water removed from underground transformer vaults, and leaks/spills from petroleum pipelines. The following are potential pollutants: oil and grease, TSS, BOD, organics, PCBs, pesticides, and heavy metals.

Pollutant Control Approach: Control of fertilizer and pesticide applications, soil erosion, and site debris that can contaminate stormwater.

Applicable Operational BMPs:

- Implement BMPs for “[Landscaping and Lawn/Vegetation Management](#)” and [R.7 in Appendix IV-D](#) on Pesticide Regulations.
- When removing water or sediments from electric transformer vaults, determine the presence of contaminants before disposing of the water and sediments. This includes inspecting for the presence of oil or sheen, and determining from records or testing if the transformers contain PCBs. If records or tests indicate that the sediments or water are contaminated above applicable levels, manage these media in accordance with applicable federal and state regulations, including the federal PCB rules (40 CFR 761) and the state MTCA cleanup regulations ([Chapter 173-340 WAC](#)). Water removed from the vaults can be discharged in accordance with the federal 40 CFR 761.79, and state regulations ([Chapter 173-201A WAC](#) and [Chapter 173-200 WAC](#)), or via the sanitary sewer if the requirements, including applicable permits, for such a discharge are met. (See also [Appendix IV-D R.1](#) and [R.3](#)).
- 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 bare or thinly vegetated ground surfaces within the corridor.
- Provide maintenance practices to prevent stormwater from accumulating and draining across and/or onto roadways. Convey

stormwater through roadside ditches and culverts. The road should be crowned, outsloped, water barred, or otherwise left in a condition not conducive to erosion. Appropriately maintaining grassy roadside ditches discharging to surface waters is an effective way of removing some pollutants associated with sediments carried by stormwater.

- Maintain ditches and culverts at an appropriate frequency to ensure that plugging and flooding across the roadbed, with resulting overflow erosion, does not occur.
- Apply the appropriate BMPs in this Volume for the storage of waste materials that can contaminate stormwater.

Recommended Operational BMPs

- When selecting utility poles for a specific location, consider the potential environmental effects of the pole or poles during storage, handling, and end-use, as well as its cost, safety, efficacy, and expected life. Use wood products treated with chemical preservatives made in accordance with generally accepted industry standards such as the American Wood Preservers Association Standards. Consider alternative materials or technologies if placing poles in or near an environmentally sensitive area, such as a wetland or a drinking water well. Alternative technologies include poles constructed with material(s) other than wood such as fiberglass composites, metal, or concrete. Consider other technologies and materials, such as sleeves or caissons for wood poles, when they are determined to be practicable and available.
- As soon as practicable remove all litter from wire cutting/replacing operations.
- Implement temporary erosion and sediment control in areas cleared of trees and vegetation and during the construction of new roads.

S416 BMPs for Maintenance of Roadside Ditches

Description of Pollutant Sources: Common road debris including eroded soil, oils, vegetative particles, and heavy metals can be sources of stormwater pollutants.

Pollutant Control Approach: Maintain roadside ditches to preserve the condition and capacity for which they were originally constructed, and to minimize bare or thinly vegetated ground surfaces. Maintenance practices should provide for erosion and sediment control (Refer to BMP [Landscaping and Lawn/Vegetation Management](#)).

Applicable Operational BMPs:

- Inspect roadside ditches regularly to identify sediment accumulations and localized erosion.
- Clean ditches on a regular basis, as needed. Keep ditches free of rubbish and debris.
- Vegetation in ditches often prevents erosion and cleanses runoff waters. Remove vegetation only when flow is blocked or excess sediments have accumulated. Conduct ditch maintenance (seeding, fertilizer application, harvesting) in late spring and/or early fall, where possible. This allows re-establishment of vegetative cover by the next wet season thereby minimizing erosion of the ditch as well as making the ditch effective as a biofilter.
- In the area between the edge of the pavement and the bottom of the ditch, commonly known as the “bare earth zone,” use grass vegetation, wherever possible. Establish vegetation from the edge of the pavement, if possible, or at least from the top of the slope of the ditch.
- Maintain diversion ditches on top of cut slopes constructed to prevent slope erosion by intercepting surface drainage to retain their diversion shape and capability.
- Do not leave ditch cleanings on the roadway surfaces. Sweep, collect, and dispose of dirt and debris remaining on the pavement at the completion of ditch cleaning operations.
- Consider screening roadside ditch cleanings, not contaminated by spills or other releases and not associated with a stormwater treatment system such as a bioswale, to remove litter. Separate screenings into soil and vegetative matter (leaves, grass, needles, branches, etc.) categories. Compost or dispose of the vegetative matter in a municipal waste landfill. Consult with the jurisdictional health department to discuss use or disposal options for the soil portion. For more information, please see *Recommendations for Management of Street Wastes*, in [Appendix IV-G](#) of this volume.
- Roadside ditch cleanings contaminated by spills or other releases known or suspected to contain dangerous waste must be handled following the [Dangerous Waste Regulations \(Chapter 173-303 WAC\)](#). If testing determines materials are not dangerous waste but contaminants are present, consult with the jurisdictional health department for disposal options.
- Examine culverts on a regular basis for scour or sedimentation at the inlet and outlet, and repair as necessary. Give priority to those culverts conveying perennial and/or salmon-bearing streams and culverts near streams in areas of high sediment load, such as those near subdivisions during construction.

Recommended Treatment BMPs:

Install biofiltration swales and filter strips – (See Chapter 9, Volume V) to treat roadside runoff wherever practicable and use engineered topsoils wherever necessary to maintain adequate vegetation. These systems can improve infiltration and stormwater pollutant control upstream of roadside ditches.

S417 BMPs for Maintenance of Stormwater Drainage and Treatment Systems

Description of Pollutant Sources: Facilities include roadside catch basins on arterials and within residential areas, conveyance systems, detention facilities such as ponds and vaults, oil/water separators, biofilters, settling basins, infiltration systems, and all other types of stormwater treatment systems presented in Volume V. Oil and grease, hydrocarbons, debris, heavy metals, sediments and contaminated water are found in catch basins, oil and water separators, settling basins, etc.

Pollutant Control Approach: Provide maintenance and cleaning of debris, sediments, and oil from stormwater collection, conveyance, and treatment systems to obtain proper operation.

Applicable Operational BMPs:

Maintain stormwater treatment facilities per the operations and maintenance (O&M) procedures presented in Section 4.6 of Volume V in addition to the following BMPs:

- Inspect and clean treatment BMPs, conveyance systems, and catch basins as needed, and determine necessary O&M improvements.
- Promptly repair any deterioration threatening the structural integrity of stormwater facilities. These include replacement of clean-out gates, catch basin lids, and rock in emergency spillways.
- Ensure adequacy of storm sewer capacities and prevent heavy sediment discharges to the sewer system.
- Regularly remove debris and sludge from BMPs used for peak-rate control, treatment, etc. and discharge to a sanitary sewer if approved by the sewer authority, or truck to an appropriate local or state government approved disposal site.
- Clean catch basins when the depth of deposits reaches 60 percent of the sump depth as measured from the bottom of basin to the invert of the lowest pipe into or out of the basin. However, in no case should there be less than six inches clearance from the debris surface to the invert of the lowest pipe. Some catch basins (for example, WSDOT Type 1L basins) may have as little as 12 inches sediment storage below the invert. These catch basins need frequent inspection and cleaning to prevent scouring. Where these catch basins are part of a stormwater collection and treatment system, the system

owner/operator may choose to concentrate maintenance efforts on downstream control devices as part of a systems approach.

- Clean woody debris in a catch basin as frequently as needed to ensure proper operation of the catchbasin.
- Post warning signs; “Dump No Waste - Drains to Ground Water,” “Streams,” “Lakes,” or emboss on or adjacent to all storm drain inlets *where possible*.
- Disposal of sediments and liquids from the catch basins must comply with “Recommendations for Management of Street Wastes” described in [Appendix IV-G](#) of this volume.

Additional Applicable BMPs: Select additional applicable BMPs from this chapter depending on the pollutant sources and activities conducted at the facility. Those BMPs include:

- [S425 BMPs for Soil Erosion and Sediment Control at Industrial Sites](#)
- [S427 BMPs for Storage of Liquid, Food Waste, or Dangerous Waste Containers](#)
- [S406 BMPs for Spills of Oil and Hazardous Substances](#)
- [S410 BMPs for Illicit Connections to Storm Drains](#)
- [S430 BMPs for Urban Streets](#)

S418 BMPs for Manufacturing Activities - Outside

Description of Pollutant Sources: Manufacturing pollutant sources include outside process areas, stack emissions, and areas where manufacturing activity has taken place in the past and significant exposed pollutant materials remain.

Pollution Control Approach: Cover and contain outside manufacturing and prevent stormwater run-on and contamination, where feasible.

Applicable Operational BMP:

- Sweep paved areas regularly, as needed, to prevent contamination of stormwater.
- Alter the activity by eliminating or minimizing the contamination of stormwater.
- **Applicable Structural Source Control BMPs:** Enclose the activity (see [Figure 2.2.6](#)): If possible, enclose the manufacturing activity in a building.
- Cover the activity and connect floor drains to a sanitary sewer, if approved by the local sewer authority. Berm or slope the floor as needed to prevent drainage of pollutants to outside areas. ([Figure 2.2.7](#))

- Two, five-gallon buckets with lids.
- Use automatic shutoff nozzles for dispensing the fuel. Replace automatic shut-off nozzles as recommended by the manufacturer.
- Maintain and replace equipment on fueling vehicles, particularly hoses and nozzles, at established intervals to prevent failures.

Applicable Structural Source Control BMPs: Include the following fuel transfer site components:

- Automatic fuel transfer shut-off nozzles.
- An adequate lighting system at the filling point.

S420 BMPs for Painting/ Finishing /Coating of Vehicles/Boats/ Buildings/ Equipment

Description of Pollutant Sources: Surface preparation and the application of paints, finishes, and/or coatings to vehicles, boats, buildings, and/or equipment outdoors can be sources of pollutants. Potential pollutants include organic compounds, oils and greases, heavy metals, and suspended solids.

Pollutant Control Approach: Cover and contain painting and sanding operations and apply good housekeeping and preventive maintenance practices to prevent the contamination of stormwater with painting over sprays and grit from sanding.

Applicable Operational BMPs:

- Train employees in the careful application of paints, finishes, and coatings to reduce misuse and over spray. Use drop cloths underneath outdoor painting, scraping, sandblasting work, and properly clean and temporarily store collected debris daily.
- Do not conduct spraying, blasting, or sanding activities over open water or where wind may blow paint into water.
- Wipe up spills with rags and other absorbent materials immediately. Do not hose down the area to a storm sewer, receiving water, or conveyance ditch.
- On marine dock areas sweep rather than hose down debris. Collect any hose water generated and convey to appropriate treatment and disposal.
- Use an effective runoff control device if dust, grit, washwater, or other pollutants may escape the work area and enter a catch basin. The containment device(s) must be in place at the beginning of the workday. Collect contaminated runoff and solids and properly dispose of such wastes before removing the containment device(s) at the end of the workday.

- Use a ground cloth, pail, drum, drip pan, tarpaulin, or other protective device for activities such as outdoor paint mixing and tool cleaning, or where spills can contaminate stormwater.
- Properly dispose of all wastes and prevent all uncontrolled releases to the air, ground, or water.
- Clean brushes and tools covered with non-water-based paints, finishes, or other materials in a manner that allows collection of used solvents (e.g., paint thinner, turpentine, xylol, etc.) for recycling or proper disposal.
- Store toxic materials under cover (tarp, etc.) during precipitation events and when not in use to prevent contact with stormwater.

Applicable Structural Source Control BMPs: Enclose and/or contain all work while using a spray gun or conducting sand blasting and in compliance with applicable air pollution control, OSHA, and WISHA requirements. Do not conduct outside spraying, grit blasting, or sanding activities during windy conditions that render containment ineffective.

Recommended Additional Operational BMPs:

- Clean paintbrushes and tools covered with water-based paints in sinks connected to sanitary sewers. Dump pollutants collected in portable containers into a sanitary sewer drain, NOT a stormwater drain.
- Recycle paint, paint thinner, solvents, pressure washwater, 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, if feasible.

S421 BMPs for Parking and Storage of Vehicles and Equipment

Description of Pollutant Sources: Public and commercial parking lots such as retail store, fleet vehicle (including rent-a-car lots and car dealerships), equipment sale and rental parking lots, and parking lot driveways, can be sources of toxic hydrocarbons and other organic compounds, including oils and greases, metals, and suspended solids.

Pollutant Control Approach: If the parking lot is a **high-use site** as defined below, provide appropriate oil removal equipment for the contaminated stormwater runoff.

Applicable Operational BMPs:

- If washing a parking lot, discharge the washwater to a sanitary sewer, if allowed by the local sewer authority, or other approved wastewater treatment system, or collect washwater for off-site disposal.

- Do not hose down the area to a storm sewer or receiving water. Vacuum sweep parking lots, storage areas, and driveways regularly to collect dirt, waste, and debris.

Applicable Treatment BMPs: An oil removal system such as an API or CP oil and water separator, catch basin filter, or equivalent BMP, approved by the local jurisdiction, is necessary for parking lots meeting the threshold vehicle traffic intensity level of a *high-use site*.

Vehicle High-Use Sites

Establishments subject to vehicle high-use intensity are significant sources of oil contamination of stormwater. Examples of potential high use areas include customer parking lots at fast food stores, grocery stores, taverns, restaurants, large shopping malls, discount warehouse stores, quick-lube shops, and banks. If the PGIS for a high-use site exceeds 5,000 square feet in a threshold discharge area, an oil control BMP from the Oil Control Menu (in Volume V) is necessary. A high-use site at a commercial or industrial establishment has one of the following characteristics: (Gaus/King County, 1994)

- Is subject to an expected average daily vehicle traffic (ADT) count equal to or greater than 100 vehicles per 1,000 square feet of gross building area: or
- Is subject to storage of a fleet of 25 or more diesel vehicles that are over 10 tons gross weight (trucks, buses, trains, heavy equipment, etc.).

S422 BMPs for Railroad Yards

Description of Pollutant Sources: Pollutant sources can include:

- Drips/leaks of vehicle fluids onto the railroad bed
- Human waste disposal
- Litter
- Locomotive/railcar/equipment cleaning areas
- Fueling areas
- Outside material storage areas
- Erosion and loss of soil particles from the railroad bed
- Maintenance and repair activities at railroad terminals
- Switching and maintenance yards
- Herbicides used for vegetation management.

Waste materials can include waste oil, solvents, degreasers, antifreeze solutions, radiator flush, acids, brake fluids, soiled rags, oil filters, sulfuric acid and battery sludges, and machine chips with residual machining oil and toxic fluids/solids lost during transit. Potential pollutants include oil and grease, TSS, BOD, organics, pesticides, and metals.

[Discharge Elimination System \(NPDES\) Permit Requirements](#),

Washington Department of Ecology, March 2011, website:

<http://www.ecy.wa.gov/biblio/94146.html>. Apply the BMPs in that guidance document to scrap material recycling facilities depending on the pollutant sources existing at those facilities.

S424 BMPs for Roof/ Building Drains at Manufacturing and Commercial Buildings

Description of Pollutant Sources: Stormwater runoff from roofs and sides of manufacturing and commercial buildings can be sources of pollutants caused by leaching of roofing materials, building vents, and other air emission sources. Research has identified vapors and entrained liquid and solid droplets/particles as potential pollutants in roof/building runoff. Metals, solvents, acidic/alkaline pH, BOD, and organics, are some of the pollutant constituents identified.

Ecology has performed a study on zinc in industrial stormwater. The study is presented in Ecology Publication 08-10-025 *Suggested Practices to reduce Zinc Concentrations in Industrial Stormwater Discharges*, website: <http://www.ecy.wa.gov/biblio/0810025.html>. The user should refer to this document for more details on addressing zinc in stormwater.

Pollutant Control Approach: Evaluate the potential sources of stormwater pollutants and apply source control BMPs where feasible.

Applicable Operational Source Control BMPs:

- If leachates and/or emissions from buildings are suspected sources of stormwater pollutants, then sample and analyze the stormwater draining from the building.
- Sweep the area routinely to remove any zinc residuals.
- If a roof/building stormwater pollutant source is identified, implement appropriate source control measures such as air pollution control equipment, selection of materials, operational changes, material recycle, process changes, etc.

Applicable Structural Source Control BMPs:

- Paint/coat the galvanized surfaces as described in [Ecology Publication # 08-10-025](#).

Applicable Treatment BMPs:

Treat runoff from roofs to the appropriate level. The facility may use enhanced treatment BMPs as described in Volume V of the SWMMWW. Some facilities regulated by the Industrial Stormwater General Permit, or local jurisdiction, may have requirements that cannot be achieved with enhanced treatment BMPs. In these cases, additional treatment measures may be required. A treatment method for meeting stringent requirements such as Chitosan-Enhanced Sand Filtration may be appropriate.

S425 BMPs for Soil Erosion and Sediment Control at Industrial Sites

Description of Pollutant Sources: Industrial activities on soil areas; exposed and disturbed soils; steep grading; etc. can be sources of sediments that can contaminate stormwater runoff.

Pollutant Control Approach: Limit the exposure of erodible soil, stabilize, or cover erodible soil where necessary to prevent erosion, and/or provide treatment for stormwater contaminated with TSS caused by eroded soil.

Applicable BMPs:

Cover Practice Options:

- Vegetative cover such as grass, trees, shrubs, on erodible soil areas.
- Covering with mats such as clear plastic, jute, synthetic fiber.
- Preservation of natural vegetation including grass, trees, shrubs, and vines.

Structural Practice Options:

- Vegetated swale
- Dike
- Silt fence
- Check dam
- Gravel filter berm
- Sedimentation basin
- Proper grading.

(For design information refer to Volume II, “Standards and Specifications for BMPs”).

S426 BMPs for Spills of Oil and Hazardous Substances

Description of Pollutant Sources: Federal law requires owners or operators of facilities engaged in drilling, producing, gathering, storing, processing, transferring, distributing, refining, or consuming oil and/or oil products to have a Spill Prevention and Emergency Cleanup Plan (SPECP). The SPECP is required if the above ground storage capacity of the facility, is 1,320 gallons or more of oil. Additionally, the SPECP is required if any single container with a capacity in excess of 660 gallons and which, due to their location, could reasonably be expected to discharge oil in harmful quantities, as defined in 40 CFR Part 110, into or upon the navigable waters of the United States or adjoining shorelines {40 CFR 112.1 (b)}. Onshore and offshore facilities, which, due to their location, could not reasonably be expected to discharge oil into or upon

the navigable waters of the United States or adjoining shorelines are exempt from these regulations {40 CFR 112.1(1)(i)}. State Law requires owners of businesses that produce dangerous wastes to have a SPECP. These businesses should refer to [Appendix IV-D R.6](#). The federal definition of oil is oil of any kind or any form, including, but not limited to petroleum, fuel oil, sludge, oil refuse, and oil mixed with wastes other than dredged spoil.

Pollutant Control Approach: Maintain, update, and implement a Spill Prevention and Emergency Cleanup Plan.

Applicable Operational BMPs: The businesses and public agencies identified in [Appendix IV-A](#) required to prepare and implement a Spill Prevention and Emergency Cleanup Plan shall implement the following:

- Prepare a Spill Prevention and Emergency Cleanup Plan (SPECP), which includes:
 - A description of the facility including the owner's name and address.
 - The nature of the activity at the facility.
 - The general types of chemicals used or stored at the facility.
 - A site plan showing the location of storage areas for chemicals, the locations of storm drains, the areas draining to them, and the location and description of any devices to stop spills from leaving the site such as positive control valves.
 - Cleanup procedures.
 - Notification procedures used in the event of a spill, such as notifying key personnel. Agencies such as Ecology, local fire department, Washington State Patrol, and the local Sewer Authority, shall be notified.
 - The name of the designated person with overall spill cleanup and notification responsibility.
- Train key personnel in the implementation of the SPECP. Prepare a summary of the plan and post it at appropriate points in the building, identifying the spill cleanup coordinators, location of cleanup kits, and phone numbers of regulatory agencies to contact in the event of a spill.
- Update the SPECP regularly.
- Immediately notify Ecology, the local jurisdiction, and the local Sewer Authority if a spill may reach sanitary or storm sewers, ground water, or surface water, in accordance with federal and Ecology spill reporting requirements.

- Immediately clean up spills. Do not use emulsifiers for cleanup unless there is an appropriate disposal method for the resulting oily wastewater. Do not wash absorbent material down a floor drain or into a storm sewer.
- Locate emergency spill containment and cleanup kit(s) in high-potential spill areas. The contents of the kit shall be appropriate for the type and quantities of chemical liquids stored at the facility.

Recommended Additional Operational BMP: Spill kits should include appropriately lined drums, absorbent pads, and granular or powdered materials for neutralizing acids or alkaline liquids where applicable. In fueling areas: Package absorbent material in small bags for easy use and make available small drums for storage of absorbent and/or used absorbent. Deploy spill kits in a manner that allows rapid access and use by employees.

S427 BMPs for Storage of Liquid, Food Waste, or Dangerous Waste Containers

Description of Pollutant Sources: Steel and plastic drums with volumetric capacities of 55 gallons or less are typically used at industrial facilities for container storage of liquids and powders. The BMPs specified below apply to container(s) located outside a building. Use these BMPs when temporarily storing accumulated food wastes, vegetable or animal grease, used oil, liquid feedstock, cleaning chemicals, or Dangerous Wastes (liquid or solid). These BMPs do not apply when Ecology has permitted the business to store the wastes ([Appendix IV-D R.4](#)). Leaks and spills of pollutant materials during handling and storage are the primary sources of pollutants. Oil and grease, acid/alkali pH, BOD, COD are potential pollutant constituents.

Pollutant Control Approach: Store containers in impervious containment under a roof, or other appropriate cover, or in a building. When collection trucks directly pick up roll-containers, ensure a filet is on both sides of the curb to facilitate moving the dumpster. For storage areas on-site for less than 30 days, consider using a portable temporary secondary system like that shown in [Figure 2.2.8](#) in lieu of a permanent system as described above.

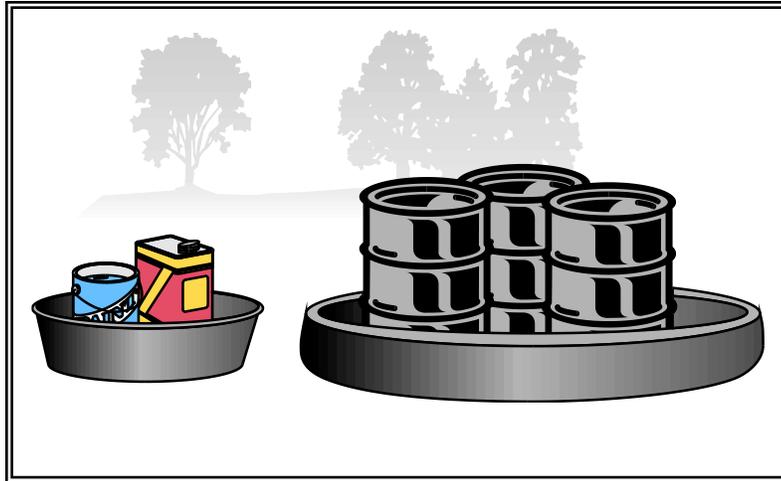


Figure 2.2.8 – Secondary Containment System

Applicable Operational BMPs:

- Place tight-fitting lids on all containers.
- Place drip pans beneath all mounted container taps and at all potential drip and spill locations during 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/spills. Replace containers, and replace and tighten bungs in drums as needed.
- Businesses accumulating Dangerous Wastes that do not contain free liquids need only to store these wastes in a sloped designated area with the containers elevated or otherwise protected from storm water run-on.
- Secure drums when stored in an area where unauthorized persons may gain access in a manner that prevents accidental spillage, pilferage, or any unauthorized use (see [Figure 2.2.9](#)).

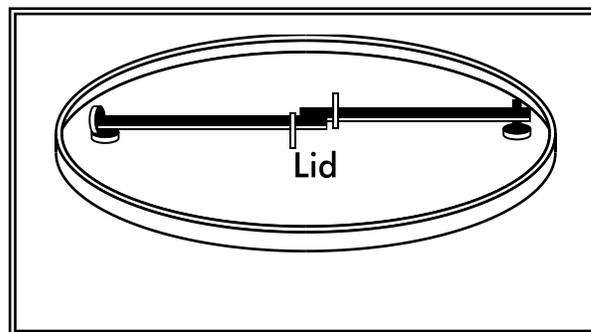


Figure 2.2.9 – Locking System for Drum Lid

- If the material is a Dangerous Waste, the business owner must comply with any additional Ecology requirements as specified in [Appendix IV-D R.3](#).
- Storage of reactive, ignitable, or flammable liquids must comply with the Uniform Fire Code ([Appendix IV-D R.2](#)).
- Cover dumpsters, or keep them under cover such as a lean-to, to prevent the entry of stormwater. Replace or repair leaking garbage dumpsters.
- Drain dumpsters and/or dumpster pads to sanitary sewer. Keep dumpster lids closed. Install waterproof liners.

Applicable Structural Source Control BMPs:

- Keep containers with Dangerous Waste, food waste, or other potential pollutant liquids inside a building unless this is not feasible due to site constraints or Uniform/International Fire Code requirements.
- Store containers in a designated area, which is covered, bermed or diked, paved and impervious in order to contain leaks and spills (see [Figure 2.2.10](#)). Slope the secondary containment to drain into a dead-end sump for the collection of leaks and small spills.
- For liquid wastes, surround the containers with a dike as illustrated in [Figure 2.2.10](#). The dike must be of sufficient height to provide a volume of either 10 percent of the total enclosed container volume or 110 percent of the volume contained in the largest container, whichever is greater.

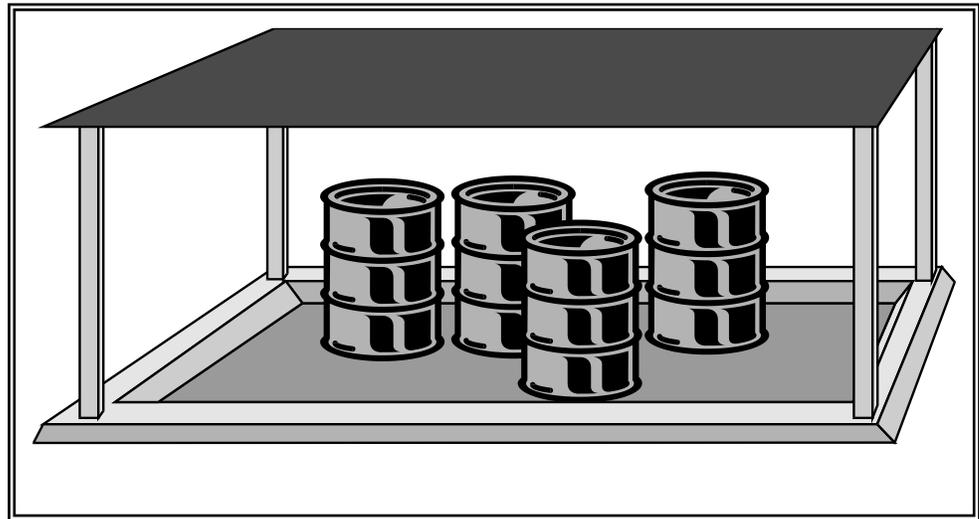


Figure 2.2.10 – Covered and Bermed Containment Area

- Where material is temporarily stored in drums, use a containment system as illustrated, in lieu of the above system (see [Figure 2.2.8](#)).

- Place containers mounted for direct removal of a liquid chemical for use by employees inside a containment area as described above. Use a drip pan during liquid transfer (see [Figure 2.2.11](#)).

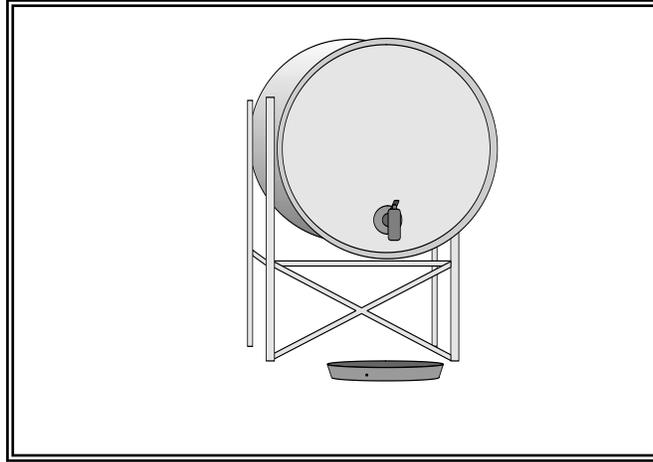


Figure 2.2.11 – Mounted Container - with drip pan
(note that the secondary containment is not shown in this figure)

Applicable Treatment BMP:

Note this treatment BMP for contaminated stormwater from drum storage areas.

- For contaminated stormwater in the containment area, connect the sump outlet to a sanitary sewer, if approved by the local Sewer Authority, or to appropriate treatment such as an API or CP oil/water separator, catch basin filter or other appropriate system (see Volume V). Equip the sump outlet with a normally closed valve to prevent the release of spilled or leaked liquids, especially flammables (compliance with Fire Codes), and dangerous liquids. Open this valve only for the conveyance of contaminated stormwater to treatment.
- Another option for discharge of contaminated stormwater is to pump it from a dead-end sump or catchment to a tank truck or other appropriate vehicle for off-site treatment and/or disposal.

S428 BMPs for Storage of Liquids in Permanent Aboveground Tanks

Description of Pollutant Sources: Aboveground tanks containing liquids (excluding uncontaminated water) may be equipped with a valved drain, vent, pump, and bottom hose connection. Aboveground tanks may be heated with steam heat exchangers equipped with steam traps, if required. Leaks and spills can occur at connections and during liquid transfer. Oil and grease, organics, acids, alkalis, and heavy metals in tank water and condensate drainage can also cause stormwater contamination at storage tanks.

Pollutant Control Approach: Install secondary containment or a double-walled tank. Slope the containment area to a drain with a sump. Operators may need to discharge stormwater collected in the containment area to

Note this applicable treatment BMP for stormwater from petroleum tank farms.

Applicable Treatment BMPs:

- For an uncovered tank containment area, equip the outlet from the spill-containment sump with a normally closed shutoff valve. Operators may open this valve manually or automatically, only to convey contaminated stormwater to approved treatment or disposal, or to convey uncontaminated stormwater to a storm sewer. 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. Use simple pH tests with litmus or pH paper for areas subject to acid or alkaline contamination.
- At petroleum tank farms, convey stormwater contaminated with floating oil or debris in the contained area through an API or CP-type oil/water separator (Volume V, Treatment BMPs), or other approved treatment prior to discharge to storm drain or surface water.

S429 BMPs for Storage or Transfer (Outside) of Solid Raw Materials, Byproducts, or Finished Products

Description of Pollutant Sources: Some pollutant sources stored outside in large piles, stacks, etc. at commercial or industrial establishments include:

- Solid raw materials
- Byproducts
- Gravel
- Sand
- Salts
- Topsoil
- Compost
- Logs
- Sawdust
- Wood chips
- Lumber
- Concrete
- Metal products

Contact between outside bulk materials and stormwater can cause leachate, and erosion of the stored materials. Contaminants may include TSS, BOD, organics, and dissolved salts (sodium, calcium, and magnesium chloride, etc.).

Pollutant Control Approach: Provide impervious containment with berms, dikes, etc. and/or cover to prevent run-on and discharge of leachate pollutant(s) and TSS.

Applicable Operational BMP: Do not hose down the contained stockpile area to a storm drain or a conveyance to a storm drain, or to a receiving water.

Applicable Structural Source Control BMP Options: The source control BMP options listed below are applicable to:

- Stockpiles greater than 5 cubic yards of erodible or water soluble materials such as:
 - Soil
 - Road deicing salts
 - Compost
 - Unwashed sand and gravel
 - Sawdust
- Outside storage areas for solid materials such as:
 - Logs
 - Bark
 - Lumber
 - Metal products

Choose one or more of the following Source Controls:

- Store in a building or paved and bermed covered area as shown in [Figure 2.2.13](#), or;

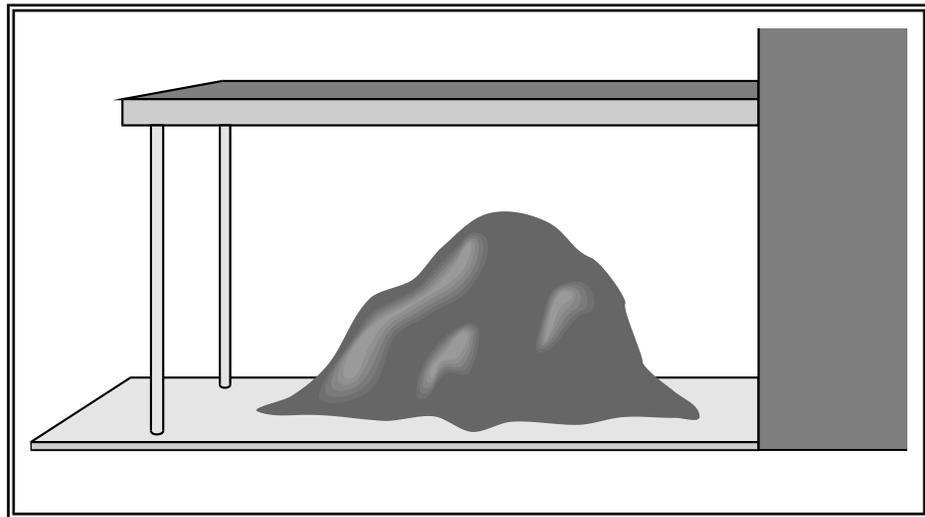


Figure 2.2.13 – Covered Storage Area for Bulk Solids (include berm if needed)

- Place temporary plastic sheeting (polyethylene, polypropylene, hypalon, or equivalent) over the material as illustrated (see [Figure 2.2.14](#)), or;

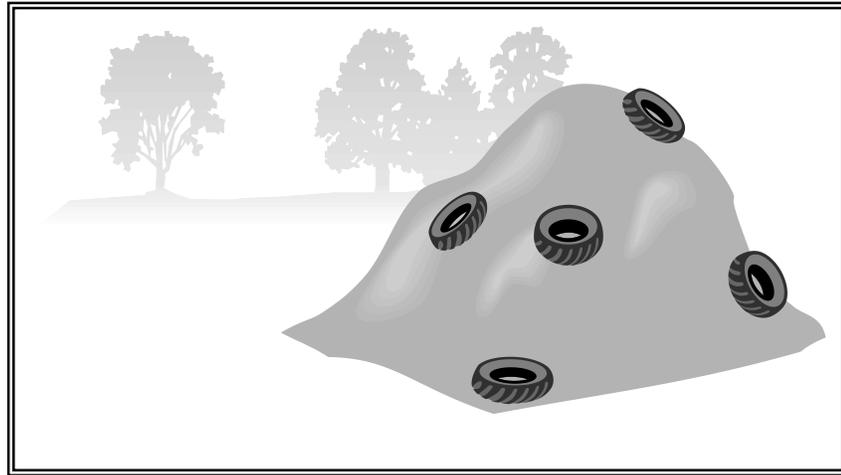


Figure 2.2.14 – Material Covered with Plastic Sheetting

- Pave the area and install a stormwater 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 treatment. Slope the paved area in a manner that minimizes the contact between stormwater (e.g., pooling) and leachable materials in compost, logs, bark, wood chips, etc.
- For large uncovered stockpiles, implement containment practices at the perimeter of the site and at any catch basins as needed to prevent erosion and discharge of the stockpiled material off-site or to a storm drain. Ensure that no direct discharge of contaminated stormwater to catch basins exists without conveying runoff through an appropriate treatment BMP.

Applicable Treatment BMP: Convey contaminated stormwater from the stockpile area to a wet pond, wet vault, settling basin, media filter, or other appropriate treatment system depending on the contamination.

Recommended Additional Operational BMPs:

- Maintain drainage areas in and around storage of solid materials with a minimum slope of 1.5 percent to prevent pooling and minimize leachate formation. Areas should be sloped to drain stormwater to the perimeter for collection or to internal drainage “alleyways” where no stockpiled material exists.
- Sweep paved storage areas regularly for collection and disposal of loose solid materials.
- If and when feasible, collect and recycle water-soluble materials (leachates).

- Stock cleanup materials, such as brooms, dustpans, and vacuum sweepers near the storage area.

S430 BMPs for Urban Streets

Description of Pollutant Sources: Urban streets can be the source of vegetative debris, paper, fine dust, vehicle liquids, tire and brake wear residues, heavy metals (lead and zinc), soil particles, ice control salts, domestic wastes, lawn chemicals, and vehicle combustion products. Street surface contaminants contain significant concentrations of particle sizes less than 250 microns (Sartor and Boyd, 1972).

Pollutant Control Approach: Conduct efficient street sweeping where and when appropriate to minimize the contamination of stormwater. Do not wash street debris into storm drains.

Facilities not covered under the Industrial Stormwater General Permit may consider a minimum amount of water washing of streets. All facilities must comply with their local stormwater requirements for discharging to storm sewers. Municipal NPDES permittees are required to limit street wash water discharges and may have special conditions or treatment requirements.

Recommended BMPs:

- For maximum stormwater pollutant reductions on curbed streets and high volume parking lots, use efficient vacuum sweepers (refer to Volume V, Ch. 12, for information about high-efficiency vacuum sweeper technology).

Note: High-efficiency street sweepers utilize strong vacuums and the mechanical action of main and gutter brooms combined with an air filtration system that only returns clean air to the atmosphere (i.e., filters very fine particulates). They sweep dry and use no water since they do not emit any dust.

High-efficiency vacuum sweepers have the capability of removing, 80 percent or more of the accumulated street dirt particles whose diameters are less than 250 microns (Sutherland, 1998). This assumes pavements under good condition and reasonably expected accumulation conditions.

- For moderate stormwater pollutant reductions on curbed streets use regenerative air sweepers or tandem sweeping operations.

Note: A tandem sweeping operation involves a single pass of a mechanical sweeper followed immediately by a single pass of a vacuum sweeper or regenerative air sweeper.

– A regenerative air sweeper blows air down on the pavement to entrain particles and uses a return vacuum to transport the material to the hopper.

- *These operations usually use water to control dust. This reduces their ability to pick up fine particulates.*

These types of sweepers have the capability of removing approximately 25 to 50 percent of the accumulated street dirt particles whose diameters are less than 250 microns. (Sutherland, 1998). This assumes pavements under good conditions and typical accumulation conditions.

- For minimal stormwater pollutant reductions on curbed streets use mechanical sweepers.
 - Note: The industry refers to *mechanical sweepers as broom sweepers and uses the mechanical action of main and gutter brooms to throw material on a conveyor belt that transports it to the hopper.*
 - *These sweepers usually use water to control dust. This reduces their ability to pick up fine particulates.*

Mechanical sweepers have the capability of removing only 10 to 20 percent of the accumulated street dirt particles whose diameters are less than 250 microns (Sutherland, 1998). This assumes pavements under good condition and the most favorable accumulation conditions.

- Conduct vacuum sweeping at optimal frequencies. Optimal frequencies are those scheduled sweeping intervals that produce the most cost-effective annual reduction of pollutants normally found in stormwater and can vary depending on land use, traffic volume and rainfall patterns.
- Train operators in those factors that result in optimal pollutant removal. These factors include sweeper speed, brush adjustment and rotation rate, sweeping pattern, maneuvering around parked vehicles, and interim storage and disposal methods.
- Consider the use of periodic parking restrictions in low to medium density single-family residential areas to ensure the sweeper's ability to sweep along the curb.
- Establish programs for prompt vacuum sweeping, removal, and disposal of debris from special events that will generate higher than normal loadings.
- Disposal of street sweeping solids must comply with "Recommendations for Management of Street Wastes" described in [Appendix IV-G](#) of this volume.
- Inform citizens about eliminating yard debris, oil and other wastes in street gutters to reduce street pollutant sources.

S431 BMPs for Washing and Steam Cleaning Vehicles/ Equipment/ Building Structures

Description of Pollutant Sources: Pollutant sources include the commercial cleaning of vehicles, aircraft, vessels, and other transportation, restaurant kitchens, carpets, and industrial equipment, and large buildings with low- or high-pressure water or steam. This includes “charity” car washes at gas stations and commercial parking lots. The cleaning can include hand washing, scrubbing, sanding, etc. Washwater from cleaning activities can contain oil and grease, suspended solids, heavy metals, soluble organics, soaps, and detergents that can contaminate stormwater.

Pollutant Control Approach: The preferred approach is to cover and/or contain the cleaning activity, or conduct the activity inside a building, to separate the uncontaminated stormwater from the washwater sources. Convey washwater to a sanitary sewer after approval by the local sewer authority. Provide temporary storage before proper disposal, or recycling. Under this preferred approach, no discharge to the ground, to a storm drain, or to surface water should occur.

The Industrial Stormwater General Permit prohibits the discharge of process wastewater (e.g., vehicle washing wastewater) to ground water or surface water. Stormwater that commingles with process wastewater is considered process wastewater.

Facilities not covered under the Industrial Stormwater General Permit that are unable to follow one of the preferred approaches listed above may discharge washwater to the ground only after proper treatment in accordance with *Ecology guidance WQ-95-056, [Vehicle and Equipment Washwater Discharges/Best Management Practices Manual](#), September 2007 or most recent update*. Note that the [Vehicle and Equipment Washwater Discharges/Best Management Practices Manual](#) is scheduled to be updated in 2012. Please check for the most recent version of Ecology guidance.

The quality of any discharge to the ground after proper treatment must comply with Ecology’s Ground Water Quality Standards, [Chapter 173-200 WAC](#).

Facilities not covered under the Industrial Stormwater General Permit that are unable to comply with one of the preferred approaches and want to discharge to storm sewer, must meet their local stormwater requirements. Local authorities may require treatment prior to discharge.

Contact the local Ecology Regional Office to discuss permitting options for discharge of washwater to surface water or to a storm drain after on-site treatment.

Applicable Structural Source Control BMPs: Conduct vehicle/equipment washing in one of the following locations:

- At a commercial washing facility in which the washing occurs in an enclosure and drains to the sanitary sewer, or
- In a building constructed specifically for washing of vehicles and equipment, which drains to a sanitary sewer.

Conduct outside washing operation in a designated wash area with the following features:

- In a paved area, construct a spill containment pad to prevent the run-on of stormwater from adjacent areas. Slope the spill containment area to collect washwater in a containment pad drain system with perimeter drains, trench drains or catchment drains. Size the containment pad to extend out a minimum of four feet on all sides of the washed vehicles and/or equipment.
- Convey the washwater to a sump (like a grit separator) and then to a sanitary sewer (if allowed by the local Sewer Authority), or other appropriate wastewater treatment or recycle system. The containment sump must have a positive control outlet valve for spill control with live containment volume, and oil/water separation. Size the minimum live storage volume to contain the maximum expected daily washwater flow plus the sludge storage volume below the outlet pipe. Shut the outlet valve during the washing cycle to collect the washwater in the sump. The valve should remain shut for at least two hours following the washing operation to allow the oil and solids to separate before discharge to a sanitary sewer.
- Close the inlet valve in the discharge pipe when washing is not occurring, thereby preventing the entry of uncontaminated stormwater into the pretreatment/ treatment system. The stormwater can then drain into the conveyance/discharge system outside of the wash pad (essentially bypassing the sanitary sewer or recycle system). Post signs to inform people of the operation and purpose of the valve. Clean the concrete pad thoroughly until there is no foam or visible sheen in the washwater prior to closing the inlet valve and allowing uncontaminated stormwater to overflow and drain off the pad.
- Collect the washwater from building structures and convey it to appropriate treatment such as a sanitary sewer system if it contains oils, soaps, or detergents. If the washwater does not contain oils, soaps, or detergents (in this case only a low pressure, clean, cold water rinse is allowed) then it could drain to soils that have sufficient natural attenuation capacity for dust and sediment.

Note that the purpose of the valve is to convey only washwater and contaminated stormwater to a treatment system.

Recommended Additional BMPs:

- Mark the wash area at gas stations, multi-family residences and any other business where non-employees wash vehicles.
- Operators may use a manually operated positive control valve for uncovered wash pads, but a pneumatic or electric valve system is preferable. The valve may be on a timer circuit and opened upon completion of a wash cycle. After draining the sump or separator, the timer would then close the valve.
- Use phosphate-free biodegradable detergents when practicable.
- Consider recycling the washwater.

Operators may use soluble/emulsifiable detergents in the wash medium and should use it with care and the appropriate treatment. Carefully consider the selection of soaps and detergents and treatment BMPs. Oil/water separators are ineffective in removing emulsified or water soluble detergents. Another treatment appropriate for emulsified and water soluble detergents may be required.

Exceptions

- At gas stations (for charity car washes) or commercial parking lots, where it is not possible to discharge the washwater to a sanitary sewer, a temporary plug or a temporary sump pump can be used at the storm drain to collect the washwater for off-site disposal such as to a nearby sanitary sewer.
- New and used car dealerships may wash vehicles in the parking stalls as long as employees use a temporary plug system to collect the washwater for disposal as stated above, or an approved treatment system for the washwater is in place.

At industrial sites, contact Ecology for NPDES Permit requirements even when not using soaps, detergents, and/or other chemical cleaners in washing trucks.

S432 BMPs for Wood Treatment Areas

Description of Pollutant Sources: Wood treatment includes both anti-staining and wood preserving using pressure processes or by dipping or spraying. Wood preservatives include creosote, creosote/coal tar, pentachlorophenol, copper naphthenate, arsenic trioxide, malathion, or inorganic arsenicals such as chromated copper arsenate, acid copper chromate, chromate zinc chloride, and fluor-chrome-arsenate-phenol. Anti-staining chemical additives include iodo-prophenyl-butyl carbamate, dimethyl sulfoxide, didecyl dimethyl ammonium chloride, sodium azide, 8-quinolinol; copper (II) chelate, sodium ortho-phenylphenate, 2-(thiocyanomethylthio)-benzothiazole (TCMTB) and methylene bis-(thiocyanate), and zinc naphthenate.

Appendix D

Shop Guide for Dangerous Waste Management

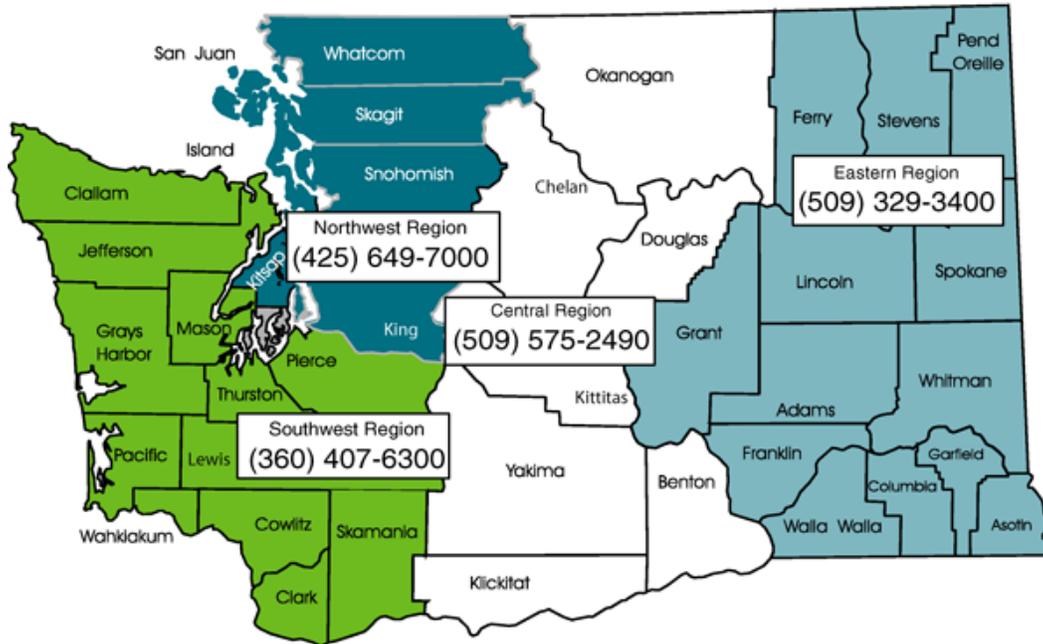


Shop Guide

For Dangerous Waste Management

Department of Ecology Regions

<http://www.ecy.wa.gov/programs/hwtr>



Central Region
15 W Yakima Ave #200
Yakima WA 98902-3452
509-575-2490

Northwest Region
3190 160th Ave SE
Bellevue WA 98008-5452
425-649-7000

Eastern Region
N 4601 Monroe
Spokane WA 99205-1295
509-329-3400

Southwest Region
PO Box 47775
Olympia WA 98504-7775
360-407-6300

Table of Contents

Introduction	1
Identify Waste: Designation	1
Parts Washers	1
Aerosol Cans	2
Shop Towels and Rags.....	3
Used Oil.....	4
Spent Antifreeze	4
Light Bulbs	5
Batteries	5
Paint Wastes.....	6
Dangerous Waste Accumulation.....	8
Waste Containers	9
Spills and Drips.....	9
Shipping and Disposal	10
Counting and Reporting Your Waste.....	11
Do You Treat Your Waste?	12
More Help	14
Appendix: <i>Quick Reference Guide for Dangerous Waste Generators</i>	15

Introduction

If handled improperly, many common workshop wastes can threaten the safety of your facility, its workers, and the community. This guide will help you:

- Comply with dangerous waste regulations and avoid costly penalties.
- Improve workplace safety.
- Save money by handling wastes properly.
- Gain customers who want to choose a shop that protects the environment.
- Be prepared in case a dangerous waste inspector visits your site.

Find more resources at the Department of Ecology's (Ecology) website:

www.ecy.wa.gov/programs/hwtr.

Get free help from your regional Ecology office:

Northwest Regional Office, Bellevue	425-649-7000
Southwest Regional Office, Lacey	360-407-6300
Central Regional Office, Yakima	509-575-2490
Eastern Regional Office, Spokane	509-329-3400

Identify Waste: Designation

Your business is responsible for complying with the laws about the safe handling and disposal of your waste. In Washington, hazardous waste and other kinds of waste with certain criteria are called dangerous waste. The laws that govern these kinds of waste are called the [Dangerous Waste Regulations](#), Chapter 173-303 Washington Administrative Code (WAC).

The process of knowing whether you have dangerous waste is called designation. This guide mentions common wastes, but you may have other types of wastes or mixtures that are not described here. Designation is a big part of knowing how to handle your waste. You must designate all of your waste streams to determine whether they are dangerous.

To get information about designating waste, please contact your regional Ecology office or visit our website at www.ecy.wa.gov/programs/hwtr/managewaste.html.

Parts Washers

Sink-type parts washers used for cleaning smaller parts and tools have solvent tanks that usually contain one or more of these solvents:

- Mineral spirits
- Stoddard solvent
- Petroleum naphtha
- Citrus-based solvent

These spent solvents are usually ignitable, toxic, or pick up hazardous material such as heavy metals and become dangerous wastes the moment the waste tank is replaced with a fresh tank. If the spent solvent is recycled, you can claim “recycling credits” to reduce your Pollution Prevention Planning fee (this applies only to businesses that are required to prepare Pollution Prevention Plans).

Keep different types of solvents in separate, labeled, closed containers.

- Don't mix solvents with any other waste.
- Don't mix solvents into used oil.
- Don't use spray cans over solvent tanks; it can contaminate the solvent in the tank.

To reduce the amount of dangerous waste from parts washers:

- Make solvent last longer by pre-cleaning parts with a rag or brush to remove the heaviest dirt.
- Make sure the solvent is actually too dirty to use before replacing it with new solvent.
- Keep the lid closed when not in use. This prevents accidental mixing with other chemicals and minimizes evaporation.
- Use a water-based cabinet-type parts washer if appropriate. These work like a dish washer and often do not require hazardous solvents. Test the sludge to be sure it doesn't contain regulated levels of heavy metals.

If you're getting a parts washer, choose one with an attached still or cartridge filter. This will make your solvent last longer and generate less dangerous waste. Used filters may be a dangerous waste, but still reduce the total amount of waste.

Aerosol Cans

Aerosol cans are not dangerous waste if they are used until empty, with the exception of cans that contained certain pesticides. Partially full (for instance, if the nozzle doesn't work) or full discarded cans may be a dangerous waste because the contents are under pressure and may be toxic or flammable.

You have two options for disposing of aerosol cans with hazardous contents:

1. Send the can with its contents to a permitted dangerous waste facility.
2. Puncture the can with a commercial puncturing device. Drain and collect the contents (and aerosol). Manage the collected liquid as dangerous waste. This means putting a dangerous waste label and risk label on the container and keeping it closed when not in use. Recycle empty cans as scrap metal.

Dangerous waste aerosol cans with liquid or drained contents must be accumulated, counted, labeled, and reported according to dangerous waste requirements.

Check labels and Safety Data Sheets (formerly Material Safety Data Sheets or MSDS) to make sure the product does not add unnecessary hazards to your shop. Look for less hazardous formulations. Buying the product in bulk and using refillable spray bottles may generate less aerosol can waste.

Shop Towels

Shop towels (towels, wipes, or rags) containing solvents, paints, stains, inks, or other chemicals may be ignitable, toxic, or have “listed” solvents that cause them to be dangerous waste. You must manage them as dangerous waste. This means they must be properly contained, labeled, accumulated, counted, shipped, and reported.

Note: used towels containing oil or solvents can spontaneously start fires even when no flame is present and should be kept in closed, fireproof metal containers.



If you send your soiled cloth towels to a permitted commercial laundry, and you handle them properly, they are not dangerous waste. This can save you money.

To recycle your towels through a laundry, you must follow these guidelines:

- Remove free liquids before tossing soiled shop towels in containers. Use simple means like hand wringing (while wearing proper protective equipment) or compressing them. Collect and reuse the liquids. If not directly reused, these liquids may be dangerous waste.
- Do not dispose of solvents by pouring them into containers of used shop towels. This is illegal.
- Do not accumulate used towels longer than 180 days before recycling.
- For safety reasons, keep incompatible wastes separated. For example, don't mix towels with alcohols amid towels with acids. Keep hazardous and non-hazardous shop towels segregated, following the instructions of your recycler.
- Make sure used shop towels contaminated with hazardous substances are collected, transported, and accumulated in closed containers. Label containers with “contaminated shop towels.” If a commercial laundry picks up your towels, they may provide you with a collection and shipping container. Place oily or flammable towels in closed, fireproof containers.
- It is your responsibility to guarantee that the recycling facility you use is meeting local sewer discharge limits and other applicable environmental regulations. Do not use recyclers that discharge dangerous wastewaters to a drain field or cleaning solvents directly to the air.

Used Oil

Used motor oil (petroleum or synthetic), transmission fluid, brake fluid, lubricating oil, compressor oil, gear oil, and metal working fluids without chlorinated compounds, are all considered used oil. They can be mixed without designating the mixture as dangerous waste.

Used oil is also not considered a dangerous waste if recycled; this may include using it as fuel in a furnace. Recycling can save you money, so don't mix solvents or other wastes into used oil. Used oil contaminated with dangerous waste, such as solvent, is dangerous waste. Even small amounts of chlorinated solvents or aerosol products (like brake or carburetor cleaner) could turn a whole container of used oil into dangerous waste that cannot be recycled.

Used oil filters are not dangerous waste if they are fully drained for 24 hours. Send drained filters to a scrap metal recycler.

Don't dispose of used oil into a dumpster, storm drain, septic tank, dry well, or sewer.

Don't pour used oil on the ground or use it for dust suppression.

Recycle your used oil following these guidelines:

- Keep used oil in a separate container marked "USED OIL ONLY."
- Place container in a secure area away from floor or storm drains. Containers must be closed at all times, except when adding or removing used oil.
- Don't mix used oil or "do-it-yourselfer" used oil with any other waste if you plan to burn it in your shop for heating.



Spent Antifreeze

Spent antifreeze is toxic and may contain lead and other hazardous contaminants. If spent ethylene glycol antifreeze is recycled, it does not have to be counted as a dangerous waste or require a Uniform Hazardous Waste Manifest.

Recycle your spent antifreeze following these guidelines:

- Do not mix any other material with antifreeze.
- Label containers "Spent Antifreeze."
- Avoid spills by keeping containers closed except when adding or removing waste.
- Maintain containers so they do not leak, rupture, or tip over when opened, handled, or accumulated.
- Place containers on a non-porous concrete surface.
- Don't dispose of spent antifreeze into a sewer, storm drain, septic tank, or dry well.
- Never pour antifreeze on the ground.

Light Bulbs

Some spent light bulbs may be dangerous waste because they contain mercury, which is very toxic. These types of light bulbs include fluorescent, neon, and high-intensity discharge (such as, mercury vapor, metal halide, or high-pressure sodium).

If such light bulbs are recycled and handled properly, they may be managed as “Universal Waste” rather than dangerous waste by following these guidelines:

- Light bulbs cannot be crushed under Universal Waste regulations. Because glass bulbs are easily broken, keep lamps in structurally sound containers like cardboard boxes or fiber drums. Keep containers closed when not adding lamps.
- You may accumulate waste light bulbs for one year from the date they are generated. To document this, mark the container or individual bulb with the first date of storage. An extension to the one-year accumulation limit may be allowed to facilitate proper recovery, treatment, or disposal.
- Clearly label bulb containers with one of the following: “Universal Waste –Lamps,” “Waste Lamps,” or “Used Lamps.”
- Immediately clean up broken bulbs. Place the debris in a closed container with a dangerous waste label and a risk label that says “Toxic” and manage the broken material as dangerous waste.
- You may self-transport waste bulbs, complying with applicable U.S. Department of Transportation (USDOT) regulations found at www.phmsa.dot.gov.

Batteries

Most batteries are dangerous waste, but you can manage them more easily as “Universal Waste” when you recycle and manage them according to the following guidelines:

- Clearly label or mark individual batteries or containers with one of the following: “Universal Waste –Batteries,” “Waste Batteries,” or “Used Batteries.”
- You may accumulate batteries for one year from the date they are generated. To document this, mark the collection container or individual battery with the first date of accumulation. An extension to the one-year accumulation limit may be allowed to facilitate proper recovery, treatment, or disposal.
- Place damaged or leaking batteries in closed containers to prevent releasing toxic materials to the environment. Before combining different types of batteries in the same container, make sure they are compatible with one another and the container. Some batteries contain acids that are highly corrosive, for example.
- You may self-transport batteries, complying with applicable USDOT regulations. You must tape the terminals of most battery types to prevent sparking or fires while in transit.

Paint Wastes

Solvent-based paint wastes are usually dangerous waste. These include thinners, cleanup solvents, waste paints, and paint booth filters. Some latex and acrylic waterborne paints are also dangerous waste. Containers for these wastes must be properly labeled and kept closed when not in use. The waste must be accumulated, counted, and reported according to the dangerous waste requirements.

■ Reduce Paint Waste

- Buy only as much paint as you need.
- Don't get in the habit of mixing a standard amount of paint for every job (1 quart, 1 pint, etc.). Mix and use the least amount of coating possible.
- Give leftover paint to customers for touch-ups.
- Return unused paint to the manufacturer if not past the expiration date. It may be possible to sell it through an industrial materials exchange service.
- Reduce the number of different coatings and colors you use when possible.

■ Spray Gun Wastes

- For most painting operations, spray guns must be washed in an enclosed solvent recirculating gun washer. This helps you get more “mileage” from your solvent, reduces solvent evaporation loss, saves labor, and reduces worker exposure.
- If you do not use an automatic gun washer, get more use from your solvent and generate less waste by using a two-stage cleaning method. Use previously used thinner or gun wash solvent for the first rinse. Then use fresh solvent to clean guns. Save that solvent to use as the first rinse next time. This will cut your waste in half. Containers of solvent must be labeled.
- Don't clean guns by spraying thinner into the air or onto booth filters.



■ Paint Booth Filters

Paint booth filters may be dangerous waste. It depends on whether they contain paint with heavy metals like chromium, nickel, or lead or whether the filter is made with certain flame retardants. Test filters to determine if they are dangerous waste or if they can be disposed of more economically as solid waste.

■ Thinners and Solvents

Thinners and solvents frequently used in paint preparation, painting, and cleanup include acetone, toluene, xylene, or MEK (methyl ethyl ketone). They typically become dangerous waste because they are “listed,” ignitable, or toxic.

- Don't mix thinner and solvents with other types of waste.

- Don't leave the product or waste thinner drum uncovered because it can evaporate.
- Reduce solvent waste:
 - Add spigots or pumps to solvent containers.
 - Use solvent until it loses its cleaning effectiveness, not just because it looks dirty.
 - Reuse flushing and rinsing solvents for thinning, when appropriate.
- Send waste solvents and paint thinners to a recycler. If spent solvent is recycled, you can claim "recycling credits" to reduce your Pollution Prevention (P2) Planning fee (this applies only to businesses that are required to prepare P2 Plans).
- Save money by using a still to reclaim your solvent on site for further use.
 - Keep a daily log of the date, amount of spent solvent distilled, and the amount awaiting distillation. These records are needed to determine your generator status and reporting requirements.
 - Don't throw still bottoms (leftover sludge or solid cakes) in the dumpster or trash. They need to be handled and disposed of as dangerous waste.

■ Solvent Recycling

If solvent is treated and reused over and over, there is a counting exemption. Count the greatest amount of spent material that needs treatment on any day during a calendar month. This is all of the spent material that you must count and report for the month. Also, count all residual dangerous waste.

■ Designate Paint Waste

Most solvent-based paint wastes are dangerous waste because they are ignitable or contain toxic chemicals or heavy metals. Some waterborne paints are dangerous waste because they contain toxic chemicals. Check the Safety Data Sheets for any components in the paint that would make it designate as dangerous waste.

Waterborne paint waste that does not designate as listed or characteristic may still designate as dangerous if it contains toxic components. Facilities have the option to send the waste for lab testing. If the paint waste passes a fish bioassay test, the waste is not considered dangerous and does not have to be managed as dangerous waste.

■ Other Tips

- Use coatings that are less toxic. Stay informed about new developments in water-based top coats.
- Use optimum gun settings and spray tips for each job.
- Thin coatings by using heat rather than solvents where possible.
- Use disposable liners for paint containers and spray gun cups. Disposing of liners creates less waste than disposing of rinsing material.
- Schedule jobs in batches to reduce the number of cleanups.

Operator technique can change spray gun efficiency by up to 50 percent and affects the quality of your product. Training and experience makes more of a difference than the type of equipment used.

Some spray equipment manufacturers provide training videos that you can use to train new employees or refresh experienced ones. Some companies videotape painters in action so they can review their own performance and technique. Ecology staff can provide information on other training resources, including paint gun simulators that allow a painter to practice spraying and evaluate their efficiency in real time.

Dangerous Waste Accumulation

■ Time Limits

How long you are allowed to accumulate wastes depends on the amount of dangerous waste you generate and accumulate each month. See the Appendix for your time limit.

■ Storage Area

You should have a specific area in your shop for accumulating dangerous wastes. This area should:

- Be well-marked with “Hazardous Waste”/“Dangerous Waste” signs, and be access-restricted.
- Have a floor made of impervious material, like concrete. It should be free of cracks.
- Be indoors or under cover outside and protected from rain water.
- Have no active floor drains in the area. A sealed drain means no contamination can leave the area through the drain.
- Have at least 30 inches of space between rows of waste containers.
- Have no more than two waste containers stacked on each other.
- Be inspected weekly for signs of leaks or damage.
- Have clear labels on every container.
- Have a secondary containment system to hold leaks and spills. Build or buy a containment system such as a dike, berm, or commercial spill-containment pallet.

■ Satellite Accumulation

You may keep limited amounts of dangerous waste near the work stations where they are generated in “satellite accumulation areas.” In these you may accumulate up to 55 gallons of each dangerous waste with no time limit. When full, label the containers and move them to the central accumulation area within three days. Containers must be:

- Near the place where the waste is created.
- Kept closed at all times except when adding or removing waste.
- Under control of the operator making the waste.

- Arranged so chemically incompatible wastes can't come in contact with each other.
- Labeled with the date, the words "Dangerous Waste" or "Hazardous Waste," and the hazard (toxic, corrosive, flammable, etc.).

Note:

- The satellite accumulation allowances are not available to small quantity generators.
- These requirements are for dangerous wastes and do not apply to spent antifreeze that is recycled or used oil.

Waste Containers

Inspect your dangerous waste containers regularly. They must be:

- Closed except when adding or removing waste. If you need to add waste frequently, consider using a screw-in funnel with latching lid, or a lever-type drum ring if using an open-top drum.
- In good condition (no rust, bulging, or other defects).
- Handled to prevent rupture or leaks.
- Properly labeled. The label must be easy to read and show "Hazardous Waste" or "Dangerous Waste," the nature of the hazard (toxic, corrosive, flammable, etc.), and the date waste was first added. Free, printable labels are available from www.ecy.wa.gov/programs/hwtr.
- Made of material that is compatible with the waste. Use metal drums for solvents. Use polyethylene drums for acids or caustics.

Hazardous Waste	
<small>FEDERAL LAW PROHIBITS IMPROPER DISPOSAL If found, contact the nearest police or public safety authority and the Washington State Department of Ecology or the Environmental Protection Agency</small>	
Accumulation Start Date:	Generator Name:
Reportable Quantities (RQ): <small>40 CFR Subchapter J, Part 302, Table 302.4</small>	Address:
Manifest Document #:	City:
Emergency Response Guide #:	State:
EPA Waste Code(s) and/or Characteristic(s)	Zip:
	EPA ID #:
EPA/DOT Shipping Name:	
Hazard Class:	
UNNA #:	
Packing Group (PG):	
<small>In the event of a spill or release of this hazardous waste, contact the US Coast Guard National Response Center at 1-800-424-8802 for information and assistance.</small>	



Spills and Drips

Material that spills, leaks, or drips is waste unless it's reused. Clean up waste spills, drips, and leaks promptly, so they don't spread. Containment and accumulation areas must be kept dry and clean.

Keep spill cleanup supplies handy and train employees how to use them. Know whether cleanup residues and absorbent pads must be handled as dangerous wastes. Select compatible absorbents – use the right tool for the job.

For small spills use absorbent granules (kitty litter), absorbent pads, or other absorbent materials. It may create less dangerous waste than washing with water. Designate and properly dispose of spill debris.

Report significant spills and releases to each of the following:

- National Response Center: 1-800-424-8802
- Washington Emergency Management Division: 1-800-258-5990 or 1-800-OILS-911
- You must report any spill that endangers human health or the environment, regardless of size.

Shipping and Disposal

■ Hazardous Waste Transporters

Use a reputable transporter with a valid RCRA Site ID number (see page 11). It is your responsibility to choose a proper transporter. Selecting a company that is financially able to respond to accidents is important.

■ Manifests

A Uniform Hazardous Waste Manifest must accompany dangerous waste when it is shipped off site. Your transporter can help fill out this form properly. Retain one of the copies signed by the transporter and someone in your shop.

When the transporter delivers the waste to the receiving facility, the facility accepts the waste and signs each copy of the manifest. The transporter takes a copy, the facility keeps a copy, and the facility sends you the last copy. This proves the waste arrived at its destination. Keep all manifests for at least five years.

As an incentive to recycle certain dangerous wastes such as used oil, spent antifreeze, batteries, and light bulbs, Washington State allows these wastes to be sent off site to a recycler without a Uniform Hazardous Waste Manifest. A receipt, bill of lading, or other documentation will work. Keep these records for at least five years.

■ Small Quantity Generators

Small quantity generators (SQG) of dangerous waste have more options for shipping their wastes. Many community household hazardous waste (HHW) facilities accept dangerous waste from SQGs. SQGs may transport their own waste to a permitted dangerous waste facility or HHW facility. A Uniform Hazardous Waste Manifest, receipt, bill of lading, or other documentation can be used.

The USDOT has rules governing how and what you transport. See www.phmsa.dot.gov for more information on required containers, labels, and shipping papers.

Counting and Reporting Your Waste

■ Count your waste

Different rules apply depending on how much dangerous waste you generate and accumulate (see Appendix 1). These levels are called “generator status.” Generator status is determined by the maximum amount of dangerous waste produced in a month during a calendar year and by the amount of waste accumulated at any one time.

Generator Status	Generates Monthly	Accumulates On Site
Small Quantity Generator (SQG)	Below 220 lbs of dangerous waste and 2.2 lbs of acutely hazardous waste or WT01 toxic waste	Up to 2,220 lbs dangerous waste (or 2.2 lbs of acutely hazardous waste and /or WT01 dangerous waste) per month.
Medium Quantity Generator (MQG)	Between 220-2,200 lbs of dangerous waste	Up to 2,200 lbs of dangerous waste per month
Large Quantity Generator (LQG)	More than 2,200 lbs of dangerous waste or 2.2 lbs of acutely hazardous waste or WT01 toxic waste	No limit

Document the amount of each dangerous waste you generate each month. Don’t use shipping manifests for this purpose because shipment records often lump several months of wastes together. This might falsely increase your generator status. Waste must be counted and reported in pounds, including liquids.

The weight of your waste can be calculated by weighing one gallon and multiply that weight by the total number of gallons or converting gallons to pounds.

Multiply the Quantity by the Conversion Factor	Example
If you do not know the density: multiply by 8.34, the density of water (1 gal water =8.34 lbs)	50 gallons of wastewater, multiplied by 8.34 = 417 lbs
If density is measured in lbs per gallon (lbs/gal): multiply by the density	50 gallons of wastewater with a density of 7.9 lbs/gal is multiplied by 7.9. = 395 pounds
If density is measured by specific gravity: multiply by 8.34 then multiply this product by the specific gravity	50 gallons of wastewater multiplied by 8.34 = 417 lbs 417 pounds multiplied by a specific gravity of 1.2 = 500.4 lbs

■ Get a RCRA Site Identification Number

Many dangerous waste generators must have a RCRA Site ID Number (also known as a Site ID#). SQGs do not need a Site ID#, however their dangerous waste transporter may require one. For more information on obtaining a Site ID#, call 800-874-2022 or visit Ecology’s website at www.ecy.wa.gov/programs/hwtr/waste-report/notification.html.

■ Report your waste annually

If you have an active RCRA Site ID#, you must submit a Dangerous Waste Annual Report, even if you did not generate any dangerous waste that year. If you are an SQG and do not have a Site ID#, you are not required to report. Annual reports are due by March 1. Keep copies for at least five years. To file an annual report, call 800-874-2022 or go to www.ecy.wa.gov/programs/hwtr/waste-report/index.html.

■ Pollution Prevention Plans

You must file an annual Pollution Prevention Plan if:

- You generate more than 2,640 pounds of dangerous waste per year, or
- You file a Toxics Release Inventory (TRI) report.

Many recycled wastes are not counted toward the 2,640 pound threshold. Your facility may be able to avoid the planning requirement by reducing or recycling your waste. For more information go to www.ecy.wa.gov/programs/hwtr/P2/index.html.

Do You Treat Your Waste?

If you treat your dangerous waste on-site, you may be subject to “Treatment by Generator” (TBG) requirements. Some examples of treatment include:

- Neutralization
- Solidification
- Evaporation
- Polymerization
- Pharmaceutical waste
- Filtration
- Carbon adsorption
- Separation and distillation
- Aldehyde Deactivation

■ Treatment for recycling

TBG requirements do not apply if you recycle treated waste. This waste must be managed under dangerous waste requirements until it enters the recycling unit. Recycled waste must be counted and reported, along with any resulting dangerous waste residues.

You must keep a daily log of the amount of dangerous waste treated and the amount of dangerous waste residues that result from the treatment.

If a material, such as cleaning solvent or distilled thinner is treated and reused over and over, you can use a counting exemption. Count the greatest amount of spent material awaiting recycling on any single day in a month and all residual dangerous waste.

There is another special exemption for waste that is treated and reused in a “closed loop” system. The treatment system is fully-connected to the equipment producing the original waste. An example is a parts washer with a built-in still.

In such cases, the waste to be treated does not have to be counted and reported, however all residual dangerous waste from this recycling process (like sludge or filters) must be counted.

■ Treatment for disposal

Follow these TBG requirements if you are not recycling your treated waste: The treatment tank or container must be marked with the date when the waste was first added. It must be emptied every 90 days (or 180 days for generators of 220-2,200 lbs/month with no time limit for SQGs).

- Any residues from the treatment process that are dangerous wastes must be counted and managed as such.
- Generators must keep a written log of the quantity of each dangerous waste treated, the treatment methods, and dates of treatment.
- When filing your Dangerous Waste Annual Report:
 - Note in the *Comment Section* of the Site Identification form that the process is treatment by generator.
 - Count the total quantity (as wet weight) of waste before treatment. Also count the weight of any remaining material that is dangerous waste. Use these figures for annual reporting and generator status.
- If you discharge wastewater from a TBG activity, you must comply with the domestic sewage exclusion.

■ Requirements for specific treatment processes

- *Evaporation* — Treat only inorganic wastes mixed with water, such as spent caustics, rinse waters, and water-based machining coolants. The evaporator must meet all applicable accumulation requirements. Use secondary containment around the evaporator to catch spills. Don't evaporate to dryness; leave some water in the remaining sludge. Dispose of the remaining sludge properly.
- *Solidification* — Solidified waste must pass the Paint Filter Liquids Test. This test, Method 9095 of the EPA document *Test Methods for Evaluating Solid Waste, Physical /Chemical Methods*, SW-846 measures the amount of free liquid in the waste. The waste must be solidified using a non-biodegradable solidification process. Solidified waste must be stable in its final disposal destination.
- *Carbon filtration* — Any treated effluent and backwash from the process must be managed under state or federal regulations. The spent carbon is either regenerated in a safe manner without discharge of dangerous waste to the air or handled as a hazardous or non-dangerous waste accordingly.

More Help

Find helpful resources at Ecology's website: www.ecy.wa.gov/programs/hwtr

Designating Dangerous Waste, www.ecy.wa.gov/biblio/96436.html

A guide for determining whether a material is a dangerous waste.

Help line for Dangerous Waste Annual Reporting (Turbowaste): 1-800-874-2022.

Shoptalk newsletter, subscribe at: www.ecy.wa.gov/programs/hwtr/shoptalkonline/

Helpful waste management information, tips, and regulatory updates.

Dangerous waste training modules: www.ecy.wa.gov/programs/hwtr/workshops/

Dangerous Waste Regulations Self Audit Checklist:

<https://fortress.wa.gov/ecy/publications/summarypages/ecy070384.html>

Be prepared. This checklist shows what dangerous waste inspectors routinely look for when they visit your site.

Dangerous Waste Regulations, Chapter 173-303 Washington Administrative Code

www.ecy.wa.gov/programs/hwtr/reg_comp_guide/173-303.HTM



Guide for Dangerous Waste (DW) Generators in Washington State Quick Reference Guide

Publication #98-1252 - HWTR

Revised June 2014

Dangerous Waste Regulations			
	Large Quantity Generator (LQG) Generates > 2,200 lbs/mo DW or >2.2 lbs/mo of Acute Hazardous Waste (AHW) or WT01 (EHW)	Medium Quantity Generator (MQG) Generates 220-2,200 lbs/mo	Small Quantity Generator (SQG) Generates <220 lbs/mo DW or <2.2 lbs/mo of Acute Hazardous Waste (AHW) or WT01 (EHW)
Dangerous Waste Designation	Determine if waste is covered by regulations. WAC 173-303-070	Determine if waste is covered by regulations. WAC 173-303-070	Determine if waste is covered by regulations. WAC 173-303-070(8),070
Identification Number and Required Notices	File DW Site Identification Form to notify and obtain ID number. WAC 173-303-060,170	File DW Site Identification Form to notify and obtain ID number. WAC 173-303-060,170	Not required. WAC 173-303-070(8)
Labeling, Marking of Waste During Accumulation	Label with the words "Hazardous Waste" or "Dangerous Waste," the start date, and the risk. WAC 173-303-200(1)(c),(1)(d)	Label with the words "Hazardous Waste" or "Dangerous Waste," the start date, and the risk. WAC 173-303-200(1)(c),(1)(d)	Major risk label required by L&I/DOSH and some local Health Departments. WAC 173-303-070(8)
Waste Generation Amount	More than 2,200 lbs/mo DW or more than 2.2 lbs/mo Acute Hazardous Waste (AHW) or WT01 (EHW). WAC 173-303-200	Between 220 lbs/mo and 2,200 lbs/mo. WAC 173-303-200	Less than 220 lbs/mo DW less than 2.2 lbs/mo AHW or WT01 (EHW). WAC 173-303-200
Waste Accumulation Amount	No volume limit. WAC 173-303-200(1)	Not to exceed a total of 2,200 lbs. WAC 173-303-201(1),(2)	Not to exceed a total of 2,200 lbs. WAC 173-303-070(8)(a)
Accumulation Time Limit	90 days. WAC 173-303-200	180 days. WAC 173-303-201(2)(a)	No limit. WAC 173-303-070(8)
Satellite Accumulation Areas	55 gallons DW or 1 quart AHW. WAC 173-303-200(2)	55 gallons DW or 1 quart AHW. WAC 173-303-200(2)	Does not apply.
Accumulation Area and General Inspections	Must be scheduled, documented, and deficiencies corrected. WAC 173-303-200(1)	Must be scheduled, documented, and deficiencies corrected. WAC 173-303-201, 202	Not required. WAC 173-303-070(8)

Dangerous Waste Regulations

	Large Quantity Generator (LQG) Generates > 2,200 lbs/mo DW or > 2.2 lbs/mo of Acute Hazardous Waste (AHW) or WT01 (EHW)	Medium Quantity Generator (MQG) Generates 220-2,200 lbs/mo	Small Quantity Generator (SQG) Generates <220 lbs/mo DW or <2.2 lbs/mo of Acute Hazardous Waste (AHW) or WT01 (EHW)
Personnel Training	Required written plan.	Familiarize employees with proper waste handling and emergency procedures. Also see Cont. Plan & Emergency Procedures below.	Written plan not required by DW regulation, but Hazard Communications required by L&I/DOSH.
	WAC 173-303-200(1)(e),330	WAC 173-303-201(2)(c)	WAC 173-303-070(8)
Preparedness and Prevention	<ul style="list-style-type: none"> Minimize fire, explosion, release. Communication systems (internal and external), fire control. Test/maintain communication and control equipment. Access to communications or alarm system. Adequate aisle space. Arrangements with local authorities. 	<ul style="list-style-type: none"> Minimize fire, explosion, release. Communication systems (internal and external), fire control. Test/maintain communication and control equipment. Access to communications or alarm system. Adequate aisle space. Arrangements with local authorities. 	Not required.
	WAC 173-303-200(1)(e)	WAC 173-303-200(1)(e)	WAC 173-303-070(8)
Contingency Plan and Emergency Procedures	<ul style="list-style-type: none"> Written plan. Arrangements with local emergency response agencies (ER). Emergency coordinator (EC) (phone, address). Emergency equipment list. Evacuation plan. Plan distribution to police, fire departments, hospitals, and local agencies. Plan must be amended if it fails in an emergency or there are changes in the facility, equipment, or personnel. EC must respond. 	<ul style="list-style-type: none"> Emergency coordinator (EC) onsite/on call. Post: EC name and phone number. Post: Location of fire extinguishers/spill control/fire alarm. Post: Fire department phone. Familiarize employees with proper waste handling and emergency procedures. EC must respond. 	Not required. Check L&I/DOSH.
	WAC 173-303-200(1)(e)	WAC 173-303-201(2)(c)	WAC 173-303-070(8)
Additional Reporting for Emergencies	Report spill, fire, explosion, release.	Report spill, fire, explosion, release.	Report spills if threat to human health and the environment.
	WAC 173-303-145,200(1)(e)	WAC 173-303-145,201(2)(c)(iv)	WAC 173-303-070(8)(b)(ii),145

Dangerous Waste Regulations

	Large Quantity Generator (LQG) Generates > 2,200 lbs/mo DW or > 2.2 lbs/mo of Acute Hazardous Waste (AHW) or WT01 (EHW)	Medium Quantity Generator (MQG) Generates 220-2,200 lbs/mo	Small Quantity Generator (SQG) Generates <220 lbs/mo DW or <2.2 lbs/mo of Acute Hazardous Waste (AHW) or WT01 (EHW)
Waste Containers	<ul style="list-style-type: none"> • Good condition. • Non-leaking. • Compatible with waste. • Closed/protected. • 30" aisle space. • Response to spills. • Leaks, emergencies. • Weekly inspections. • Ignitable, reactive, incompatible waste. • Containment system. 	<ul style="list-style-type: none"> • Good condition. • Non-leaking. • Compatible with waste. • Closed/protected. • 30" aisle space. • Response to spills. • Leaks, emergencies. • Weekly inspections. • Ignitable, reactive, incompatible waste. • Containment system. 	Manage waste in way that does not pose a threat. Local regulations may apply.
	WAC 173-303-200(1)(b), 200(1)(b)(i)	WAC 173-303-200(1)(b), 200(1)(b)(i)	WAC 173-303-070(8)
Waste Tanks	<ul style="list-style-type: none"> • Assessment. • Design, installation. • Containment, release, direction. • Operating requirements. • Daily inspections. • Response to spills, leaks. • Closure, post closure. • Ignitable, reactive, incompatible waste. 	<ul style="list-style-type: none"> • Operating requirements. • Daily/weekly inspections. • Closure, post closure. • Ignitable, reactive, incompatible waste. • Freeboard requirement. • Ignitable, reactive, incompatible waste. 	Local regulations may apply.
	WAC 173-303-200(1)(b), 200(1)(b)(i)	WAC 173-303-202	WAC 173-303-070(8)
Disposal of Dangerous Waste	Ship to permitted TSD or DW recycler. Uniform Manifest Form required.	Ship to permitted TSD or DW recycler. Uniform Manifest Form required.	Ship off-site or treat on-site: permitted TSD or permitted to manage moderate risk waste or legitimate recycle or other permitted solid waste facility.
	WAC 173-303-200(1)(a)	WAC 173-303-200(1)(a)	WAC 173-303-070(8)
Packaging, Labeling, Marking for Transport	Package, label and mark per USDOT (49 CFR).	Package, label and mark per USDOT (49 CFR).	Refer to DOT Regulations.
	WAC 173-303-190(1),(2),(3), (5),(6)	WAC 173-303-190(1),(2),(3), (5),(6)	WAC 173-303-070(8)
Placarding for Transport	Must offer placard.	Must offer placard.	Refer to DOT Regulations.
	WAC 173-303-190(4)	WAC 173-303-190(4)	WAC 173-303-070(8)
Manifest	Use for shipments off-site.	Use for shipments off-site.	Not required – only bill of lading.
	WAC 173-303-180	WAC 173-303-180	WAC 173-303-070(8)
Annual Reporting	File every year.	File every year.	File every year, if have ID#. Site Identification form only.
	WAC 173-303-220(1), 170(2)	WAC 173-303-220(1), 170(2)	WAC 173-303-070(8)(b)(iv)

Dangerous Waste Regulations

	Large Quantity Generator (LQG) Generates > 2,200 lbs/mo DW or > 2.2 lbs/mo of Acute Hazardous Waste (AHW) or WT01 (EHW)	Medium Quantity Generator (MQG) Generates 220-2,200 lbs/mo	Small Quantity Generator (SQG) Generates <220 lbs/mo DW or <2.2 lbs/mo of Acute Hazardous Waste (AHW) or WT01 (EHW)
Exception Reporting	45 days: if no signed manifest from TSD returned. WAC 173-303-170(2)	45 days: if no signed manifest from TSD returned. WAC 173-303-220(2)	Not required. WAC 173-303-070(8)
Recordkeeping	5 years: manifests 5 years: annual reports, exception reports, test results. WAC 173-303-210(1),(2),(3)(a)	5 years: manifests 5 years: annual reports, exception reports, test results. WAC 173-303-210(1),(2),(3)(a)	Not required, but encouraged. WAC 173-303-070(8)
Waste Minimization	<ul style="list-style-type: none"> • For generators > 2,640 lbs/yr: plan to minimize waste required. • Written plan and program in place to minimize hazardous waste volume, toxicity. • Submit executive summary to WDOE. • 5 year updates. WAC 173-307	<ul style="list-style-type: none"> • Good faith effort to minimize waste and selected best waste management method. • For generators > 2,640 lbs/yr: Plan to minimize waste required. • Submit executive summary to WDOE. • 5 year updates. WAC 173-307	Not required.
Recycled, Reclaimed, Recovered Waste	Depending on the circumstances, recycled used oil, recycled car batteries, other recycled wastes partially or fully exempt. WAC 173-303-120,500-525	Depending on the circumstances, recycled used oil, recycled car batteries, other recycled wastes partially or fully exempt. WAC 173-303-120,500-525	Depending on the circumstances, recycled used oil, recycled used batteries, other recycled wastes partially or fully exempt. WAC 173-303-120,500-525
Regulating Agency	Ecology	Ecology	Ecology/ County Health District
Universal Waste	Standards for universal waste management (batteries, mercury-containing equipment, and lamps). WAC 173-303-573	Standards for universal waste management (batteries, mercury-containing equipment, and lamps). WAC 173-303-573	Standards for universal waste management (batteries, mercury-containing equipment, and lamps). WAC 173-303-573

This Quick Reference Guide summarizes the requirements for each generator status under the *Dangerous Waste Regulations* (Chapter 173-303 WAC), but does not replace them. Always refer to the regulations for details or call a hazardous waste specialist at your nearest Ecology Regional Office.

Central Regional Office 509-575-2490
Northwest Regional Office 425-649-7000

Eastern Regional Office 509-329-3400
Southwest Regional Office 360-407-6300

To ask about available formats for the visually impaired please call the Hazardous Waste and Toxics Reduction Program at 360-407-6700. Persons with hearing loss can call 711 for Washington Relay Service. Persons with a speech disability can call 877-833-6341.

Inspect Your Dangerous Waste Drums

TIGHTEN BUNGS

Keep bungs tight except when adding waste to the container.

GROUND DRUMS

Prevent igniting flammable waste by grounding drums.

AISLE SPACE

Leave at least 30" of aisle space between rows of drums. Rows must be no more than two drums wide.

LATCH FUNNELS

Keep funnels closed and latched when not in use. Funnels must be screwed in with gaskets.

TIGHTEN LIDS

Make sure contents cannot spill if tipped over.

LABEL IT

Labels must be visible.

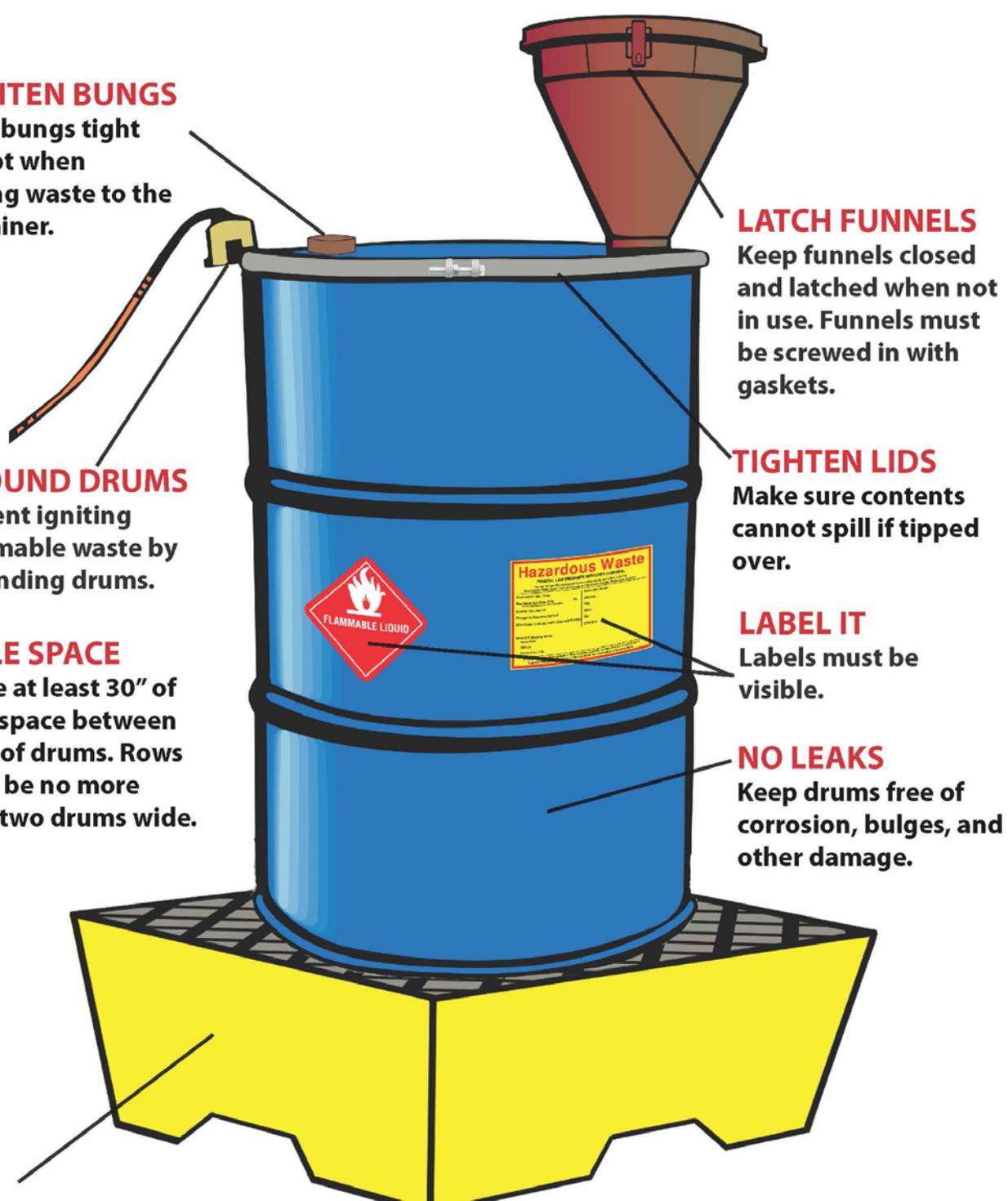
NO LEAKS

Keep drums free of corrosion, bulges, and other damage.

SECONDARY CONTAINMENT

Secondary containment must be large enough to contain 10% of the free liquid in all containers or 100% of the free liquid in the largest container, whichever is larger.

To request a large, color copy of this poster:
Call 360-407-6700
Email hwtrpubs@ecy.wa.gov



Appendix E

Street Waste Disposal

APPENDIX 6 – Street Waste Disposal

Street Waste Liquids

General Procedures:

Street waste collection should emphasize retention of solids in preference to liquids. Street waste solids are the principal objective in street waste collection and are substantially easier to store and treat than liquids.

Street waste liquids require treatment before their discharge. Street waste liquids usually contain high amounts of suspended and total solids and adsorbed metals. Treatment requirements depend on the discharge location.

Discharges to sanitary sewer and storm sewer systems must be approved by the entity responsible for operation and maintenance of the system. Ecology will not generally require waste discharge permits for discharge of stormwater decant to sanitary sewers or to stormwater treatment BMPs constructed and maintained in accordance with Ecology's Stormwater Management Manual for Western Washington.

The following order of preference, for disposal of catch basin decant liquid and water removed from stormwater treatment facilities, is required.

1. Discharge of catch basin decant liquids to a municipal sanitary sewer connected to a Public Owned Treatment Works (POTW) is the preferred disposal option.

Discharge to a municipal sanitary sewer requires the approval of the sewer authority. Approvals for discharge to a POTW will likely contain pretreatment, quantity and location conditions to protect the POTW.

2. Discharge of catch basin decant liquids may be allowed into a Basic or Enhanced Stormwater Treatment BMP, if option 1 is not available.

Decant liquid collected from cleaning catch basins and stormwater treatment wet vaults may be discharged back into the storm sewer system under the following conditions:

- The preferred disposal option of discharge to sanitary sewer is not reasonably available, and
- The discharge is to a Basic or Enhanced Stormwater Treatment Facility. If pretreatment does not remove visible sheen from oils, the treatment facility must be able to prevent the discharge of oils causing a visible sheen, and
- The discharge is as near to the treatment facility as is practical, to minimize contamination or recontamination of the collection system, and
- The storm sewer system owner/operator has granted approval and has determined that the stormwater treatment facility will accommodate the increased loading. Pretreatment conditions to protect the stormwater treatment BMP may be issued as part of the approval process. Following local pretreatment conditions is a requirement of this permit.

- Flocculants for the pretreatment of catch basin decant liquids must be non-toxic under the circumstances of use and must be approved in advance by the Department of Ecology.

The reasonable availability of sanitary sewer discharge will be determined by the Permittee, by evaluating such factors as distance, time of travel, load restrictions, and capacity of the stormwater treatment facility.

3. Water removed from stormwater ponds, vaults and oversized catch basins may be returned to the storm sewer system. Stormwater ponds, vaults and oversized catch basins contain substantial amounts of liquid, which hampers the collection of solids and pose problems if the removed waste must be hauled away from the site. Water removed from these facilities may be discharged back into the pond, vault or catch basin provided:

- Clear water removed from a stormwater treatment structure may be discharged directly to a down gradient cell of a treatment pond or into the storm sewer system.
- Turbid water may be discharged back into the structure it was removed from if
 - the removed water has been stored in a clean container (eductor truck, Baker tank or other appropriate container used specifically for handling stormwater or clean water); and
 - there will be no discharge from the treatment structure for at least 24 hours.
- The discharge must be approved by the storm sewer system owner/operator.

Street Waste Solids

Soils generated from maintenance of the MS4 may be reclaimed, recycled or reused when allowed by local codes and ordinances. Soils that are identified as contaminated pursuant to Chapter 173-350 WAC shall be disposed at a qualified solid waste disposal facility.

