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Source Control BMPs

Introduction

This manual contains materials from the 2019 Washington State Department of Ecology Stormwater Management Manual for Western Washington to provide City of Ferndale staff, residents, and businesses with information to reduce pollution to from stormwater runoff and meet requirements related to Minimum Requirement #3: Source Control of Pollution, as well as Source Control from Existing Development. Please refer to the Stormwater Management Manual for Western Washington for additional information.

How to Determine Which Source Control BMPs are Appropriate for the Site

Volume IV provides Ecology's library of Source Control BMPs. These BMPs are categorized as either "operational" or "structural", and either "applicable" or "recommended".

For the sites listed above that must implement Source Control BMPs, use the following steps to guide selection of appropriate Source Control BMPs:

1. All sites must implement the Source Control BMPs listed in IV-1 Source Control BMPs Applicable to All Sites.

2. Next, base selection of additional Source Control BMPs on land use and the pollutant generating sources at the site.
    - Use Appendix IV-A: Urban Land Uses and Pollutant Generating Sources to help determine activities and the potential pollutant generating sources associated with those activities for various land uses.
    - Applicable operational and structural Source Control BMPs for each pollutant source can then be selected by reviewing the BMPs in Volume IV, which are categorized by activity. Land uses not included in Appendix IV-A: Urban Land Uses and Pollutant Generating Sources should also consider implementing Source Control BMPs for their pollutant sources.

    For example, if a commercial printing business conducts weed control with herbicides, loading and unloading of materials, and vehicle washing, it should refer to the following BMP sections for these activities:

- S411 BMPs for Landscaping and Lawn / Vegetation Management
- S412 BMPs for Loading and Unloading Areas for Liquid or Solid Material
- S431 BMPs for Washing and Steam Cleaning Vehicles / Equipment / Building Structures
- S404 BMPs for Commercial Printing Operations

3. Within the text for each Source Control BMP, there are "applicable" and "recommended" BMPs listed.

   The reader should interpret the term “applicable” when referring to specific operational or structural Source Control BMPs as meaning “mandatory” or “required”. These BMPs must be implemented at the site.

   Ecology offers "recommended" Source Control BMPs as approaches that go beyond or complement the applicable (mandatory) BMPs. Implementing the recommended Source Control BMPs may improve control of pollutants and provide a more comprehensive and environmentally effective stormwater management program. Ecology encourages all operators to review their SWPPPs and use recommended BMPs where possible.

4. The project may have additional source control responsibilities as a result of area-specific pollution control plans (e.g., watershed or basin plans, water clean-up plans, ground water management plans, lakes management plans), ordinances, and regulations.

I-3.4.3 MR3: Source Control of Pollution

All known, available and reasonable Source Control BMPs must be applied to all projects. Source Control BMPs must be selected, designed, and maintained in accordance with this manual.

Objective

The intent of Source Control BMPs is to prevent stormwater from coming in contact with pollutants. They are a cost-effective means of reducing pollutants in stormwater and should be a first consideration in all projects.

Supplemental Guidelines

Source Control BMPs include Operational BMPs and Structural Source Control BMPs. See Volume IV for design details of these BMPs. For construction sites, see II-3.2 Construction Source Control BMPs.

Structural Source Control BMPs should be identified in the stormwater site plan and should be shown on all applicable plans submitted for local government review and approval.

An adopted and implemented Basin Plan (see Appendix I-B: Basin Plans) or Total Maximum Daily Load (see I-2.13 Total Maximum Daily Loads (TMDLs)) may be used to develop more stringent source control requirements that are tailored to a specific basin.

Identifying Source Control Strategies in a Basin Plan

Basin Plans can identify potential sources of pollution within the basin and develop strategies to eliminate or control these sources to protect beneficial uses.

A Basin Plan can include the following Source Control strategies:

1. Detection and correction of illicit discharges to storm sewer systems, including the use of dry weather sampling and dye-tracing techniques;

2. Identification of existing businesses, industries, utilities, and other activities that may store materials susceptible to spillage or leakage of pollutants into the storm sewer system or to the ground via wells, drains, or sumps;

3. Elimination or control of pollutant sources identified in (2);

4. Identification and control of future businesses, industries, utilities, and other activities which may store materials susceptible to spillage or leakage of pollutants into the storm sewer system; and

5. Training and public education

A Basin Plan that incorporates the standard requirements from this section as well as more stringent requirements does not require Ecology approval.

Executive Summary of Volume IV

Welcome to Volume IV of Ecology's 2019 Stormwater Management Manual for Western Washington. Volume IV contains a collection of operational and structural source control BMPs. Stormwater source control BMPs focus on preventing stormwater pollution from occurring, as opposed to other BMP types that reduce the volume, timing, or pollution in stormwater flows. In this Volume you will find the following:

IV-1 Source Control BMPs Applicable to All Sites through IV-7 Other Source Control BMPs provide BMPs grouped by types of activities that have the potential to produce pollution.

Appendix IV-A: Urban Land Uses and Pollutant Generating Sources identifies pollutant-generating sources at various land uses, i.e. manufacturing, transportation, communication, wholesale, retail, and service land uses.

Appendix IV-B: Management of Street Waste Solids and Liquids addresses what to do with waste generated from stormwater maintenance activities such as street sweeping, catch basin cleaning, and Flow Control and Runoff Treatment BMP maintenance.

Refer to Volumes I, II, III, and V for information on the following:

Volume I introduces the measures necessary to control the quantity and quality of stormwater produced by new development and redevelopment. It includes an introduction to stormwater management, guidance on regulatory requirements for stormwater management, and details the minimum requirements for new development and redevelopment sites.

Volume II focuses on managing stormwater impacts associated with construction activities. It discusses the need for pollution prevention for construction stormwater, details how to document construction BMPs in a construction stormwater pollution prevention plan, and includes information on how to implement construction stormwater BMPs.

Source Control BMPs

Volume III provides guidance on how to choose, hydrologically model, and document stormwater BMPs in a stormwater site plan.

Volume V contains a library of design criteria for BMPs that project proponents can use to meet I-3.4.5 MR5: On-Site Stormwater Management, I-3.4.6 MR6: Runoff Treatment, and/or I-3.4.7 MR7: Flow Contro

Source Control BMPs

IV-1 Source Control BMPs Applicable to All Sites

- S410 BMPs for Correcting Illicit Discharges to Storm Drains
- S453 BMPs for Formation of a Pollution Prevention Team
- S454 BMPs for Preventive Maintenance / Good Housekeeping
- S455 BMPs for Spill Prevention and Cleanup
- S456 BMPs for Employee Training
- S457 BMPS for Inspections
- S458 BMPs for Record Keeping

S410 BMPs for Correcting Illicit Discharges to Storm Drains

Description of Pollutant Sources: Illicit discharges are unpermitted sanitary or process wastewater discharges to a storm sewer or to surface water, rather than to a sanitary sewer, industrial process wastewater, or other appropriate treatment. They can also include swimming pool water, filter backwash, cleaning solutions/washwaters, cooling water, etc. Experience has shown that illicit discharges are common, particularly in older buildings.

Pollutant Control Approach: Identify and eliminate unpermitted discharges or obtain an NPDES permit, where necessary, particularly at industrial and commercial facilities.

Applicable Operational BMPs:

- For all real properties, responsible parties must examine their plumbing systems to identify any potential illicit discharges. Review site plans, engineering drawings, or other sources of information for the plumbing systems on the property.
- If an illicit discharge is suspected, trace the source using an appropriate method such as visual reconnaissance, smoke test, flow test, dye test with a nontoxic dye, or closed circuit television (CCTV) inspection. These tests are to be performed by qualified personnel such as a plumbing contractor. Note: Contact Ecology prior to performing a dye test which may result in a discharge to a receiving water.
- If illicit connections are found, permanently plug or disconnect the connections.
- Eliminate prohibited discharges to storm sewer, ground water, or surface water.
- Convey unpermitted discharges to a sanitary sewer if allowed by the local sewer authority, or to other approved treatment.
- Obtain all necessary permits for altering or repairing side sewers and plumbing fixtures. Restrictions on certain types of discharges, particularly industrial process waters, may require pretreatment of discharges before they enter the sanitary sewer. It is the responsibility of the property owner or business operator to obtain the necessary permits and to replace the connection.
- Obtain appropriate state and local permits for these discharges.

Source Control BMPs

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 discharge.
- 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.

S453 BMPs for Formation of a Pollution Prevention Team

The pollution prevention team should be responsible for implementing and maintaining all BMPs and treatment for the site. This team should be able to address any corrective actions needed on site to mitigate potential stormwater contamination. The team members should:

- Consist of those people who are familiar with the facility and its operations.
- Possess the knowledge and skills to assess conditions and activities that could impact stormwater quality at your facility, and who can evaluate the effectiveness of control measures.
- Assign pollution prevention team staff to be on duty on a daily basis to cover applicable permittee facilities when those facilities are in operation.
- Have the primary responsibility for developing and overseeing facility activities necessary to comply with stormwater requirements.
- Have access to all applicable permit, monitoring, SWPPP, and other records.
- Be trained in the operation, maintenance and inspections of all BMPs and reporting procedures.
- Establish responsibilities for inspections, operation, maintenance, and emergencies.
- Regularly meet to review overall facility operations and BMP effectiveness.

S454 BMPs for Preventive Maintenance / Good Housekeeping

Preventative maintenance and good housekeeping practices reduce the potential for stormwater to come into contact with pollutants and can reduce maintenance intervals for the drainage system and sewer system.

Applicable BMPs:

- Prevent the discharge of unpermitted liquid or solid wastes, process wastewater, and sewage to ground or surface water, or to storm drains that discharge to surface water, or to the ground. Conduct all oily parts cleaning, steam cleaning, or pressure washing of equipment or containers inside a building, or on an impervious contained area, such as a concrete pad. Direct contaminated stormwater from such an area to a sanitary sewer where allowed by local sewer authority, or to other approved treatment.
- Promptly contain and clean up solid and liquid pollutant leaks and spills including oils, solvents, fuels, and dust from manufacturing operations on an exposed soil, vegetation, or paved area.
- If a contaminated surface must be pressure washed, collect the resulting washwater for proper disposal (usually involves plugging storm drains, or otherwise preventing discharge and pumping or vactoring up washwater, for discharge to sanitary sewer or for vactor truck transport to a waste water treatment plant for disposal).
- Do not hose down pollutants from any area to the ground, storm drains, conveyance ditches, or receiving water. Convey pollutants before discharge to a treatment system approved by the local jurisdiction.
- Sweep all appropriate surfaces with vacuum sweepers quarterly, or more frequently as needed, for the collection and disposal of dust and debris that could contaminate stormwater. Use mechanical sweepers, and manual sweeping as necessary to access areas that a vacuum sweeper can't reach to ensure that all surface contaminants are routinely removed.
- Do not pave over contaminated soil unless it has been determined that ground water has not been and will not be contaminated by the soil. Call Ecology for assistance.

Source Control BMPs

- Construct impervious areas that are compatible with the materials handled. Portland cement concrete, asphalt, or equivalent material may be considered.
- Use drip pans to collect leaks and spills from industrial/commercial equipment such as cranes at ship/boat building and repair facilities, log stackers, industrial parts, trucks and other vehicles stored outside.
- At industrial and commercial facilities, drain oil and fuel filters before disposal. Discard empty oil and fuel filters, oily rags, and other oily solid waste into appropriately closed and properly labeled containers, and in compliance with the Uniform Fire Code or International Building Code.
- For the storage of liquids use containers, such as steel and plastic drums, that are rigid and durable, corrosion resistant to the weather and fluid content, non-absorbent, water tight, rodent-proof, and equipped with a close fitting cover.
- For the temporary storage of solid wastes contaminated with liquids or other potential polluted materials use dumpsters, garbage cans, drums, and comparable containers, which are durable, corrosion resistant, non-absorbent, non-leaking, and equipped with either a solid cover or screen cover to prevent littering. If covered with a screen, the container must be stored under a roof or other form of adequate cover.
- Where exposed to stormwater, use containers, piping, tubing, pumps, fittings, and valves that are appropriate for their intended use and for the contained liquid.
- Clean oils, debris, sludge, etc. from all stormwater facilities regularly, including catch basins, settling/detention basins, oil/water separators, boomed areas, and conveyance systems to prevent the contamination of stormwater. Refer to Ecology Requirements for Generators of Dangerous Wastes in I-2.15 Other Requirements for references to assist in handling potentially dangerous waste.
- Promptly repair or replace all substantially cracked or otherwise damaged paved secondary containment, high-intensity parking, and any other drainage areas, subjected to pollutant material leaks or spills. Promptly repair or replace all leaking connections, pipes, hoses, valves, etc., which can contaminate stormwater.
- Do not connect floor drains in potential pollutant source areas to storm drains, surface water, or to the ground.

Source Control BMPs

Recommended BMPs:

- Where feasible, store potential stormwater pollutant materials inside a building or under a cover and/or containment.
- Minimize use of toxic cleaning solvents, such as chlorinated solvents, and other toxic chemicals.
- Use environmentally safe raw materials, products, additives, etc. such as substitutes for zinc used in rubber production.
- Recycle waste materials such as solvents, coolants, oils, degreasers, and batteries to the maximum extent feasible. Contact Ecology's *Hazardous Waste & Toxics Reduction Program* at https://ecology.wa.gov/About-us/Get-to-know-us/Our-Programs/Hazardous-Waste-Toxics-Reduction for recommendations on recycling or disposal of vehicle waste liquids and other waste materials.
- Empty drip pans immediately after a spill or leak is collected in an uncovered area.
- Stencil warning signs at stormwater catch basins and drains, e.g., “Dump no waste – Drains to waterbody”.
- Use solid absorbents, e.g., clay and peat absorbents and rags for cleanup of liquid spills/leaks, where practicable.
- Promptly repair/replace/reseal damaged paved areas at industrial facilities.
- Recycle materials, such as oils, solvents, and wood waste, to the maximum extent practicable.

Note: Evidence of stormwater contamination by oils and grease can include the presence of visible sheen, color, or turbidity in the runoff, or present or historical operational problems at the facility. Operators can use simple pH tests, for example with litmus or pH paper. These tests can screen for high or low pH levels (anything outside a 6.5-8.5 range) due to contamination in stormwater.

S455 BMPs for Spill Prevention and Cleanup

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

Applicable BMPs:

Spill Prevention

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

Spill Plan

- Develop and implement a spill plan and update it annually or whenever there is a change in activities or staff responsible for spill cleanup. Post a written summary of the plan at areas with a high potential for spills, such as loading docks, product storage areas, waste storage areas, and near a phone. The spill plan may need to be posted at multiple locations. Describe the facility, including the owner's name, address, and telephone number; the nature of the facility activity; and the general types of chemicals used at the facility.
- Designate spill response employees to be on-site during business activities. Provide a current list of the names and telephone numbers (home and office) of designated spill response employees who are responsible for implementing the spill plan.

Source Control BMPs

- Provide a site plan showing the locations of storage areas for chemicals, inlets/catch basins, spill kits and other relevant infrastructure or materials information.
- Describe the emergency cleanup and disposal procedures. Note the location of all spill kits in the spill plan.
- List the names and telephone numbers of public agencies to contact in the event of a spill.

Spill Cleanup Kits

- Store all cleanup kits near areas with a high potential for spills so that they are easily accessible in the event of a spill. The contents of the spill kit must be appropriate to the types and quantities of materials stored or otherwise used at the facility, and refilled when the materials are used. Spill kits must be located within 25 feet of all fueling/fuel transfer areas, including on-board mobile fuel trucks.

  Note: Ecology recommends that the kit(s) include salvage drums or containers, such as high density polyethylene, polypropylene or polyethylene sheet-lined steel; polyethylene or equivalent disposal bags; an emergency response guidebook; safety gloves/clothes/equipment; shovels or other soil removal equipment; and oil containment booms and absorbent pads; all stored in an impervious container.

Spill Cleanup and Proper Disposal of Waste

- Stop, contain, and clean up all spills immediately upon discovery.
- Implement the spill plan immediately.
- Contact the designated spill response employees.
- Block off and seal nearby inlets/catch basins to prevent materials from entering the drainage system or combined sewer.
- Use the appropriate material to clean up the spill.
- Do not use emulsifiers or dispersants such as liquid detergents or degreasers unless disposed of proplerly. Emulsifiers and dispersants are not allowed to be used on surface water, or in a place where they may enter storm drains, surface waters, treatments systems, or sanitary sewers.

Source Control BMPs

- Immediately notify Ecology and the local jurisdiction if a spill has reached or may reach a sanitary or storm sewer, ground water, or surface water. Notification must comply with state and federal spill reporting requirements.
- Do not wash absorbent material into interior floor drains or inlets/catch basins.
- Place used spill control materials in appropriate containers and dispose of according to regulations.

S456 BMPs for Employee Training

Train all employees that work in pollutant source areas about the following topics:

- Identifying Pollution Prevention Team Members.
- Identifying pollutant sources.
- Understanding pollutant control measures.
- Spill prevention and response.
- Emergency response procedures.
- Handling practices that are environmentally acceptable. Particularly those related to vehicle/equipment liquids such as fuels, and vehicle/equipment cleaning.

Additional specialized training may be needed for staff who will be responsible for handling hazardous materials.

S457 BMPS for Inspections

Qualified personnel shall conduct inspections monthly. Make and maintain a record of each inspection on-site. The following requirements apply to inspections:

- Be conducted by someone familiar with the facility's site, operations, and BMPs.
- Verify the accuracy of the pollutant source descriptions in the SWPPP.
- Assess all BMPs that have been implemented for effectiveness and needed maintenance and locate areas where additional BMPs are needed.
- Reflect current conditions on the site.
- Include written observations of the presence of floating materials, suspended solids, oil and grease, discoloration, turbidity and odor in the stormwater discharges; in outside vehicle maintenance/repair; and liquid handling, and storage areas. In areas where acid or alkaline materials are handled or stored use a simple litmus or pH paper to identify those types of stormwater contaminants where needed.
- Eliminate or obtain a permit for unpermitted non-stormwater discharges to storm drains or receiving waters, such as process wastewater and vehicle/equipment washwater.
- Identify actions to address inspection deficiencies.

S458 BMPs for Record Keeping

See the applicable permit for specific record-keeping requirements and retention schedules for the following reports. At a minimum, retain the following reports for five years:

- Inspection reports which should include:
  - Time and date of the inspection
  - Locations inspected
  - Statement on status of compliance with the permit
  - Summary report of any remediation activities required
  - Name, title, and signature of person conducting the inspection
- Reports on spills of oil or hazardous substances in greater than Reportable Quantities (Code of Federal Regulations Title 40 Parts 302.4 and 117). Report spills of the following: antifreeze, oil, gasoline, or diesel fuel, that cause:
  - A violation of the State of Washington's Water Quality Standards.
  - A film or sheen upon or discoloration of the waters of the State or adjoining shorelines.
  - A sludge or emulsion to be deposited beneath the surface of the water or upon adjoining shorelines.

  To report a spill or to determine if a spill is a substance of a Reportable Quantity, call the Ecology regional office and ask for an oil spill operations or a dangerous waste specialist:

  - Northwest Region (425)649-7000
  - Southwest Region (360)407-6300
  - Eastern Region (509)329-3400
  - Central Region (509) 575-2490

  In addition, call the Washington Emergency Management Division at 1-800-258-5990 or 1-800-OILS-911 AND the National Response Center at 1-800-424-8802.

  Also, refer to *Focus on Emergency Spill Response* (Ecology, 2009).

Source Control BMPs

The following is additional recommended record keeping:

Maintain records of all related pollutant control and pollutant generating activities such as training, materials purchased, material use and disposal, maintenance performed, etc.

IV-2 Cleaning or Washing Source Control BMPs

- S431 BMPs for Washing and Steam Cleaning Vehicles / Equipment / Building Structures
- S434 BMPs for Dock Washing
- S441 BMPs for Potable Water Line Flushing, Water Tank Maintenance, and Hydrant Testing

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.

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

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 *Vehicle and Equipment Washwater Discharges Best Management Practices Manual* (Ecology, 2012).

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 operations 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.
- Use a two way valve for discharges from the containment pad. This valve should be normally switched to direct water to treatment, but may be switched to the drainage system after that pad is clean to handle stormwater runoff. 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.

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

- 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.
- Sweep surfaces prior to cleaning/washing to remove excess sediment and other pollutants.
- If roof equipment or hood vents are cleaned, ensure that no washwater or process water is discharged to the roof drains or drainage systems.
- Label all mobile cleaning equipment as follows: "Properly dispose of all wastewater. Do not discharge to an inlet/catch basin, ditch, stream, or on the ground."

Recommended Additional BMPs:

- Mark the wash area at gas stations, multifamily 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.
- Minimize the use of water and detergents in washing operations when practicable.
- Use phosphate-free biodegradable detergents when practicable.
- Use the least hazardous cleaning products available.
- Consider recycling the washwater.

Source Control BMPs

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.

S434 BMPs for Dock Washing

Description of Pollutant Sources: Washing docks (or wharves, piers, floats, and boat ramps) can result in the discharge dirt, bird feces, soaps, and detergents that can be toxic to aquatic life, especially after they take on contaminants while cleaning. The BMPs in this section do not address dry docks, graving docks, or marine railway cleaning operations.

Pollutant Control Approach: Use dry methods and equipment (scraping, sweeping, vacuuming) to remove debris and contaminants prior to cleaning with water to prevent these substances from entering surface water.

Applicable Operational BMPs:

Surface Preparation and Spot Cleaning

- Scoop and collect debris and bird feces.
- Sweep, capture, and dispose of debris from the dock as solid waste. Sweep or vacuum docks to minimize the need for chemical cleaners.
- During cleaning activities, if debris, substances, or wash water could enter surface waters through drains, temporarily block the drains and collect the water for proper disposal.
- Hose down the area if necessary and collect water as feasible.
- Try spot cleaning with water and a coarse cloth before using soaps or detergents.
- If a cleaner is needed for spot cleaning:
    - Mix it in a bucket and use it to scrub down only the areas that need extra attention.
    - Start with vinegar and baking soda and move to other options as needed. Spot clean using a rag if harsher cleaning products are needed.
    - Avoid or minimize the use of petroleum distillates, chlorinated solvents, and ammoniated cleaning agents.
    - Use degreasers or absorbent material to remove residual grease by hand and do not allow this material to enter surface water.
    - Keep cleaners in sealed containers. Keep cleaner containers closed securely when transporting between the shore and docks.
    - Properly dispose of the dirty bucket water.

- Minimize the scour impact of wash water to any exposed soil at the landward end(s) of the dock or below the dock. Place a tarp over exposed soil, plant vegetation, or put berms to contain eroded soil.

Dock Washing and Disposal

- To the extent practicable, collect any wash water generated from hosing down, pressure washing, or cleaning dock areas, and dispose of it properly.
- The following video, provided courtesy of the Port of Seattle, highlights the methods they have developed to collect wash water generated during dock washing.

- Try pressure washing using light pressure. This uses less water and decreases the need for soap and scrubbing when washing the dock. Avoid using excessive pressure, which may damage the dock or send flakes of paint and other material into the water.
- Do not place any debris and substances resulting from cleaning activities in shoreline areas, riparian areas, or on adjacent land where these substances may erode into waters of the state.
- Where treated wood associated with the structure being washed are present, use non-abrasive methods and tools that, to the maximum extent practicable, minimize removal of the creosote or treated wood fibers when it removes marine growth from creosote or any other treated wood.
- Do not discharge removed marine growth to waters of the state where such marine growth would accumulate on the sea bed.
- Do not discharge emulsifiers, dispersants, solvents, or other toxic deleterious materials to waters of the state.

S441 BMPs for Potable Water Line Flushing, Water Tank Maintenance, and Hydrant Testing

Description of Pollutant Sources: Flushing is a common maintenance activity used to improve pipe hydraulics and to remove pollutants in systems. Flushing done improperly can result in the discharge of solids to receiving waters. Hydrant testing may result in the discharge of rust particles.

Chemicals used in line flushing and tank maintenance are highly toxic to aquatic organisms and can degrade receiving waters.

Pollutant Control Approach: Dechlorinate and pH adjust water used for flushing, tank maintenance, or hydrant testing. Dispose of the water to the sanitary sewer if possible.

Applicable Operational BMPs:

- Remove solids from associated curbs and gutters before flushing water. Use erosion and sediment control BMPs such as BMP C235: Wattles, BMP C220: Inlet Protection, etc. to collect any solids resulting from flushing activities.
- If using super chlorination or chemical treatment as part of flushing, discharge water to the sanitary sewer. If sanitary sewer is not available, the water may be infiltrated to the ground as long as all of the following are met:
    - The water is dechlorinated to a total residual chlorine of 0.1 ppm or less.
    - Water quality standards are met.
    - A diffuser is used to prevent erosion.
    - The water does not cross property lines.
- Discharging water to a drainage system requires approval from the local jurisdiction. Check with the local jurisdiction to determine their requirements for approval. Most jurisdictions will require the water to be dechlorinated to a total residual chlorine concentration of 0.1 ppm or less and pH adjusted if necessary. Water must be volumetrically and velocity controlled to prevent resuspension of sediments or pollutants in the Municipal Separate Storm Sewer System (MS4).
- Do not over apply dechlorination agents. This can deplete the dissolved oxygen concentration and reduce the pH in discharge / receiving waters.

Source Control BMPs

Optional Operational BMPs:

- If possible, design flushing to convey accumulated material to strategic locations, such as to the sanitary sewer or to a treatment facility; thus, preventing re-suspension and overflow of a portion of the solids during storm events.
- If possible, conduct flushing and tank maintenance activities on non-rainy days and during the time of year that poses the least risk to aquatic biota.

Optional Treatment BMPs:

- Treatment for dechlorinating can include an application of a stoichiometric quantity of:
    - Ascorbic Acid, Sodium Ascorbate (Vitamin C)
    - Calcium Thiosulfate
    - Sodium Sulfite tablets
    - Sodium Thiosulfate
    - Sodium Bisulfite
    - Alternate Dechlorination Solutions

IV-3 Roads, Ditches, and Parking Lot Source Control BMPs

- S405 BMPs for Deicing and Anti-Icing Operations for Airports
- S406 BMPs for Streets and Highways
- S415 BMPs for Maintenance of Public and Private Utility Corridors and Facilities
- S416 BMPs for Maintenance of Roadside Ditches
- S417 BMPs for Maintenance of Stormwater Drainage and Treatment Systems
- S421 BMPs for Parking and Storage of Vehicles and Equipment
- S430 BMPs for Urban Streets

S405 BMPs for Deicing and Anti-Icing Operations for Airports

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 airport runways, taxiways, and on aircraft to control ice and snow. Typically, ethylene glycol and propylene glycol are deicers used on aircraft. Deicers commonly used on runways, taxiways, and other hard surfaces 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.

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 S428 BMPs for Storage of Liquids in Permanent 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 S429 BMPs for Storage or Transfer (Outside) of Solid Raw Materials, Byproducts, 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 and Highways

Description of Pollutant Sources: These BMPs apply to the maintenance and deicing/anti-icing of streets and highways. Deicing products can be conveyed during storm events to inlets/catch basins or to receiving waters after application. Leaks and spills of these products can also occur during their handling and storage. Equipment and processes using during maintenance can contribute pollutants such as oil and grease, suspended solids, turbidity, high pH, and metals.

Pollutant Control Approach: Apply good housekeeping practices, preventative maintenance, properly train employees, and use materials that cause less adverse effects on the environment.

Applicable BMPs:

Deicing and Anti-Icing Operations

- Adhere to manufacturer's guidelines and industry standards of use and application.
- Store and transfer de and anti-icing materials on impervious containment pads, or an equivalent spill/leak containment area in accordance with S429 BMPs for Storage or Transfer (Outside) of Solid Raw Materials, Byproducts, or Finished Products.
- Sweep/clean up accumulated de and anti-icing materials and grit from roads as soon as possible after the road surface clears.
- Minimize use in areas where runoff or spray from the roadway immediately enters sensitive areas such as fish-bearing streams.

Maintenance Operations

- Use drip pans or absorbents wherever concrete, asphalt, asphalt emulsion, paint product, and drips are likely to spill, such as beneath discharge points from equipment.
- Cover and contain nearby storm drains to keep runoff from entering the drainage system.

Source Control BMPs

- Collect and contain all solids, slurry, and rinse water. Do not allow these to enter gutters, storm drains, or drainage ditches or onto the paved surface of a roadway or driveway.
- Designate an area onsite for washing hand tools and collect that water for disposal.
- Conduct all fueling of equipment in accordance with S419 BMPs for Mobile Fueling of Vehicles and Heavy Equipment.
- Do not use diesel fuel for cleaning or prepping asphalt tools and equipment.
- Sweep areas as frequently as needed. Collect all loose aggregate and dust for disposal. Do not hose down areas into storm drains.
- Store all fuel, paint, and other products on secondary containment.
- Conduct paint striping operations during dry weather.

Recommended Additional BMPs:

- Where feasible and practicable, use roadway deicing chemicals that cause the least adverse environmental impact. Apply only as needed using minimum quantities. Consider the Pacific Northwest Snowfighters Qualified Products List when selecting roadway de-icers and anti-icers.
- Intensify roadway and drainage structure cleaning in early spring to help remove particulates from road surfaces.
- Include limits on toxic metals in the specifications for de/anti-icers.
- Install catch basin inserts to collect excess sediment and debris as necessary. Inspect and maintain catch basin inserts to ensure they are working correctly.
- Research admixtures (e.g. corrosion inhibitors, surfactants) to determine what additional pollutants may be an issue. Verify with the local jurisdiction if there are any restrictions on admixtures.

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

Description of Pollutant Sources: Corridors and facilities at petroleum product pipelines, natural gas pipelines, water pipelines, 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: Implementation of spill control plans as well as control of fertilizer and pesticide applications, soil erosion, and site debris that can contaminate stormwater.

Applicable Operational BMPs:

- Minimize the amount of herbicides and other pesticides used to maintain access roads and facilities.
- Implement S411 BMPs for Landscaping and Lawn / Vegetation Management.
- Comply with WSDA Pesticide Regulations (see I-2.15 Other Requirements).
- 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 Requirements for Stormwater Discharges to Public Sanitary Sewers, Septic Systems, Dead-End Sumps, and Industrial Waste Treatment Systems and Ecology Requirements for Generators of Dangerous Wastes in I-2.15 Other Requirements).

- Stabilize access roads or areas of bare ground with gravel, crushed rock, or another method to prevent erosion. Use and manage vegetation to minimize bare ground/soils that may be susceptible to erosion.
- 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 (see http://www.awpa.com/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 (see S411 BMPs for Landscaping and Lawn / Vegetation Management).

Additional Regulations: Note that work in wet areas may be regulated by local, state, or federal regulations that impose additional obligations on the responsible party. Check with the appropriate authorities prior to beginning work in those areas.

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.
- Do not apply fertilizer unless needed to maintain vegetative growth.
- 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.
- Use temporary erosion and sediment control measures or re-vegetate as necessary to prevent erosion during ditch reshaping.

- 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 as described below:
    - 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, see Appendix IV-B: Management of Street Waste Solids and Liquids.
    - 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. Maintain trash racks to avoid damage, blockage, or erosion of culverts.

Recommended Treatment BMPs:

Install biofiltration swales and filter strips (see V-7 Biofiltration BMPs) 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 other pollutants from stormwater collection, conveyance, and treatment systems to maintain proper operation.

Applicable Operational BMPs:

Maintain stormwater treatment facilities per the operations and maintenance (O&M) procedures presented in Appendix V-A: BMP Maintenance Tables 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's *Catch Basin Type 1L* (WSDOT, 2011)) 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.

- Properly dispose of all solids, polluted material, and stagnant water collected through system cleaning. Do not decant water back into the drainage system from eductor trucks or vacuum equipment since there may be residual contaminants in the cleaning equipment. Do not jet material downstream into the public drainage system.
- Clean woody debris in a catch basin as frequently as needed to ensure proper operation of the catch basin.
- 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 Appendix IV-B: Management of Street Waste Solids and Liquids.

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 meets the site use thresholds to determine if the site is expected to generate high concentrations of oil, as defined in Step 2: Determine if an Oil Control BMP is Required in III-1.2 Choosing Your Runoff Treatment BMPs, provide oil removal equipment for the contaminated stormwater runoff.

Applicable Operational BMPs:

- If a parking lot must be washed, 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. Mechanical or hand sweeping may be necessary for areas where a vacuum sweeper cannot reach.
- Clean up vehicle and equipment fluid drips and spills immediately.
- Place drip pans below leaking vehicles (including inoperative vehicles and equipment) in a manner that catches leaks or spills, including employee vehicles. Drip pans must be managed to prevent overfilling and the contents disposed of properly.

Recommended Operational BMPs:

- Encourage employees to repair leaking personal vehicles.
- Encourage employees to carpool or use public transit through incentives.
- Encourage customers to use public transit by rewarding valid transit pass holders with discounts.
- Install catch basin inserts to collect excess sediment and oil if necessary. Inspect and maintain catch basin inserts to ensure they are working correctly.

Source Control BMPs

Applicable Treatment BMPs:

Establishments subject to 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.

Refer to Step 2: Determine if an Oil Control BMP is Required in III-1.2 Choosing Your Runoff Treatment BMPs for the site use thresholds that determine if an oil control BMP is required, and for a list of oil control BMPs.

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.

  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 et al., 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 et al., 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 et al., 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, receiving water, 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.

Source Control BMPs

- 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 Appendix IV-B: Management of Street Waste Solids and Liquids.
- Consider developing ordinances that prohibit citizens from putting yard debris in the street gutters, or doing vehicle maintenance on the street.
- Provide incentives to property owners for installing permeable pavement parking areas and driveways.
- Consider installing catch basin inserts in high use areas to remove trash and yard debris before it enters the system.
- Implement a storm drain stenciling program to label and educate the public not to dump materials into storm drains or onto sidewalks, streets, parking lots, and gutters.
- Provide household hazardous waste collection and used oil recycling for citizens to avoid illegal dumping.

IV-4 Soil Erosion, Sediment Control, and Landscaping Source Control BMPs

- S407 BMPs for Dust Control at Disturbed Land Areas and Unpaved Roadways and Parking Lots
- S408 BMPs for Dust Control at Manufacturing Areas
- S411 BMPs for Landscaping and Lawn / Vegetation Management
- S425 BMPs for Soil Erosion and Sediment Control at Industrial Sites
- S435 BMPs for Pesticides and an Integrated Pest Management Program
- S444 BMPs for the Storage of Dry Pesticides and Fertilizers
- S449 BMPs for Nurseries and Greenhouses
- S450 BMPs for Irrigation

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

Note: Contact the local air quality authority for appropriate and required BMPs for dust control to implement at your project site. Use the following website to determine the air quality authority for the project site:

https://ecology.wa.gov/About-us/Our-role-in-the-community/Partnerships-committees/Clean-air-agencies

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 dust suppressant chemicals that are approved by the local jurisdiction and/or state government approved dust suppressant chemicals such as those listed in *Alternatives to Hazardous Materials: Techniques for Dust Prevention and Suppression* (Ecology, 2016b).
- 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.
- Protect inlets/catch basins during application of dust suppressants.
- 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.

- Street gutters, sidewalks, driveways, and other paved surfaces in the immediate area of the activity must be swept regularly to collect and properly dispose of dust, dirt, loose debris, and garbage.
- Install catch basin filter socks on site and in surrounding catch basins to collect sediment and debris. Maintain the filters regularly to prevent plugging.

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* (Cowherd et al., 1988) and *Fugitive Dust Background Document and Technical Information Document for Best Available Control Measures* (USEPA, 1992).
- 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.

Note: Construction site dust control is covered in BMP C140: Dust Control.

S408 BMPs for Dust Control at Manufacturing Areas

Note: Contact the local air quality authority for appropriate and required BMPs for dust control to implement at your project site. Use the following website to determine the air quality authority for the project site:

https://ecology.wa.gov/About-us/Our-role-in-the-community/Partnerships-committees/Clean-air-agencies

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.

Pollutant Control Approach: Prevent dust generation and emissions where feasible, regularly clean-up dust that can contaminate stormwater, and convey dust contaminated stormwater to proper treatment.

Applicable BMPs:

- Clean, as needed, powder material handling equipment and vehicles.
- Regularly sweep dust accumulation areas that can contaminate stormwater. Conduct sweeping using vacuum filter equipment to minimize dust generation and to ensure optimal dust removal.
- Use dust filtration/collection systems such as baghouse filters, cyclone separators, etc. to control vented dust emissions that could contaminate stormwater. Control of zinc dusts in rubber production is one example.
- Maintain on-site controls to prevent vehicle track-out.
- Maintain dust collection devices on a regular basis.

Recommended BMPs:

- In manufacturing operations, train employees to handle powders carefully to prevent generation of dust.

- Use water spray to flush dust accumulations to sanitary sewers where allowed by the local sewer authority or to other appropriate treatment system.
- Use approved dust suppressants such as those listed in *Methods for Dust Control* (Ecology, 2016b). Application of some products may not be appropriate in close proximity to receiving waters or conveyances close to receiving waters. For more information check with Ecology or the local jurisdiction.

Recommended Treatment BMPs

Install sedimentation basins, wet ponds, wet vaults, catch basin filters, vegetated filter strips, or equivalent sediment removal BMPs.

S411 BMPs for Landscaping and Lawn / Vegetation Management

Description of Pollutant Sources: Landscaping can include grading, soil transfer, vegetation planting, and vegetation removal. Examples include weed control on golf course lawns, access roads, and utility corridors and during landscaping; and residential lawn/plant care. Proper management of vegetation can minimize excess nutrients and pesticides.

Pollutant Control Approach: Maintain appropriate vegetation to control erosion and the discharge of stormwater pollutants. Prevent debris contamination of stormwater. Where practicable, grow plant species appropriate for the site, or adjust the soil properties of the site to grow desired plant species.

Applicable BMPs:

- Install engineered soil/landscape systems to improve the infiltration and regulation of stormwater in landscaped areas.
- Select the right plants for the planting location based on proposed use, available maintenance, soil conditions, sun exposure, water availability, height, sight factors, and space available.
- Ensure that plants selected for planting are not on the noxious weed list. For example, butterfly bush often gets planted as an ornamental but is actually on the noxious weed list.

  The Washington State Noxious Weed List can be found at the following webpage:

  https://www.nwcb.wa.gov/printable-noxious-weed-list

- Do not dispose of collected vegetation into waterways or storm sewer systems.
- Do not blow vegetation or other debris into the drainage system.
- Dispose of collected vegetation such as grass clippings, leaves, sticks by composting or recycling.
- Remove, bag, and dispose of class A & B noxious weeds in the garbage immediately.

Source Control BMPs

- Do not compost noxious weeds as it may lead to spreading through seed or fragment if the composting process is not hot enough.
- Use manual and/or mechanical methods of vegetation removal (pincer-type weeding tools, flame weeders, or hot water weeders as appropriate) rather than applying herbicides, where practical.
- Use at least an eight-inch "topsoil" layer with at least 8 percent organic matter to provide a sufficient vegetation-growing medium.
    - 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.
        - The fungus causes no known adverse effects to the host plant or to humans.
        - Tall fescues and rye grasses do not repel root-feeding lawn pests such as Crane Fly larvae.
        - Tall fescues and rye grasses are toxic to ruminants such as cattle and sheep
    - 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: BMP C120: Temporary and Permanent Seeding, BMP C121: Mulching, BMP C123: Plastic Covering, and BMP C124: Sodding.
- Adjusting the soil properties of the subject site can assist in selection of desired plant species. Consult a soil restoration specialist for site-specific conditions.

Source Control BMPs

Recommended Additional BMPs:

- Conduct mulch-mowing whenever practicable.
- Use native plants in landscaping. Native plants do not require extensive fertilizer or pesticide applications. Native plants may also require less watering.
- Use mulch or other erosion control measures on soils exposed for more than one week during the dry season (May 1 to September 30) or two days during the rainy season (October 1 to April 30).
- 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.
- Apply an annual topdressing application of 3/8" compost. Amending existing landscapes and turf systems by increasing the percent organic matter and depth of topsoil can:
    - Substantially improve the permeability of the soil.
    - Increase the disease and drought resistance of the vegetation.
    - Reduces the demand for fertilizers and pesticides.
- Disinfect gardening tools after pruning diseased plants to prevent the spread of disease.
- Prune trees and shrubs in a manner appropriate for each species.
- If specific plants have a high mortality rate, assess the cause and replace with another more appropriate species.
- When working around and below mature trees, follow the most current American National Standards Institute (ANSI) ANSI A300 standards (see http://www.tcia.org/TCIA/BUSINESS/ANSI_A300_Standards_/TCIA/BUSINESS/A300_Standards/A300_Standards.aspx?hkey=202ff566-4364-4686-b7c1-2a365af59669) and International Society of Arboriculture BMPs to the extent practicable (e.g., take care to minimize any damage to tree roots and avoid compaction of soil).
- Monitor tree support systems (stakes, guys, etc.).
    - Repair and adjust as needed to provide support and prevent tree damage.
    - Remove tree supports after one growing season or maximum of 1 year.
    - Backfill stake holes after removal.
- When continued, regular pruning (more than one time during the growing season) is required to maintain visual sight lines for safety or clearance along a walk or drive, consider relocating the plant to a more appropriate location.

- Make reasonable attempts to remove and dispose of class C noxious weeds.
- Re-seed bare turf areas until the vegetation fully covers the ground surface.
- Watch for and respond to new occurrences of especially aggressive weeds such as Himalayan blackberry, Japanese knotweed, morning glory, English ivy, and reed canary grass to avoid invasions.
- Plant and protect trees per BMP T5.16: Tree Retention and Tree Planting.
- 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.
- 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.
    - Mowing is a stress-creating activity for turfgrass.
    - Grass decreases its productivity when mowed 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.

Additional BMP Information:

- King County's *Best Management Practices for Golf Course Development and Operation* (King County, 1993) has additional BMPs for Turfgrass Maintenance and Operation.
- King County, Seattle Public Utilities, and the Saving Water Partnership have created the following natural lawn and garden care resources that include guidance on building healthy soil with compost and mulch, selecting appropriate plants, watering, using alternatives to pesticides, and implementing natural lawn care techniques.
    - *Natural Yard Care - Five steps to make your piece of the planet a healthier place to live* (King County and SPU, 2008)
    - *The Natural Lawn & Garden Series: Smart Watering* (Saving Water Partnership, 2006)
    - *Natural Lawn Care for Western Washington* (Saving Water Partnership, 2007)

    - *The Natural Lawn & Garden Series: Growing Healthy Soil; Choosing the Right Plants; and Natural Pest, Weed and Disease Control* (Saving Water Partnership, 2012)
- The International Society of Arboriculture (ISA) is a group that promotes the professional practice of arboriculture and fosters a greater worldwide awareness of the benefits of trees through research, technology, and education. ISA standards used for managing trees, shrubs, and other woody plants are the American National Standards Institute (ANSI) A300 standards. The ANSI A300 standards are voluntary industry consensus standards developed by the Tree Care Industry Association (TCIA) and written by the Accredited Standards Committee (ASC). The ANSI standards can be found on the ISA website: www.isa-arbor.com/education/publications/index.aspx
- Washington State University's *Gardening in Washington State* website at http://gardening.wsu.edu contains Washington State specific information about vegetation management based on the type of landscape.
- See the *Pacific Northwest Plant Disease Management Handbook* (Pscheidt and Ocamb, 2016) for information on disease recognition and for additional resources.

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:

- Limit the exposure of erodible soil.
- Stabilize entrances/exits to prevent track-out. See BMP C105: Stabilized Construction Access.
- Stabilize or cover erodible soil to prevent erosion. Cover practice options include:
    - Use vegetative cover such as grass, trees, shrubs, on erodible soil areas.
    - Cover exposed areas with mats such as clear plastic, jute, synthetic fiber. See BMP C122: Nets and Blankets and BMP C123: Plastic Covering.
    - Preserve natural vegetation including grass, trees, shrubs, and vines when possible. See BMP C101: Preserving Natural Vegetation.
- If stabilizing or covering the erodible soil is not possible, then structural controls must be implemented. Structural practice options include:
    - Vegetated swales
    - BMP C200: Interceptor Dike and Swale
    - BMP C233: Silt Fence
    - BMP C207: Check Dams
    - BMP C232: Gravel Filter Berm
    - Sedimentation basin
    - Proper grading
    - Paving

For design information refer to II-3 Construction Stormwater BMPs.

S435 BMPs for Pesticides and an Integrated Pest Management Program

Description of Pollutant Sources: Pesticides include herbicides, rodenticides, insecticides, fungicides, etc. Examples of pesticide uses include:

- Weed control on golf course lawns, access roads, utility corridors and landscaping.
- Sap stain and insect control on lumber and logs.
- Rooftop moss removal.
- Killing nuisance rodents.
- Fungicide application to patio decks.

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 pesticides can cause appreciable stormwater contamination and unintended impacts to non-targeted organisms.

Pollutant Control Approach: Control of pesticide applications to prevent contamination of stormwater. Develop and implement an Integrated Pest Management (IPM) Plan. Carefully apply pesticides, in accordance with label requirements.

Applicable Operational BMPs:

- Train employees on proper application of pesticides and disposal practices.
- Follow manufacturers' application guidelines and label requirements.
- Do not apply pesticides in quantities that exceed the limits on the product the Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA) label. Avoid excessive application of chemical.
- Conduct spray applications during weather conditions as specified in the label requirements and applicable local and state regulations. Do not apply during rain or immediately before expected rain (unless the label directs such timing).
- Clean up any spilled pesticides immediately. Do not hose down to a storm drain, conveyance ditch, or water body.

Source Control BMPs

- Remove weeds/vegetation in stormwater ditches, stormwater facilities, and drainage systems by hand or other mechanical means and only use pesticides as a last resort.
- 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.
- Refer to S411 BMPs for Landscaping and Lawn / Vegetation Management and use pesticides only as a last resort.
- 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 thuringiens 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.
- Mix pesticides and clean the application equipment under cover in an area where accidental spills will not enter surface or ground waters, and will not contaminate the soil.
- The pesticide application equipment must be capable of immediate shutoff in the event of an emergency.
- Implement a pesticide-use plan and include at a minimum:
    - A list of selected pesticides and their specific uses.
    - Brands and formulations of the pesticides.
    - Application methods and quantities to be used.
    - Equipment use and maintenance procedures.
    - Safety, storage, and disposal methods.
    - Monitoring, record keeping, and public notice procedures. All procedures shall conform to the requirements of Chapter 17.21 RCW and Chapter 16-228 WAC.
- Develop and implement an Integrated Pest Management (IPM) program if pests are present. The following steps are adapted from (Daar, 1992).
    - **Step One:** Correctly identify problem pests and understand their life cycle.
        - Learn more about the pest.
        - Observe it and pay attention to any damage that may be occurring.
        - Learn about the life cycle.
        - Many pests are only a problem during certain seasons, or can only be treated effectively in certain phases of the life cycle.
    - **Step Two:** Establish tolerance thresholds for pests.

        - Decide on the level of infestation that must be exceeded before treatment needs to be considered. Pest populations under this threshold should be monitored but don't need treatment.
    - **Step Three:** Monitor to detect and prevent pest problems.
        - Monitor regularly to anticipate and prevent major pest outbreaks.
        - Conduct a visual evaluation of the lawn or landscape's condition. Take a few minutes before mowing to walk around and look for problems.
        - Keep a notebook, record when and where a problem occurs, then monitor for it at about the same time in future years.
        - Specific monitoring techniques can be used in the appropriate season for some potential problem pests, such as European crane fly.
    - **Step Four:** Modify the maintenance program to promote healthy plants and discourage pests.
        - Review your landscape maintenance practices to see if they can be modified to prevent or reduce the problem.
        - A healthy landscape is resistant to most pest problems. Lawn aeration and overseeding along with proper mowing height, fertilization, and irrigation will help the grass out-compete weeds.
        - Correcting drainage problems and letting soil dry out between waterings in the summer may reduce the number of crane-fly larvae that survive.
    - **Step Five:** If pests exceed the tolerance thresholds:
        - Consider the most effective management options concurrent with reducing impacts to the environment. This may mean chemical pesticides are the best option in some circumstances.
        - Consider the use of physical, mechanical, or biological controls.
        - Study to determine what products are available and choose a product that is the least toxic and has the least non-target impact.
    - **Step Six:** Evaluate and record the effectiveness of the control, and modify maintenance practices to support lawn or landscape recovery and prevent recurrence.
        - Keep records!
        - Note when, where, and what symptoms occurred, or when monitoring revealed a potential pest problem.

    - Note what controls were applied and when, and the effectiveness of the control.
    - Monitor next year for the same problems.

Recommended Additional Operational BMPs:

- 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.
- Choose pesticides categorized by EPA as reduced risk. For example, the herbicide imazamox.
- When possible, apply pesticides during the dry season so that the pesticide residue is degraded prior to the next rain event.
- If possible, do not spray pesticides within 100 feet of water bodies. Spraying pesticides within 100 feet of water bodies including any drainage ditch or channel that leads to open water may have additional regulatory requirements beyond just following the pesticide product label. Additional requirements may include:
    - Obtaining a discharge permit from Ecology.
    - Obtaining a permit from the local jurisdiction.
    - Using an aquatic labeled pesticide and adjuvant.
- Use manual pest control strategies such as physically scraping moss from rooftops, high-pressure sprayers to remove moss, and rodent traps.
- 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.
- Once a pesticide is applied, evaluate its effectiveness for possible improvement. Records should be kept showing the effectiveness of the pesticides applied.
- Follow the FIFRA label requirements for disposal. If the FIFRA label does not have disposal requirements the rinseate from equipment cleaning and/or triple-rinsing of pesticide containers should be used as product or recycled into product.
- Develop an and adaptive management plan and annual evaluation procedure including: (adapted from (Daar, 1992))
    - A review of the effectiveness of pesticide applications.

- Impact on buffers and sensitive areas, including potable wells. 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.
- Public concerns.
- Recent toxicological information on pesticides used/proposed for use.

Additional Information

For more information, refer to the Pesticide Information Center Online (PICOL) Databases at http://cru66.cahe.wsu.edu/LabelTolerance.html.

Washington pesticide law requires most businesses that commercially apply pesticides to the property of another to be licensed as a Commercial Applicator from the Washington State Department of Agriculture.

S444 BMPs for the Storage of Dry Pesticides and Fertilizers

Description of Pollutant Sources: Pesticides such as pentachlorophenol, carbamates, and organometallics can be released to the environment as a result of container leaks and outside storage of pesticide-contaminated materials and equipment. Inappropriate management of pesticides or fertilizers can result in stormwater contamination. Runoff contaminated by pesticides and fertilizers can severely degrade streams and lakes and adversely affect fish and other aquatic life.

Pollutant Control Approach: Store fertilizer and pesticide properly to prevent stormwater contamination.

Applicable Structural BMPs:

Store pesticides and fertilizers in enclosed impervious containment areas that prevent precipitation or unauthorized personnel from coming into contact with the materials.

Applicable Operational BMPs:

- Containers and bags must be covered, intact, and off the ground.
- Store all material so that it cannot come into contact with water.
- Immediately clean up any spilled fertilizer or pesticides.
- Keep pesticide and fertilizer contaminated waste materials in designated covered and contained areas, and dispose of properly.
- Store and maintain spill cleanup materials near the storage area.
- Sweep paved storage areas as needed. Collect and dispose of spilled materials. Do not hose down the area.
- Do not discharge pesticide contaminated stormwater or spills/leaks of pesticides to storm sewers or to the sanitary sewer. Contaminated stormwater must be collected and disposed of properly. Unused or spilled/leaked pesticides must be disposed of according to the label.
- Comply with WAC 16-228-1220 and Chapter 16-229 WAC.

S449 BMPs for Nurseries and Greenhouses

Description of Pollutant Sources: These BMPs are for use by commercial container plant, greenhouse grown, and cut foliage production operations. Common practices at nurseries and greenhouses can cause elevated levels of phosphorus, nitrogen, sediment, bacteria, and organic material which can contribute to the degradation of water quality.

Pollutant Control Approach: Minimize the pollutants that leave the site by controlling the placement of materials, stabilizing the site, and managing irrigation water.

Applicable Operational BMPs:

- Establish nursery composting areas, soil storage, and mixing areas at least 100 feet away from any stream or other surface water body and as far away as possible from drainage systems.
- Do not dispose of collected vegetation into waterways or storm sewer systems.
- Do not blow, sweep, or otherwise allow vegetation or other debris into the drainage system.
- Regularly clean up spilled potting soil to prevent its movement, especially if fertilizers and pesticides are incorporated. (Haver, 2014)
- Use soil mixing and layering techniques with composted organic material to reduce herbicide use and watering.
- Utilize soil incorporated with fertilizers and / or pesticides immediately; do not store for extended periods. (Haver, 2014)
- Cover soil storage and compost storage piles. Refer to S429 BMPs for Storage or Transfer (Outside) of Solid Raw Materials, Byproducts, or Finished Products.
- Dispose of pathogen-laced potting substrate and diseased plants appropriately.
- Place plants on gravel, geotextile, or weed cloth to allow infiltration and minimize erosion, including inside greenhouse structures. (Haver, 2014)
- Properly reuse, recycle, or dispose of used polyfilm, containers, and other plastic-based products so that they do not collect stormwater. (FDACS, 2014)
- Evaluate and manage irrigation to reduce runoff, sediment transport, and erosion.

  - Place irrigation inputs to keep moisture primarily in the plant's root zone. This will significantly reduce nutrient related impacts from fertilizers. (FDACS, 2014)
  - Avoid over-irrigating. This may exceed the soil's water-holding capacity and lead to runoff or leaching. (FDACS, 2014)
  - Consider and adjust as needed the uniformity of application, the amount of water retained within the potting substrate, and the amount of water that enters containers compared to that which exits the containers and / or falls between containers. (FDACS, 2014)
  - Consolidate containers and turn off irrigation in areas not in production. This may require individual on / off valves at each sprinkler head. (Haver, 2014)
  - Based on the stage of plant growth, space containers and flats as close as possible to minimize the amount of irrigation water that falls between containers. (FDACS, 2014)
  - Group plants of similar irrigation needs together. (FDACS, 2014)
  - Consider minimizing water losses by using cyclic irrigation (multiple applications of small amounts). (FDACS, 2014)
  - Consider using sub-irrigation systems (e.g. capillary mat, ebb-and-flow benches, and trays or benches with liners); these systems can conserve water and reduce nutrient loss, particularly when nutrients are supplied in irrigation water that is reused. (FDACS, 2014)
  - Refer to S450 BMPs for Irrigation for additional BMP considerations.
- Refer to S443 BMPs for Fertilizer Application and S435 BMPs for Pesticides and an Integrated Pest Management Program.

Applicable Structural BMPs:

- Use windbreaks or other means (e.g. pot in pot) to minimize plant blowover. (FDACS, 2014)
- Cover potting areas with a permanent structure to minimize movement of loose soil. Use a temporary structure if a permanent structure is not feasible. (Haver, 2014)
- Control runoff from central potting locations that have a watering station used to irrigate plants immediately after potting. Either:
  - Collect runoff in a small basin and reuse the runoff.

    - Or, route runoff through an onsite vegetative treatment area.
    - Or, use a graveled area and allow runoff to infiltrate.
- Surround soil storage and compost storage areas with a berm or wattles.
- Utilize a synthetic (geotextile) groundcover material to stabilize disturbed areas and prevent erosion in areas where vegetative cover is not an option. (FDACS, 2014)
- In areas with a large amount of foot traffic, use appropriate aggregate such as rock and gravel for stabilization. (FDACS, 2014)
- Store potting substrate that contains fertilizer in a dedicated area with an impermeable base. If the storage area is not under a roof to protect it from rainfall, manage runoff by directing it to a stormwater treatment area. (FDACS, 2014)

S450 BMPs for Irrigation

Description of Pollutant Sources: Irrigation consists of discharges from irrigation water lines, landscape irrigation, and lawn or garden watering. Excessive watering can lead to discharges of chlorinated potable water runoff into drainage systems; it can also cause erosion; and negatively affect plant health. Improper irrigation can encourage pest problems, leach nutrients, and make a lawn completely dependent on artificial watering. Mosquito breeding habitats may form through excessive watering.

Pollutant Control Approach: Limit the amount and location of watering to prevent runoff and discharges to drainage systems.

Applicable Operational BMPs:

- Irrigate with the minimum amount of water needed. Never water at rates that exceed the infiltration rate of the soil.
- Maintain all irrigation systems so that irrigation water is applied evenly and where it is needed.
- Ensure sprinkler systems do not overspray vegetated areas resulting in excess water discharging into the drainage system.
- Inspect irrigated areas for excess watering. Adjust watering times and schedules to ensure that the appropriate amount of water is being used to minimize runoff. Consider factors such as soil structure, grade, time of year, and type of plant material in determining the proper amounts of water for a specific area.
- Inspect irrigated areas regularly for signs of erosion and / or discharge.
- Place sprinkler systems appropriately so that water is not being sprayed on impervious surfaces instead of vegetation.
- Repair broken or leaking sprinkler nozzles as soon as possible.
- Appropriately irrigate lawns based on the species planted, the available water holding capacity of the soil, and the efficiency of the irrigation system.
    - 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.

- Do not irrigate plants during or immediately after fertilizer application. The longer the period between fertilizer application and irrigation, the less fertilizer runoff occurs.
- Do not irrigate plants during or immediately after pesticide application (unless the pesticide label directs such timing).
- Reduce frequency and / or intensity of watering as appropriate for the wet season (October 1 to April 30).
- Place irrigation systems to ensure that plants receive water where they need it. For example, do not place irrigation systems downgradient of plant's root zones on hillsides.

Recommended Operational BMPs:

- Add a tree bag or slow-release watering device (e.g., bucket with a perforated bottom) for watering newly installed trees when irrigation system is not present.
- Water deeply, but infrequently, so that the top 6 to 12 inches of the root zone is moist.
- Use soaker hoses or spot water with a shower type wand when an irrigation system is not present.
    - Pulse water to enhance soil absorption, when feasible.
    - Pre-moisten soil to break surface tension of dry or hydrophobic soils/mulch, followed by several more passes. With this method, each pass increases soil absorption and allows more water to infiltrate prior to runoff.
- Identify trigger mechanisms for drought-stress (e.g., leaf wilt, leaf senescence, etc.) of different species and water immediately after initial signs of stress appear.
- Water during drought conditions or more often if necessary to maintain plant cover.
- Adjust irrigation frequency / intensity as appropriate after plant establishment.
- Annually inspect irrigation systems to ensure:
    - That there are no blockages of sprayer nozzles.
    - Sprayer nozzles are rotating as appropriate.
    - Sprayer systems are still aligned with the plant locations and root zones.
- Consult with the local water utility, Conservation District, or Cooperative Extension office to help determine optimum irrigation practices.

- Do not use chemigation and fertigation in irrigation systems. This will help avoid over application of pesticides and fertilizers.

IV-5 Storage and Stockpiling Source Control BMPs

- S427 BMPs for 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, Byproducts, or Finished Products
- S445 BMPs for Temporary Fruit Storage

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 potential pollution generating materials or wastes. These BMPs do not apply when Ecology has permitted the business to store the wastes (see Standards for Solid Waste Containers in I-2.15 Other Requirements). 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. For storage areas on-site for less than 30 days, consider using a portable temporary secondary system like that shown in Figure IV-5.1: Secondary Containment System in lieu of a permanent system as described above.

Applicable Operational BMPs:

- Place tight-fitting lids on all containers.
- Label all containers appropriately. Store containers so that the labels are clearly visible.
- 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.
- Empty drums containing residues should be stored to prevent stormwater from entering drum closures. Cover or tilt drums to prevent stormwater from accumulating on the top of empty drums and around drum closures.
- Store containers that do not contain free liquids in a designated sloped area with the containers elevated or otherwise protected from stormwater run-on. Comply with local fire code.

- 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 IV-5.2: 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 Ecology Requirements for Generators of Dangerous Wastes within I-2.15 Other Requirements.
- Storage of flammable, ignitable, and reactive chemicals and materials must comply with the stricter of local zoning codes, local fire codes, the Uniform Fire Code (UFC), UFC standards, or the National Electric Code
- Have spill kits or cleanup materials near container storage areas.
- Clean up all spills immediately.
- Cover dumpsters, or keep them under cover such as a lean-to, to prevent the entry of stormwater. Keep dumpster lids closed.
- Replace or repair leaking garbage dumpsters, or install waterproof liners.
- Drain dumpsters and/or dumpster pads to sanitary sewer where approved by the sewer authority.
- When collection trucks directly pick up roll-containers, ensure a filet is on both sides of the curb to facilitate moving the dumpster.

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 IV-5.3: Covered and Bermed Containment Area). Slope the secondary containment to drain into a dead-end sump for the collection of leaks and small spills.
- For liquid materials, surround the containers with a dike as illustrated in Figure IV-5.3: Covered and Bermed Containment Area. 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.
- Where material is temporarily stored in drums, use a containment system as illustrated, in lieu of the above system (see Figure IV-5.1: Secondary Containment System).

- 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 IV-5.4: Mounted Container - With Drip Pan).

Applicable Treatment BMP:

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

- To discharge contaminated stormwater, pump it from a dead-end sump or catchment and dispose of appropriately.

Figure IV-5.1: Secondary Containment System

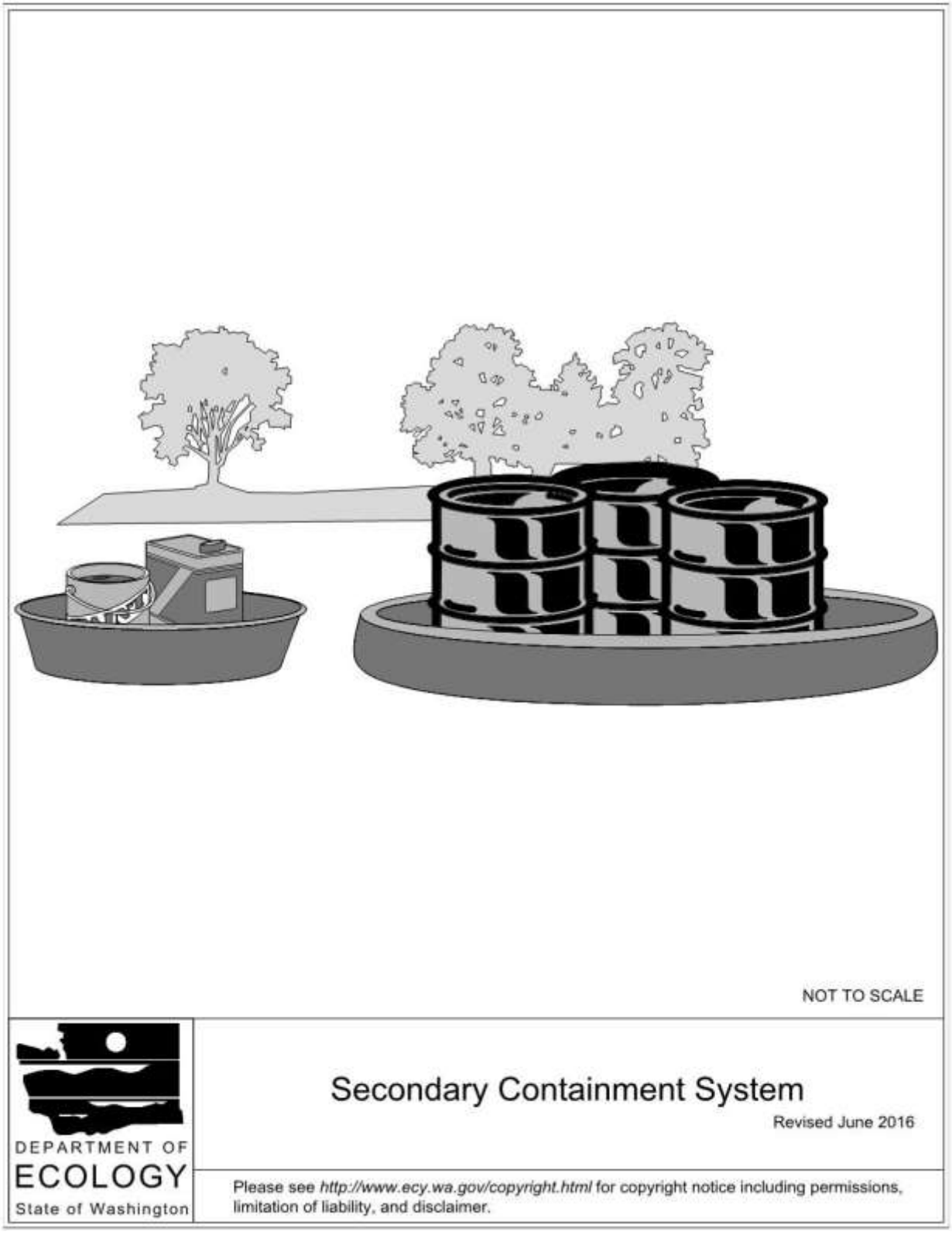

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Figure IV-5.2: Locking System for Drum Lid

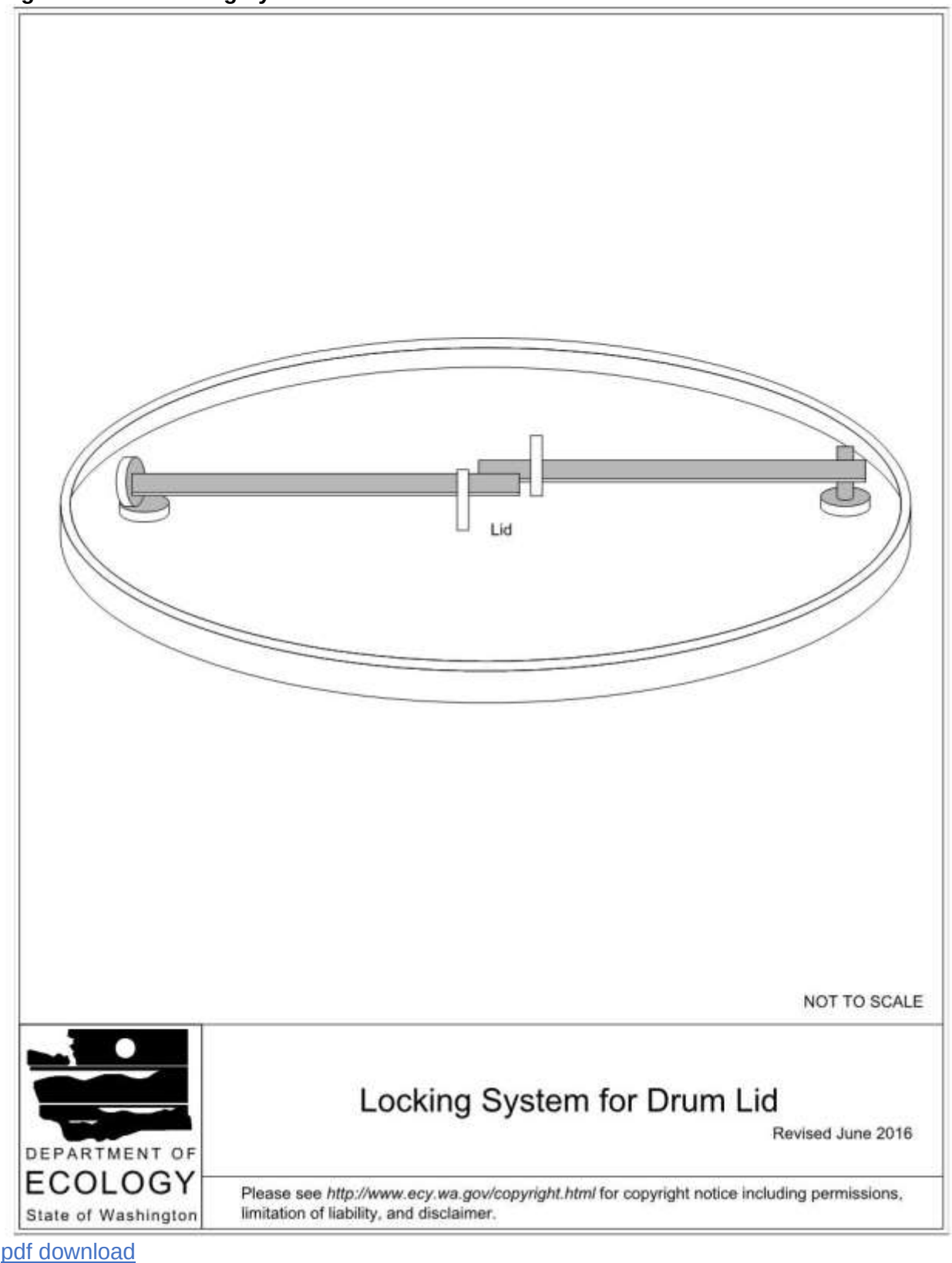

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Figure IV-5.3: Covered and Bermed Containment Area

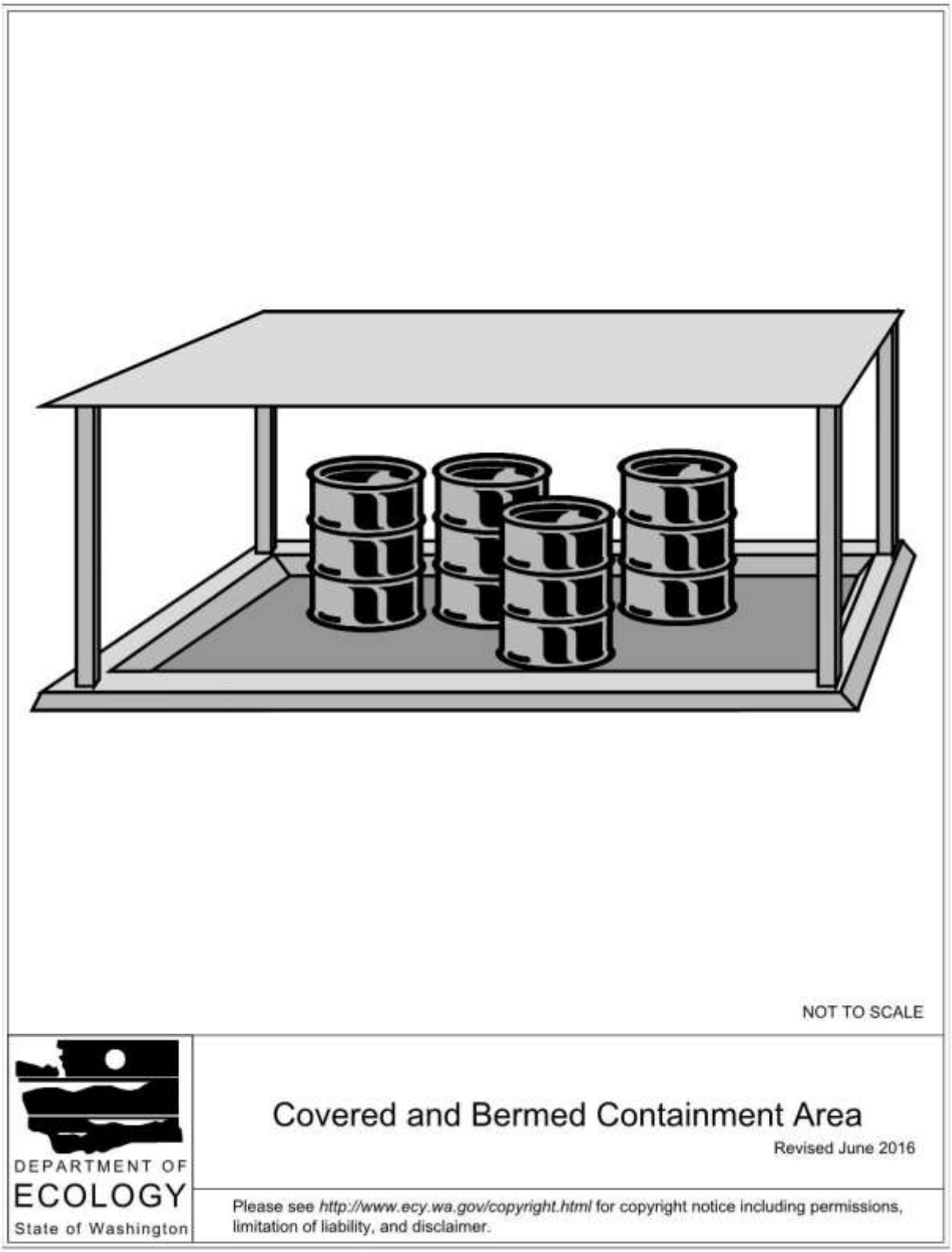

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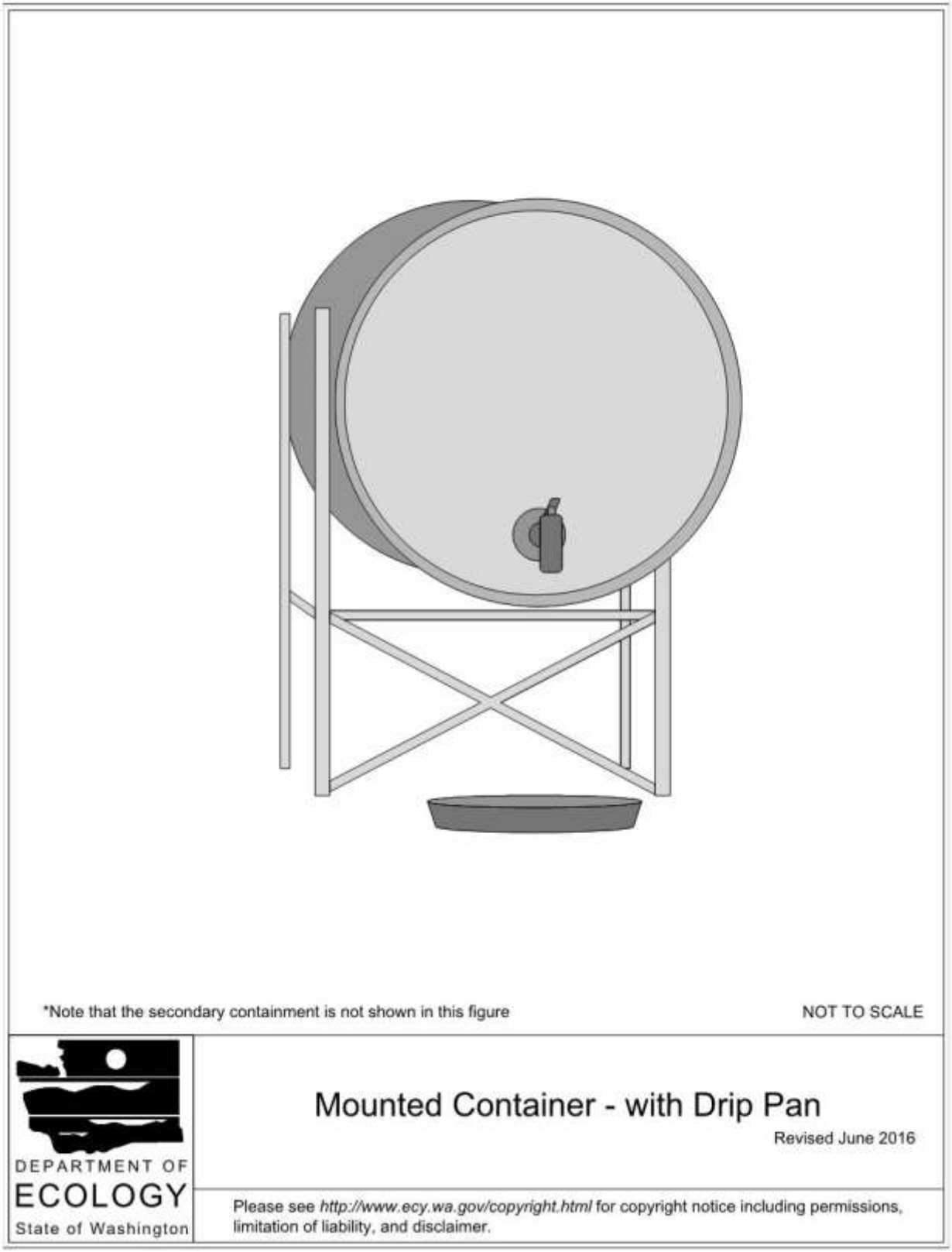
Figure IV-5.4: Mounted Container - With Drip Pan



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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 a Runoff Treatment BMP such as BMP T11.10: API (Baffle type) Separator or BMP T11.11: Coalescing Plate (CP) Separator, or an equivalent BMP. Add safeguards against accidental releases including protective guards around tanks to protect against vehicle or forklift damage, and tagging valves to reduce human error. *Tank water and condensate discharges are process wastewater that may need an NPDES Permit.*

Applicable Operational BMPs:

- Inspect the tank containment areas regularly for leaks/spills, cracks, corrosion, etc. to identify problem components such as fittings, pipe connections, and valves.
- Place adequately sized drip pans beneath all mounted taps and drip/spill locations during filling/unloading of tanks. Operators may need valved drain tubing in mounted drip pans.
- Vacuum sweep and clean the tank storage area regularly, if paved.
- Replace or repair tanks that are leaking, corroded, or otherwise deteriorating.
- Storage of flammable, ignitable, and reactive chemicals and materials must comply with the stricter of local zoning codes, local fire codes, the Uniform Fire Code (UFC), UFC standards, or the National Electric Code.

Source Control BMPs

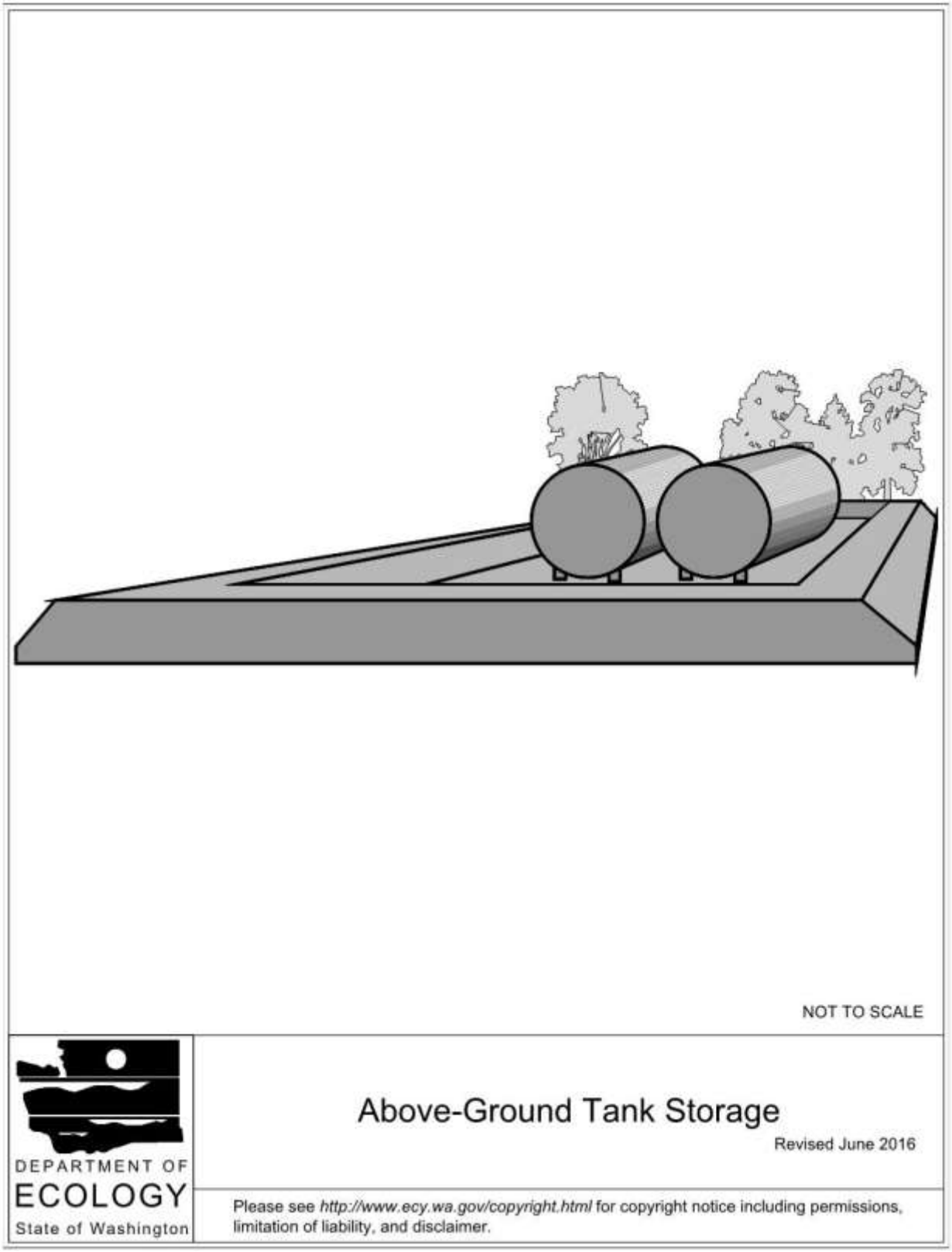
Applicable Structural BMPs:

- Inspect the tank containment areas regularly for leaks/spills, cracks, corrosion, etc. to identify problem components such as fittings, pipe connections, and valves.
- Place adequately sized drip pans beneath all mounted taps and drip/spill locations during filling/unloading of tanks. Operators may need valved drain tubing in mounted drip pans.
- Vacuum sweep and clean the tank storage area regularly, if paved.
- Replace or repair tanks that are leaking, corroded, or otherwise deteriorating.
- Storage of flammable, ignitable, and reactive chemicals and materials must comply with the stricter of local zoning codes, local fire codes, the Uniform Fire Code (UFC), UFC standards, or the National Electric Code.

Applicable Treatment BMPs:

- Depending on the kind of liquid being stored, the potential and type of stormwater contamination will vary and may require specialized treatment.
- 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 to a sanitary sewer with the sewer authority's approval or through BMP T11.10: API (Baffle type) Separator or BMP T11.11: Coalescing Plate (CP) Separator, or other approved treatment prior to discharge to the storm drain or surface water.

Figure IV-5.5: Above-Ground Tank Storage



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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 BMPs:

- Do not hose down the contained stockpile area to a storm drain or a conveyance to a storm drain, or to a receiving water.
- 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.

Applicable Structural BMPs:

For stockpiles less than 5 cubic yards, place temporary plastic sheeting (polyethylene, polypropylene, hypalon, or equivalent) over the material as shown in Figure IV-5.7: Material Covered with Plastic Sheeting.

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 Control BMPs:

- Store in a building or paved and bermed covered area as shown in Figure IV-5.6: Covered Storage Area for Bulk Solids.

- Place temporary plastic sheeting (polyethylene, polypropylene, hypalon, or equivalent) over the material as shown in Figure IV-5.7: Material Covered with Plastic Sheeting.

- Pave the area and install a drainage system. Place curbs or berms along the perimeter of the area to prevent the run-on of uncontaminated stormwater and to collect and convey runoff to 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 BMPs:

Convey contaminated stormwater from the stockpile area to:

- BMP T10.10: Wetponds - Basic and Large,
- BMP T10.20: Wetvaults,
- BMP T6.10: Presettling Basin,
- Manufactured Treatment Device (see V-10 Manufactured Treatment Devices as BMPs, or

Figure IV-5.6: Covered Storage Area for Bulk Solids

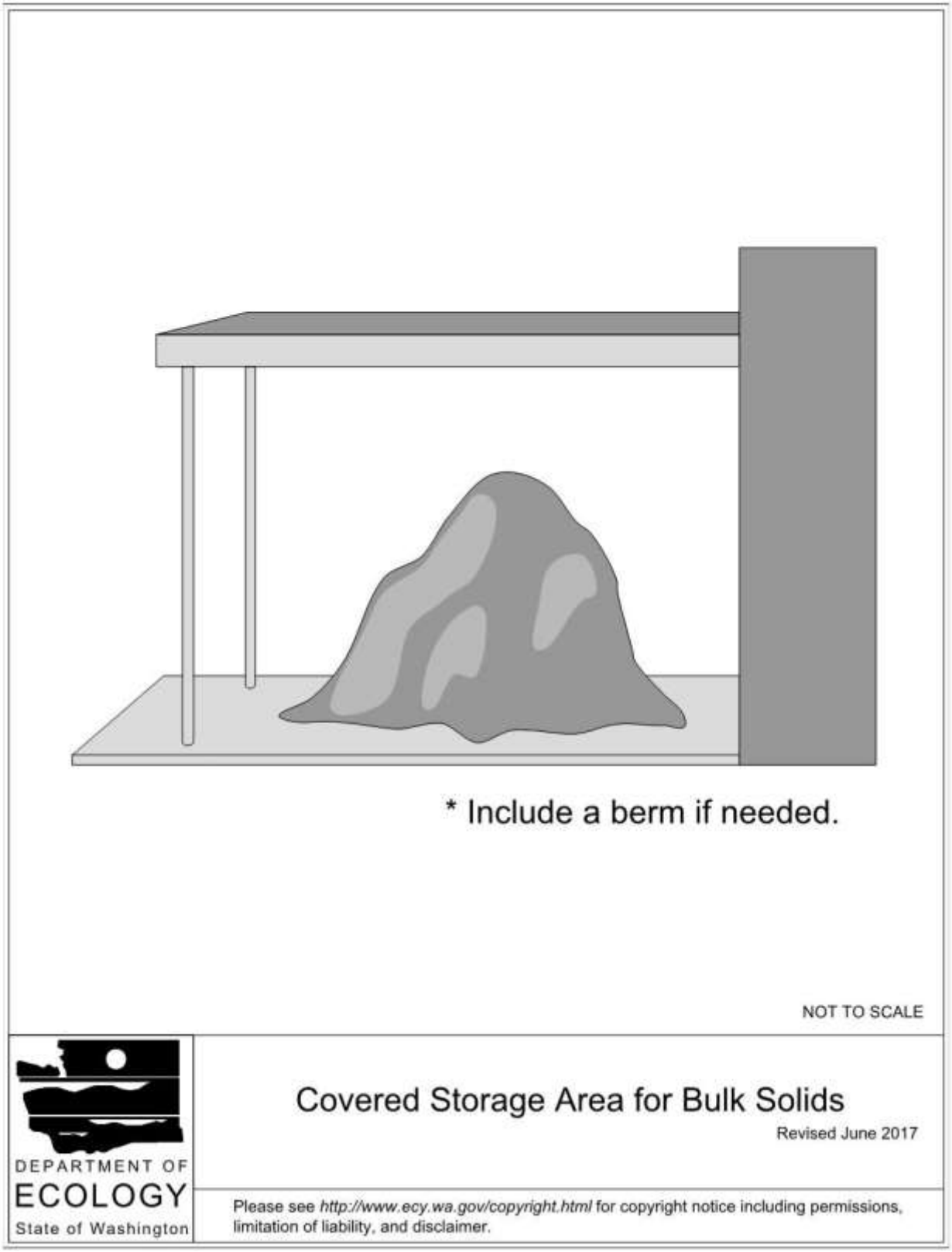

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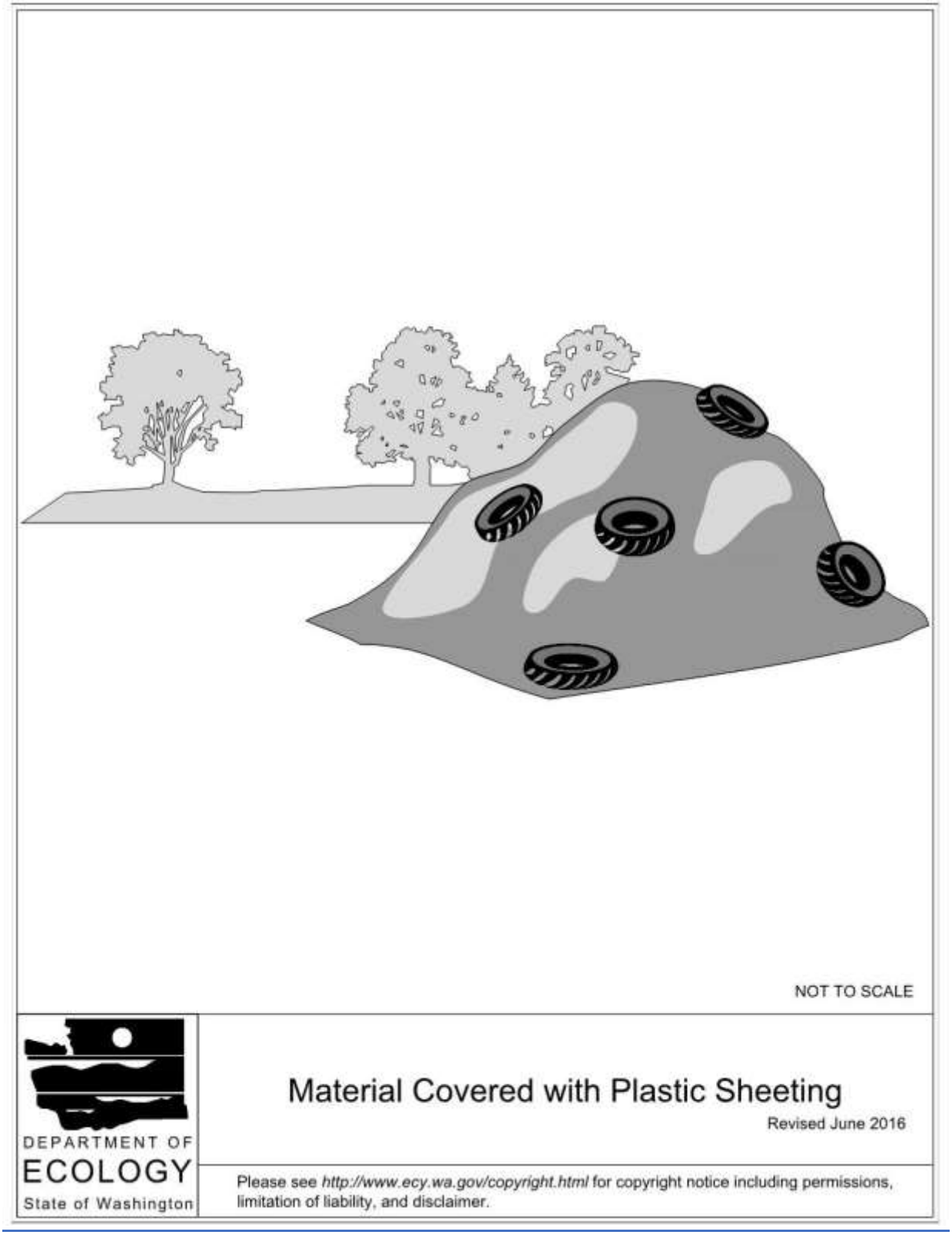
Figure IV-5.7: Material Covered with Plastic Sheeting



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S445 BMPs for Temporary Fruit Storage

Description of Pollutant Sources: This activity applies to businesses that temporarily store fruits and vegetables outdoors prior to or after packing, processing, or sale, or that crush, cut, or shred fruits or vegetables for wines, frozen juices, and other food and beverage products.

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

Pollutant Control Approach: Store and process fruits and vegetables indoors or under cover whenever possible. Educate employees about proper procedures. Cover and contain operations and apply good housekeeping and preventive maintenance practices to prevent the contamination of stormwater.

Applicable Operational BMPs:

- Educate employees on the benefits of keeping a clean storage area.
- Keep fruits, vegetables, and grains stored outside for longer than a day in plastic bins or in bins lined with plastic. The edge of the plastic liner should be higher than the amount of fruit stored or should drape over the side of the bin.
- Dispose of rotten fruit, vegetables, and grains in a timely manner (typically, within a week).
- Make sure all outside materials that have the potential to leach or spill to the drainage system are covered, contained, or moved to an indoor location. For fruits, vegetables, and grains stored outside for a week or more, cover with a tarp or other waterproof material. Make sure coverings are secured from wind.
- Minimize the use of water when cleaning produce to avoid excess runoff.
- Sweep or shovel storage and processing areas daily to collect dirt and fruit and vegetable fragments for proper disposal. Keep hosing to a minimum.
- Keep cleanup materials, such as brooms and dustpans, near the storage area.

- If a holding tank is used for the storage of wastewater, pump out the contents before the tank is full and dispose of wastewater to a sanitary sewer or approved wastewater treatment system.

Applicable Structural BMPs:

- Enclose the processing area in a building or shed, or cover the area with provisions for stormwater run-on prevention. Alternatively, pave and slope the area to drain to the sanitary sewer, holding tank, or process treatment system collection drain.

Optional Structural BMPs:

- Cover outdoor storage areas for fruits and vegetables.
- Use a containment curb, dike, or berm to prevent off-site runoff from storage or processing areas and to prevent stormwater run-on.

IV-6 Transfer of Liquid or Solid Materials Source Control BMPs

- S409 BMPs for Fueling At Dedicated Stations
- S412 BMPs for Loading and Unloading Areas for Liquid or Solid Material
- S419 BMPs for Mobile Fueling of Vehicles and Heavy Equipment
- S426 BMPs for Spills of Oil and Hazardous Substances
- S439 BMPs for In-Water and Over-Water Fueling

S409 BMPs for Fueling At Dedicated Stations

Description of Pollutant Sources: A fueling station is a facility dedicated to the transfer of fuels from a stationary pumping station to mobile vehicles or equipment. It includes above or underground fuel storage facilities. Fueling may occur at:

- General service gas stations
- 24-hour convenience stores
- Construction sites
- Maintenance yards
- Warehouses
- Car washes
- Manufacturing establishments
- Port facilities
- Marinas
- Boatyards
- Businesses with fleet vehicles.

Typical causes of stormwater contamination at fueling stations include leaks/spills of fuels, lubrication oils, radiator coolants, and vehicle washwater.

Pollutant Control Approach: New or substantially remodeled* fueling stations must be constructed on an impervious concrete pad under a roof to keep out rainfall and stormwater run-on. The facility must use a treatment BMP for contaminated stormwater and wastewaters in the fueling containment area.

** Substantial remodeling includes (but is not limited to) replacing the canopy, or relocating or adding one or more fuel dispensers in such a way that modifies the Portland cement concrete (or equivalent) paving in the fueling area.*

Applicable Operational BMPs:

- Prepare an emergency spill response and cleanup plan (spill plan) per S426 BMPs for Spills of Oil and Hazardous Substances.
- Train employees on the proper use of fuel dispensers and on the spill plan.

- Have a designated trained person(s) available either on site or on call at all times to promptly and properly implement the spill plan and immediately cleanup all spills.
- If the fueling station is unattended by a trained person during operating hours, the spill plan must be visible to all customers and untrained employees using the station, and the spill kit must also be accessible and fully stocked at all times.
- The person conducting the fuel transfer must be present at the fueling pump during fuel transfer, particularly at unattended or self-serve stations.
- Keep suitable cleanup materials, such as dry adsorbent materials, on site to allow prompt cleanup of a spill.
- Do not use dispersants to clean up spills or sheens unless properly removed for disposal following application. Dispersants are not allowed to enter storm drains, surface waters, treatment systems, or sanitary sewers.
- Post signs in accordance with the requirements in the Uniform Fire Code (UFC) or International Fire Code (IFC). For example, post “No Topping Off” signs (topping off gas tanks causes spillage and vents gas fumes to the air).
- Make sure that the automatic shut-off on the fuel nozzle is functioning properly.
- Refer to S439 BMPs for In-Water and Over-Water Fueling for BMPs for in-water or over-water fueling operations

Applicable Structural Source Control BMPs:

For new or substantially remodeled fueling stations:

- Design the fueling island to:
  - Minimize stormwater contamination.
  - Control spills (dead-end sump or spill control separator in compliance with the UFC or IFC).
  - Collect stormwater and/or wastewater and direct it to an appropriate treatment system.
- Slope the concrete containment pad around the fueling island toward drains; either trench drains, catch basins and/or a dead-end sump. The slope of the drains shall not be less than 1 percent (Section 7901.8 of the UFC, Section 5703.6.8 of the IFC).
- Drains from containment pads must have a normally closed shutoff valve. The valve may be opened to convey contaminated stormwater to oil removal treatment such as an API or CP oil/water separator (see V-13 Oil and Water

Separator BMPs), catchbasin insert, or equivalent treatment, and then to a basic treatment BMP (as described in III-1.2 Choosing Your Runoff Treatment BMPs) or to a sanitary sewer, if approved by the sewer authority. Discharges from treatment systems to storm sewer or surface water or to the ground must not display ongoing or recurring visible sheen and must not contain a significant amount of oil and grease.

- The spill control capacity must be sized in compliance with Section 7901.8 of the UFC. The spill control capacity may be acquired by either an underground system including a sump, or an above ground containment area consisting of a containment pad with berms.

  The fueling island may be designed as a spill containment pad with a sill or berm raised to a minimum of four inches (per Section 7901.8 of the UFC) to prevent the runoff of spilled liquids and to prevent run-on of stormwater from the surrounding area. All stormwater collected on the containment pad must discharge to treatment with a normally closed valve downstream of the treatment.

- The fueling pad must be paved with Portland cement concrete, or equivalent. Ecology does not consider asphalt an equivalent material.
- The fueling island must have a roof or canopy to prevent the direct entry of precipitation onto the spill containment pad (see Figure IV-6.1: Covered Fuel Island). The roof or canopy should, at a minimum, cover the spill containment pad (within the grade break or fuel dispensing area) and preferably extend 3 feet on each side for roofs and canopies 10 feet or less in height and 5 feet on each side for roofs and canopies greater than 10 feet in height. Overhangs reduce the introduction of windblown rain. Measure the overhang relative to the berm or other hydraulic grade break for the spill containment pad.
- Convey all roof drains to storm drains outside the fueling containment area.
- Convey stormwater collected on the fuel island containment pad to a sanitary sewer system, if approved by the sanitary authority, or to an approved treatment system such as an oil/water separator and a basic treatment BMP. (Basic treatment BMPs are listed in III-1.2 Choosing Your Runoff Treatment BMPs). Discharges from treatment systems to storm drains or surface water or to the ground must not display ongoing or recurring visible sheen and must not contain oil and grease.

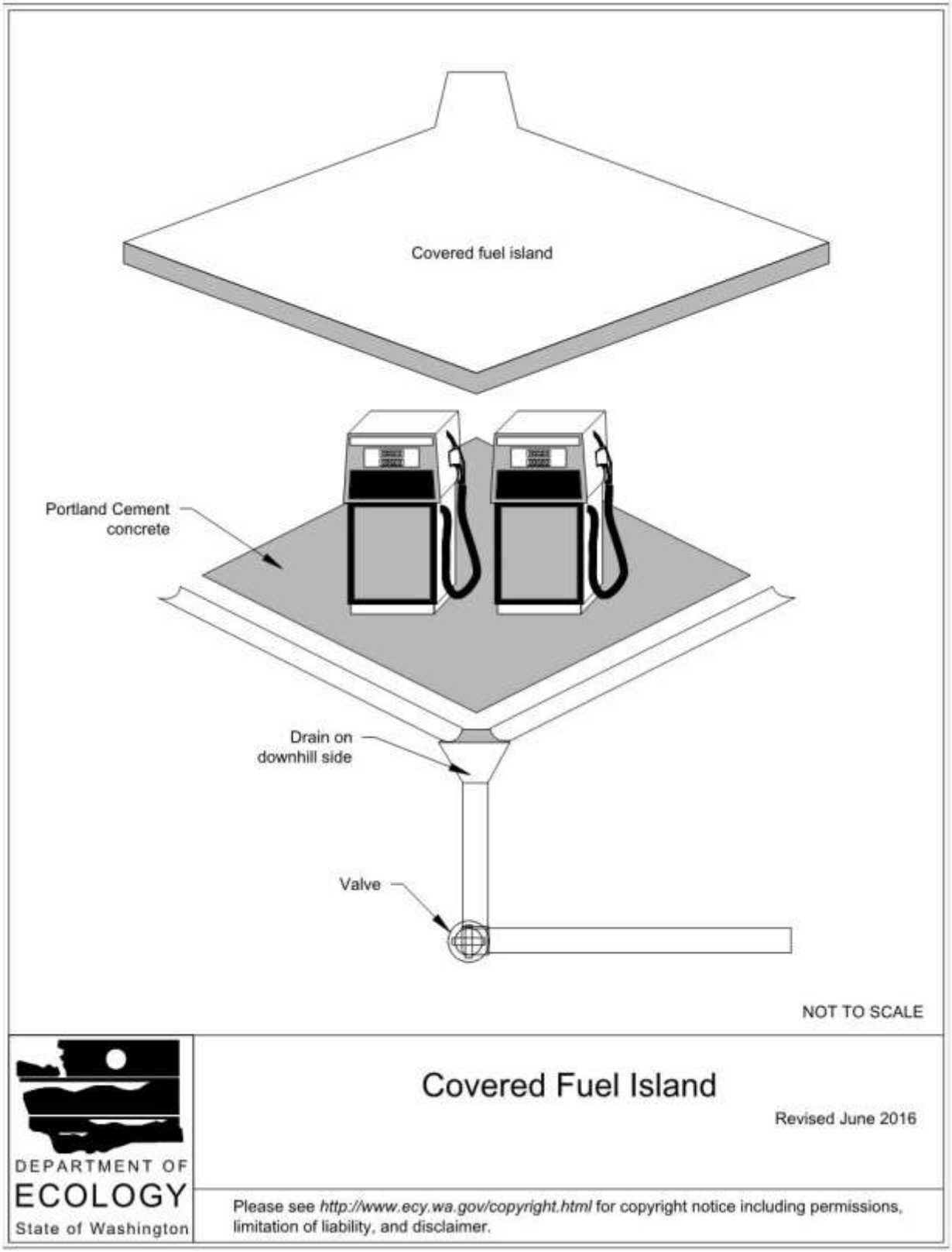
- Alternatively, collect stormwater from the fuel island containment pad and hold for proper off-site disposal.
- Approval from the local sewer authority is required for conveyance of any fuel-contaminated stormwater to a sanitary sewer. The discharged stormwater must comply with pretreatment regulations (WAC 173-216-060). These regulations prohibit discharges that could "cause fire or explosion." State and federal pretreatment regulations define an explosive or flammable mixture, based on a flash point determination of the mixture. Stormwater could be conveyed to a sanitary sewer system if it is determined not to be explosive.
- Transfer the fuel from the delivery tank trucks to the fuel storage tank in impervious contained areas and ensure that appropriate overflow protection is used. Alternatively, cover nearby storm drains during the filling process and use drip pans under all hose connections.

Additional BMP for Vehicles 10 feet in height or greater

A roof or canopy may not be feasible at fueling stations that regularly fuel vehicles that are 10 feet in height or greater, particularly at industrial or WSDOT sites. At those types of fueling facilities, the following BMPs apply, as well as the applicable BMPs and fire prevention (UFC requirements) of this BMP for fueling stations:

- If a roof or canopy is impractical, the concrete fueling pad must be equipped with emergency spill control including a shutoff valve for drainage from the fueling area. Maintain the valve in the closed position in the event of a spill. Clean up spills and dispose of materials off-site in accordance with S426 BMPs for Spills of Oil and Hazardous Substances.
- The valve may be opened to convey contaminated stormwater to a sanitary sewer, if approved by the sewer authority, or to oil removal treatment such as an API or CP oil/water separator (see V-13 Oil and Water Separator BMPs), catchbasin insert, or equivalent treatment, and then to a basic treatment BMP (as described in III-1.2 Choosing Your Runoff Treatment BMPs). Discharges from treatment systems to storm sewer or surface water or to the ground must not display ongoing or recurring visible sheen and must not contain a significant amount of oil and grease.

Figure IV-6.1: Covered Fuel Island



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S412 BMPs for Loading and Unloading Areas for Liquid or Solid Material

Description of Pollutant Sources: Operators typically conduct loading/unloading of liquid and solid materials at industrial and commercial facilities at shipping and receiving, outside storage, fueling areas, etc. Materials transferred can include products, raw materials, intermediate products, waste materials, fuels, scrap metals, etc. Leaks and spills of fuels, oils, powders, organics, heavy metals, salts, acids, alkalis, etc. during transfer may cause stormwater contamination. Spills from hydraulic line breaks are a common problem at loading docks.

Pollutant Control Approach: Cover and contain the loading/unloading area where necessary to prevent run-on of stormwater and runoff of contaminated stormwater.

Applicable Operational BMPs:

At All Loading/ Unloading Areas

- A significant amount of debris can accumulate at outside, uncovered loading/unloading areas. Sweep these surfaces frequently to remove loose material that could contaminate stormwater. Sweep areas temporarily covered after removal of the containers, logs, or other material covering the ground.
- Place drip pans, or other appropriate temporary containment device, at locations where leaks or spills may occur such as hose connections, hose reels and filler nozzles. Always use drip pans when making and breaking connections (see Figure IV-6.2: Drip Pan). Check loading/unloading equipment such as valves, pumps, flanges, and connections regularly for leaks and repair as needed.

At Tanker Truck and Rail Transfer Areas to Above/Below-ground Storage Tanks

- To minimize the risk of accidental spillage, prepare an "Operations Plan" that describes procedures for loading/unloading. Train employees in its execution and post it or otherwise have it readily available to all employees.
- Report spills of reportable quantities to Ecology.

- Prepare and implement an Emergency Spill Cleanup Plan for the facility (See S426 BMPs for Spills of Oil and Hazardous Substances) which includes the following BMPs:
    - Ensure the cleanup of liquid/solid spills in the loading/unloading area immediately, if a significant spill occurs, and, upon completion of the loading/unloading activity, or, at the end of the working day.
    - Retain and maintain an appropriate oil spill cleanup kit on-site for rapid cleanup of material spills. (See S426 BMPs for Spills of Oil and Hazardous Substances).
    - Ensure that an employee trained in spill containment and cleanup is present during loading/unloading.

At Rail Transfer Areas to Above/below-ground Storage Tanks

Install a drip pan system as illustrated (see Figure IV-6.3: Drip Pan Within Rails) within the rails to collect spills/leaks from tank cars and hose connections, hose reels, and filler nozzles.

Loading/Unloading from/to Marine Vessels

Facilities and procedures for the loading or unloading of petroleum products must comply with Coast Guard requirements specified in Coast Guard Requirements for Marine Transfer of Petroleum Products within I-2.15 Other Requirements.

Transfer of Small Quantities from Tanks and Containers

Refer to S428 BMPs for Storage of Liquids in Permanent Aboveground Tanks and S427 BMPs for Storage of Liquid, Food Waste, or Dangerous Waste Containers for requirements on the transfer of small quantities from tanks and containers, respectively.

Applicable Structural Source Control BMPs:

At All Loading/ Unloading Areas

- Consistent with Uniform Fire Code requirements (see Uniform Fire Code Requirements within I-2.15 Other Requirements) and to the extent practicable,

conduct unloading or loading of solids and liquids in a manufactured building, under a roof, or lean-to, or other appropriate cover.

- Berm, dike, and/or slope the loading/unloading area to prevent run-on of stormwater and to prevent the runoff or loss of any spilled material from the area.
- Place curbs along the edge of the shoreline, or slope the edge such that the stormwater can flow to an internal storm sewer system that leads to an approved treatment BMP. Avoid draining directly to the surface water from loading areas.
- Pave and slope loading/unloading areas to prevent the pooling of water. Minimize the use of catch basins and drain lines within the interior of the paved area or place catch basins in designated “alleyways” that are not covered by material, containers, or equipment.
- Retain on-site the necessary materials for rapid cleanup of spills.

Recommended Structural Source Control BMPs:

For the transfer of pollutant liquids in areas that cannot contain a catastrophic spill, install an automatic shutoff system in case of unanticipated off-loading interruption (e.g. coupling break, hose rupture, overfill, etc.).

At Loading and Unloading Docks

- Install/maintain overhangs, or door skirts that enclose the trailer end (see Figure IV-6.4: Loading Dock with Door Skirt and Figure IV-6.5: Loading Dock with Overhang) to prevent contact with rainwater.
- Design the loading/unloading area with berms, sloping, etc., to prevent the run-on of stormwater.

At Tanker Truck Transfer Areas to Above/Below-Ground Storage Tanks

- Pave the area on which the transfer takes place. If any transferred liquid, such as gasoline, is reactive with asphalt, pave the area with Portland cement concrete.
- 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 capacity provided for grit sedimentation.

Figure IV-6.2: Drip Pan

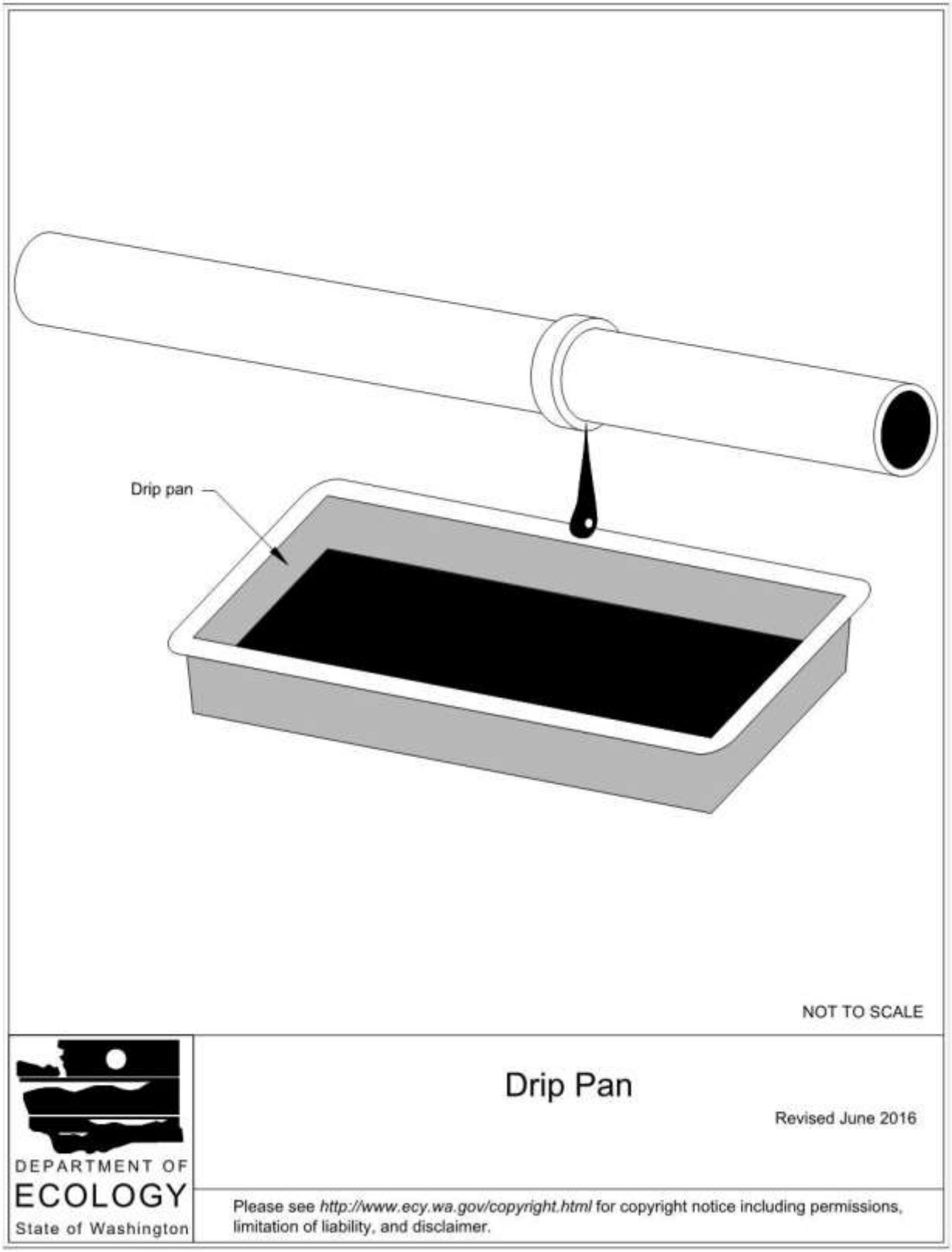

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Figure IV-6.3: Drip Pan Within Rails

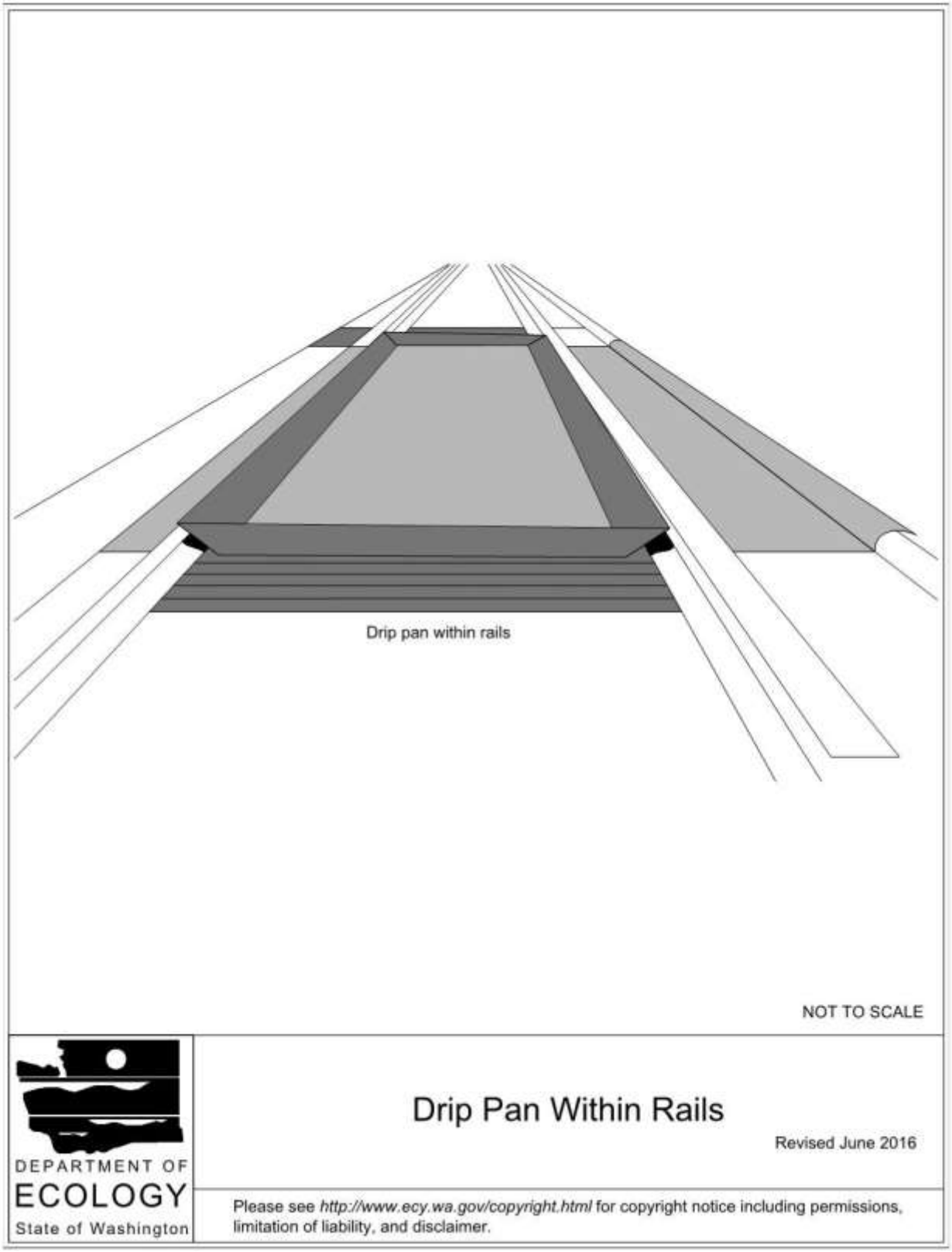

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Figure IV-6.4: Loading Dock with Door Skirt

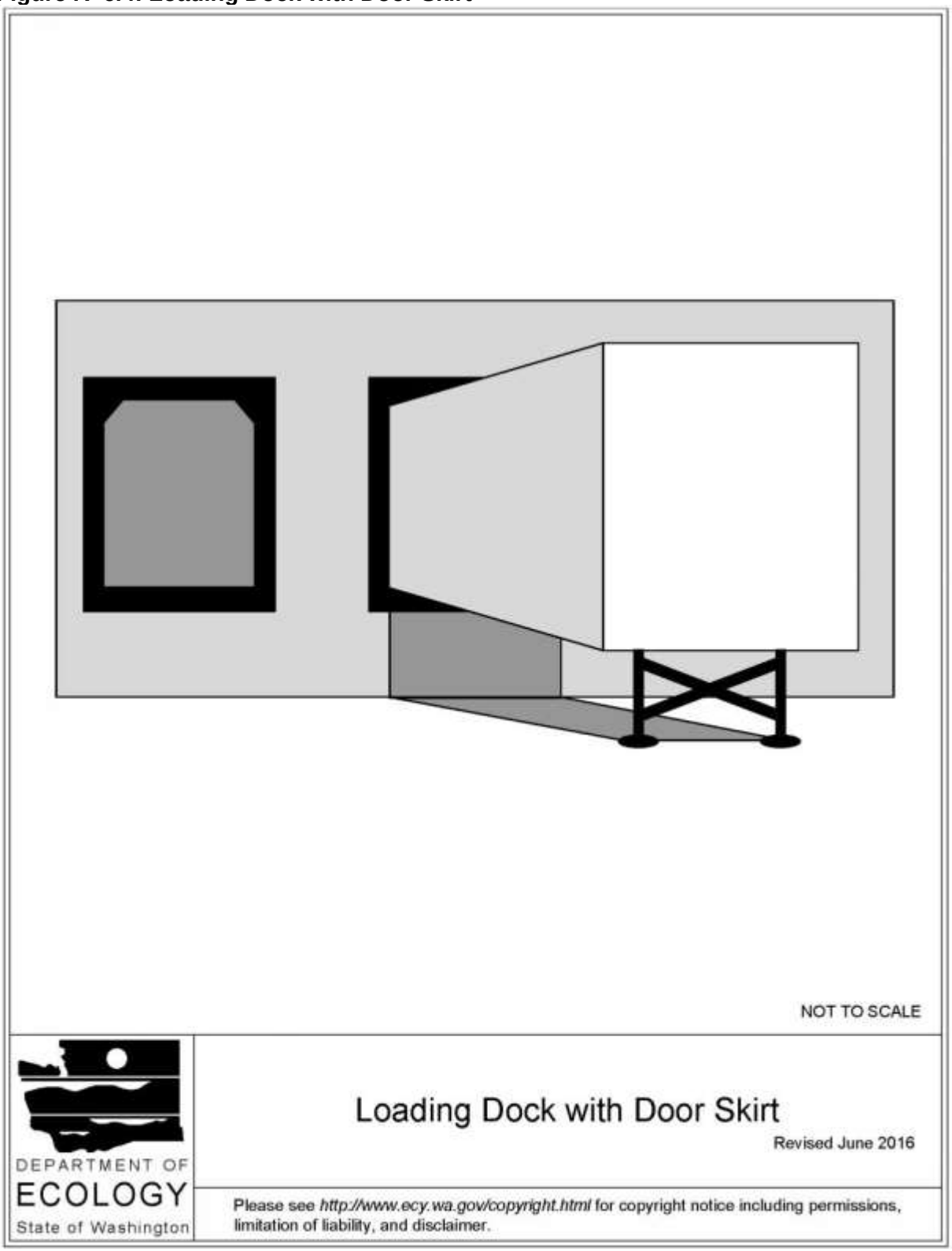

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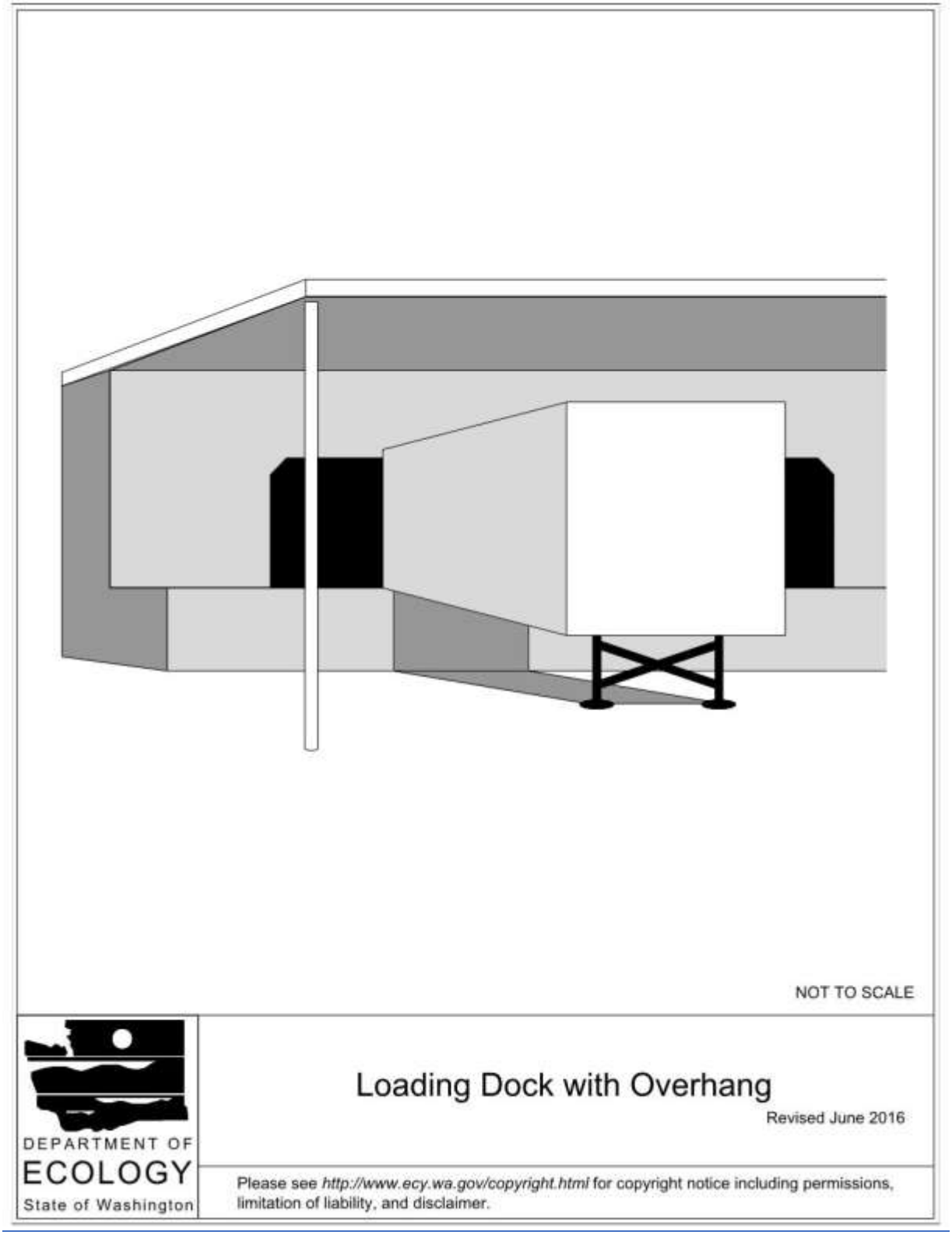
Figure IV-6.5: Loading Dock with Overhang



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S419 BMPs for Mobile Fueling of Vehicles and Heavy Equipment

Description of Pollutant Sources: Mobile fueling, also known as fleet fueling, wet fueling, or wet hosing, is the practice of filling fuel tanks of vehicles by tank trucks that are driven to the yards or sites where the vehicles to be fueled are located. Diesel fuel is categorized as a Class II Combustible Liquid, whereas gasoline is categorized as a Flammable Liquid.

Note that some local fire departments may have restrictions on mobile fueling practices.

Historically organizations conducted mobile fueling for off-road vehicles operated for extended periods in remote areas. This includes construction sites, logging operations, and farms. Some organizations conduct mobile fueling of on-road vehicles commercially in the State of Washington.

Pollutant Control Approach: Fueling operators need proper training of fueling operations, the use of spill/drip control, and fuel transfer procedures.

Applicable Operational BMPs:

Organizations and individuals conducting mobile fueling operations must implement the BMPs in the following list. The operating procedures for the driver/operator should be simple, clear, effective, and their implementation verified by the organization liable for environmental and third party damage.

- Ensure that the local fire department approves all mobile fueling operations. Comply with local and Washington State fire codes.
- In fueling locations that are in close proximity to sensitive aquifers, designated wetlands, wetland buffers, or other waters of the State, approval by local jurisdictions is necessary to ensure compliance with additional local requirements.
- Ensure compliance with all 49 CFR 178 requirements for all fuel delivery vehicles or containers. Documentation from a Department of Transportation (DOT) Registered Inspector provides proof of compliance.

- Ensure the presence and the constant observation/monitoring of the driver/operator at the fuel transfer location at all times during fuel transfer and ensure implementation of the following procedures at the fuel transfer locations:
    - Locate the point of fueling at least 25 feet from the nearest storm sewer or inside an impervious containment with a volumetric holding capacity equal to or greater than 110 percent of the fueling tank volume, or covering the storm sewer to ensure no inflow of spilled or leaked fuel. Covers are not required for storm sewers that convey the inflow to a spill control separator approved by the local jurisdiction and the fire department. Potential spill/leak conveyance surfaces must be impervious and in good repair. Do not remove the drain cover if sheen is present. Properly collect and dispose of any contaminated material.
    - Place a drip pan, or an absorbent pad under each fueling location prior to and during all dispensing operations. The pan (must be liquid tight) and the absorbent pad must have a capacity of at least 5 gallons. There is no need to report spills retained in the drip pan or the pad.
    - Manage the handling and operation of fuel transfer hoses and nozzle, drip pan(s), and absorbent pads as needed to prevent spills/leaks of fuel from reaching the ground, storm sewer, and receiving waters.
    - Avoid extending the fueling hoses across a traffic lane without fluorescent traffic cones, or equivalent devices, conspicuously placed to block all traffic from crossing the fuel hose.
    - Remove the fill nozzle and cease filling the tank when the automatic shut-off valve engages. Do not lock automatic shutoff fueling nozzles in the open position.
    - Do not “top off” the fuel receiving equipment.
- Provide the driver/operator of the fueling vehicle with:
    - Adequate flashlights or other mobile lighting to view fuel fill openings with poor accessibility. Consult with local fire department for additional lighting requirements.
    - Two-way communication with his/her home base.
- Train the driver/operator annually in spill prevention and cleanup measures and emergency procedures. Make all employees aware of the significant liability associated with fuel spills.
- The responsible manager shall properly sign and date the fueling operating procedures. Distribute procedures to the operators, retain them in the

organization files, and make them available in the event an authorized government agency requests a review.

- Immediately notify the local fire department (911), the appropriate regional office of the Department of Ecology, and the local jurisdiction in the event of any spill entering surface or ground waters. Establish a “call down list” to ensure the rapid and proper notification of management and government officials should any significant amount of product be lost off-site. Keep the list in a protected but readily accessible location in the mobile fueling truck. The “call down list” should also identify spill response contractors available in the area to ensure the rapid removal of significant product spillage into the environment.
- In all fueling vehicles, maintain a minimum of the following spill cleanup materials and have them readily available for use:
    - Non-water absorbents capable of absorbing at least 15 gallons of fuel.
    - A storm drain plug or cover kit.
    - A non-water absorbent containment boom of a minimum 10 feet in length with a 12-gallon minimum absorbent capacity.
    - A non-spark generating shovel (a steel shovel could generate a spark and cause an explosion in the right environment around a spill).
    - 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.
- Immediately remove and properly dispose of soils with visible surface contamination to prevent the spread of chemicals to groundwater or receiving water via stormwater runoff.
- Do not use dispersants to clean up spills or sheens unless properly removed for disposal following application. Dispersants are prohibited from use for spills on water or where the dispersant may enter storm drains, surface waters, treatment systems, or sanitary sewers.

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.

S426 BMPs for Spills of Oil and Hazardous Substances

Description of Pollutant Sources: Washington Administrative Code 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 the facility, due to its 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(d)(1)(i)}. State Law requires owners of businesses that produce dangerous wastes to have a SPECP. These businesses should refer to Washington State/Federal Emergency Spill Cleanup Requirements (see I-2.15 Other Requirements). 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: Urban Land Uses and Pollutant Generating Sources 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(s), 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.

S439 BMPs for In-Water and Over-Water Fueling

Description of Pollutant Sources: BMPs in this section apply to businesses and public agencies that operate a facility used for the transfer of fuels from a stationary pumping station to vehicles or equipment in water. This type of fueling station includes aboveground or underground fuel storage facilities, which may be permanent or temporary. Fueling stations include facilities such as, but not limited to, commercial gasoline stations, port facilities, marinas, private fleet fueling stations, and boatyards.

Typically, stormwater contamination at fueling stations is caused by leaks or spills of fuels, lubrication oils, and fuel additives. These materials contain organic compounds, oil and greases, and metals that can be harmful to humans and aquatic life.

Most fuel dock spills are small and result from overfilling boat fuel tanks, burps from air vent lines, and drips from the pump nozzle as it is being returned to the pump.

Pollutant Control Approach: Provide employees with proper training and use spill control devices to prevent the discharge of pollutants in the receiving water or the drainage system.

Applicable Operational BMPs

Applicable Operational BMPs for Fuel Docks

General

- Facilities and procedures for the loading or unloading of petroleum products must comply with U.S. Coast Guard requirements. Refer to specifications in Coast Guard Requirements for Marine Transfer of Petroleum Products.

Training and Fueling Dock Supervision

- Train staff on proper fueling procedures. Document training and maintain records.
- Have a trained employee supervise the fuel dock during fueling activities.
- Do not allow self-service on a marina dock without some means of controlling the dock activity. According to *NFPA 30A: Code for Motor Fuel Dispensing Facilities*

and Repair Garages, each facility must have an attendant on duty to supervise, observe, and "control" the operation when open for business. This can be done via camera, intercom, and shutoff abilities in the office. However, this can lead to complacency and nothing can replace having an attendant on the dock to attend to emergencies when they occur. (NFPA, 2012)

Fueling Dock Setup, Maintenance, and Inspection

- Install a tank and leak detection monitoring system that shuts off the pump and fuel line when a leak is sensed.
- Install personal watercraft floats at fuel docks to stabilize personal watercraft/jet skis while refueling.
- Provide a spill containment equipment storage area where materials are easily accessible and clearly marked.
- Use automatic shut-off nozzles and promote the use of "whistles" and fuel/air separators on air vents or tank stems of inboard fuel tanks to reduce the amount of fuel spilled into receiving waters during fueling of boats.
- Post readable refueling directions, BMPs, and emergency protocols.
- Always have a "Spills Aren't Slick" sign with emergency spill reporting numbers clearly visible. Marinas on land leased from the Washington Department of Natural Resources (DNR) are required to post these signs.
- Display "No Smoking" signs on fuel docks.
- Create a regular inspection, maintenance, and replacement schedule for fuel hoses, pipes, and tanks. Have staff walk the dock fuel lines from dispenser to tank to look for signs of leakage at joints and determine hose condition from end to end.

Fueling Practices

- Discourage operators from "topping off" (no more than 90% capacity). Fuel expands and can slosh out of the vent when temperatures rise or waters become choppy.
- When handing over the nozzle, wrap an absorbent pad around the nozzle end or plug inside the nozzle end to prevent fuel in the nozzle from spilling.
- Have the boat operator place an absorbent pad or suction cup bottle under the vent(s) to capture fuel spurts from the vent.

- Never block open the fuel nozzle trigger and always disable hands-free clips to ensure the boater remains with the nozzle to prevent overfilling. Hands-free clips are not allowed in Washington, per WAC 296-24-33015.
- Always keep the nozzle tip pointing up and hang the nozzle vertically when not in use.
- During fueling operations, visually monitor the liquid level indicator to prevent the tank from being overfilled.
- The maximum amount of product received must not exceed 95 percent capacity of the receiving tank.

Spill cleanup

- See S426 BMPs for Spills of Oil and Hazardous Substances.
- Manage petroleum-contaminated booms, pads, and absorbents in a designated collection container and properly dispose of these materials (see S427 BMPs for Storage of Liquid, Food Waste, or Dangerous Waste Containers).
- Ensure customers do not use soaps in the event of a spill. Use oil absorbent booms or pads instead.

Applicable Operational BMPs for Fueling by Portable Container

- Have boats fuel on shore or at a fuel dock rather than transport fuel from an upland facility to the boats. Only use hand-held fueling containers or “jerry cans” when necessary or when on shore or at dock fueling is not practical.
- Always refill portable fuel containers on the pavement or dock to ensure a good electrical ground. While the deck of the boat may seem stable, static electricity can build up and cause a spark.
- On the dock, put an absorbent pad under the container and wrap an absorbent pad around the fuel fill — this can easily be done by putting a hole in the pad.
- Ensure the nozzle stays in contact with the tank opening.
- When transferring fuel from a portable can, use a fuel siphon with a shut-off feature. If a siphon is not available, a nozzle/spout with a shut off is a good alternative.
- Since fueling boats with a portable container can take time, make sure the container is comfortable to carry, hold, and balance.

Source Control BMPs

- Use a high flow funnel. Funnels can help prevent spills by making a larger opening for fueling.
- Place a plug of absorbent pad or paper towel in the nozzle when not in use to capture any extra drops that accumulate.
- Fuel slowly and pour deliberately, and watch the container (especially the nozzle mechanism) for signs of wear.
- Store portable fuel tanks out of direct sunlight and keep in a cool, dry place to minimize condensation.

IV-7 Other Source Control BMPs

- S401 BMPs for the Building, Repair, and Maintenance of Boats and Ships
- S402 BMPs for Commercial Animal Handling Areas
- S403 BMPs for Commercial Composting
- S404 BMPs for Commercial Printing Operations
- S413 BMPs for Log Sorting and Handling
- S414 BMPs for Maintenance and Repair of Vehicles and Equipment
- S418 BMPs for Manufacturing Activities - Outside
- S420 BMPs for Painting/Finishing/Coating of Vehicles/Boats/Buildings/Equipment
- S422 BMPs for Railroad Yards
- S423 BMPs for Recyclers and Scrap Yards
- S424 BMPs for Roof / Building Drains at Manufacturing and Commercial Buildings
- S432 BMPs for Wood Treatment Areas
- S433 BMPs for Pools, Spas, Hot Tubs, and Fountains
- S436 BMPs for Color Events
- S438 BMPs for Construction Demolition
- S440 BMPs for Pet Waste
- S442 BMPs for Labeling Storm Drain Inlets On Your Property
- S443 BMPs for Fertilizer Application
- S446 BMPs for Well, Utility, Directional and Geotechnical Drilling
- S447 BMPs for Roof Vents
- S451 BMPs for Building, Repair, Remodeling, Painting, and Construction
- S452 BMPs for Goose Waste

S401 BMPs for the Building, Repair, and Maintenance of Boats and Ships

Description of Pollutant Sources: Sources of pollutants for the building, repair, and maintenance of boats and ships at boatyards, shipyards, ports, and marinas include pressure washing, surface preparation, paint removal, sanding, painting, engine maintenance and repairs, and material handling and storage, if conducted outdoors.

Potential pollutants include spent abrasive grits, solvents, oils, ethylene glycol, washwater, paint over-spray, cleaners/detergents, anti-corrosion compounds, paint chips, scrap metal, welding rods, resins, glass fibers, dust, and miscellaneous trash. Pollutant constituents include suspended solids, oil and grease, organics, copper, lead, tin, and zinc.

Pollutant Control Approach: Apply good housekeeping, conduct routine preventive maintenance, and cover and contain BMPs in and around work areas.

NPDES Permit Requirements: Ecology's statewide Boatyard General Permit applies to boatyards that discharge stormwater runoff from areas with industrial activity directly to the ground, to a surface waterbody, or to a storm sewer system that drains to a surface waterbody. This general permit also regulates wastewater from pressure washing in boatyards. All boatyards in the state must apply for coverage under this permit and must comply with all conditions specified in this permit, as applicable to their facility, unless exempted. Ecology may require coverage under an individual NPDES permit for large boatyards and shipyards in Washington State not covered by the Boatyard General Permit or Industrial Stormwater General Permit (ISGP).

Applicable Operational BMPs:

- Clean regularly all accessible work, service, and storage areas to remove debris, spent sandblasting material, and any other potential stormwater pollutants.
- Whenever the boat is in the water, avoid the use of soaps, detergents and other chemicals that need to be rinsed or hosed off. If necessary, consider applying sparingly so that a sponge, towel or rag can be used to remove residuals. Consider instead washing the boat in a suitable controlled area (see S431 BMPs for Washing and Steam Cleaning Vehicles / Equipment / Building Structures) while it is out of the water.

Source Control BMPs

- Sweep rather than hose debris on the dock. Collect and convey hose water to treatment if hosing is unavoidable,
- Collect spent abrasives regularly and store them under cover to await proper disposal.
- Dispose of greasy rags, oil filters, air filters, batteries, spent coolant, and degreasers properly.
- Drain oil filters before disposal or recycling.
- Immediately repair or replace leaking connections, valves, pipes, hoses, and other equipment that may cause the contamination of stormwater.
- Use drip pans, drop cloths, tarpaulins, or other protective devices in all paint mixing and solvent operations unless carried out in impervious contained and covered areas.
- Convey sanitary sewage to pump-out stations, portable on-site pump-outs, commercial mobile pump-out facilities, or other appropriate onshore facilities.
- Maintain automatic bilge pumps in a manner that will prevent automatic pumping of waste material into surface water.
- Prohibit uncontained spray painting, blasting or sanding activities over open water.
- Do not dump or pour waste materials down floor drains, sinks, or outdoor storm drain inlets that discharge to surface water. Plug floor drains connected to storm drains or to surface water. If necessary, install a regularly operated sump pump.
- Prohibit outside spray-painting, blasting, or sanding activities during windy conditions that render containment ineffective.
- Do not burn paint and/or use spray guns on topsides or above decks.
- Immediately clean up any spillage on the pier, wharf, boat, ship deck, or adjacent surface areas and dispose of the wastes properly.
- Apply source control BMPs for other activities conducted at the marina, boat yard, shipyard, or port facility (see S409 BMPs for Fueling At Dedicated Stations, S431 BMPs for Washing and Steam Cleaning Vehicles / Equipment / Building Structures, and S426 BMPs for Spills of Oil and Hazardous Substances).
- Locate spill kits so they are readily accessible on all piers and docks.

Source Control BMPs

Applicable Structural Source Control BMPs:

- Use fixed platforms with appropriate plastic or tarpaulin barriers as work surfaces and for containment when performing work on a vessel in the water to prevent blast material or paint overspray from contacting stormwater or the surface water. Keep the use of such platforms to a minimum, and do not perform extensive repair, modification, surface preparation, or coating while the boat is in the water (anything in excess of 25 percent of the surface area of the vessel above the waterline).
- Use plastic or tarpaulin barriers beneath the hull and between the hull and dry dock walls to contain and collect waste and spent materials. Clean and sweep regularly to remove debris.
- Enclose, cover, or contain blasting and sanding activities to the maximum extent practicable to prevent abrasives, dust, and paint chips, from reaching storm sewers or receiving waters. Use plywood and/or plastic sheeting to cover open areas between decks when sandblasting (scuppers, railings, freeing ports, ladders, and doorways).
- Direct deck drainage to a collection system sump for settling and/or additional treatment.
- Store cracked batteries in covered secondary containers.

Recommended Additional Operational BMPs:

- Consider recycling paint, paint thinner, solvents, used oils, oil filters, pressure wash wastewater and any other recyclable materials.
- Perform paint and solvent mixing, fuel mixing, etc., on shore.

S402 BMPs for Commercial Animal Handling Areas

Description of Pollutant Sources: Animals at racetracks, kennels, fenced pens, veterinarians, and businesses that provide boarding services for horses, dogs, cats, etc., can generate pollutants from the following activities: manure deposits, animal washing, grazing, and any other animal handling activity that could contaminate stormwater. Pollutants can include coliform bacteria, nutrients, and total suspended solids. Individual Stormwater Permits covering commercial animal handling facilities include additional applicable source controls.

Pollutant Control Approach: To prevent, to the maximum extent practicable, the discharge of contaminated stormwater from animal handling and keeping areas.

Applicable Operational BMPs

- Regularly sweep and clean animal keeping areas to collect and properly dispose of droppings, uneaten food, and other potential stormwater contaminants.
- Do not hose down areas that contain potential stormwater contaminants where they drain to storm drains or to receiving waters.
- Do not discharge any washwater to storm drains or to receiving waters without proper treatment.
- If the operator keeps animals in unpaved and uncovered areas, the ground must have either vegetative cover or some other type of ground cover such as mulch.
- Surround the area where animals are kept with a fence or other means to prevent animals from moving away from the controlled area where BMPs are used.
- For outside surface areas that must be disinfected, use an unsaturated mop to spot clean the area. Do not allow wastewater runoff to enter the drainage system.
- Do not stockpile manure in areas where runoff is allowed to flow into a storm drain or to nearby receiving waters or wetlands.

S403 BMPs for Commercial Composting

Description of Pollutant Sources: Commercial composting facilities, operating outside without cover, require large areas to decompose wastes and other feedstocks. Design these facilities to separate stormwater from leachate (i.e., industrial wastewater) to the greatest extent possible. When stormwater contacts any active composting areas, including waste receiving and processing areas, it becomes leachate. Pollutants in leachate include nutrients, biochemical oxygen demand (BOD), organics, coliform bacteria, acidic pH, color, and suspended solids. Stormwater at composting facilities include runoff from areas not associated with active processing and curing, such as product storage areas, vehicle maintenance areas, and access roads.

NPDES and State Solid Waste Permit Requirements: Composting facilities are regulated under WAC 173-350-220. Solid Waste Regulations require the collection and containment of all leachate produced from activities at commercial composting facilities. Composting facilities that propose to discharge to surface water, municipal sewer system, or ground water must obtain the appropriate permits. Zero discharge is possible by containing all leachate from the facility (in tanks or ponds) for use early in the composting process or preventing production of leachate (by composting under a roof or in an enclosed building).

Pollutant Control Approach: Consider zero leachate discharge.

Applicable Operational, Structural, and Treatment BMPs:

- See WAC 173-350-220, Composting Facilities
- See *Siting and Operating Composting Facilities in Washington State: Good Management Practices* (Ecology, 2013) for common sense actions that can be implemented at a facility to help run a successful program.
- See Ecology's Organic Materials Management page for the most up-to-date information: https://ecology.wa.gov/Waste-Toxics/Reducing-recycling-waste/Organic-materials .
- All composting facilities shall obtain the appropriate state and local permits. Contact your local permitting authority and jurisdictional health department or district for more information.
- Apply for coverage under the Industrial Stormwater General Permit (ISGP) if the facility discharges stormwater to surface water or a municipal stormwater system.

If all stormwater from the facility properly infiltrates to ground water, the ISGP may not be required. There are some cases where an Individual State Waste Discharge permit is required. Check with your local Ecology office and jurisdictional health department or district to discuss your permitting options.

- Screen incoming wastes for dangerous materials and solid wastes. These materials may not be accepted for composting and must be properly disposed of.
- Locate composting areas on impervious surfaces.
- Drain all leachate from composting operations to a sanitary sewer, holding tank, or on-site treatment system. Leachate may not go to the storm drain or groundwater.
- Collect the leachate with a dike or berm, or with intercepting drains placed on the down slope side of the compost area.
- Direct outside runoff away from the composting areas.
- Clean up debris from yard areas as needed to prevent stormwater contamination.

Recommended BMPs:

- Install catch basin inserts to collect excess sediment and debris if necessary. Inspect and maintain catch basin inserts to ensure they are working correctly.
- Locate stored residues in areas designed to collect leachate and limit storage time to prevent degradation and generation of leachate.

S404 BMPs for Commercial Printing Operations

Description of Pollutant Sources: Materials used in the printing process include inorganic and organic acids, resins, solvents, polyester film, developers, alcohol, vinyl lacquer, dyes, acetates, and polymers. Waste products may include waste inks and ink sludge, resins, photographic chemicals, solvents, acid and alkaline solutions, chlorides, chromium, zinc, lead, spent formaldehyde, silver, plasticizers, and used lubricating oils. With indoor printing operations, the only likely points of potential contact with stormwater are the outside temporary storage of waste materials and offloading of chemicals at external unloading bays. Pollutants can include TSS, pH, heavy metals, oil and grease, and COD.

Pollutant Control Approach: Ensure appropriate disposal and NPDES permitting of process wastes. Cover and contain stored raw and waste materials.

Applicable Operational BMPs:

- Discharge process wastewaters to a sanitary sewer, if approved by the local sewer authority, or to an approved process wastewater treatment system.
- Do not discharge process wastes or wastewaters into storm sewers or surface water.
- Determine whether any of these wastes qualify for regulation as dangerous wastes and dispose of them accordingly.
- Store raw materials or waste materials that could contaminate stormwater in covered and contained areas.
- 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 volatile organic compound (VOC) content possible. Do not 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 *Environmental Management and Pollution Prevention: A Guide for Lithographic Printers* (Ecology, 2001).

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 or areas where logs are sorted or loaded 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 *Industrial Stormwater General Permit Implementation Manual for Log*

Yards (Ecology, 2016c). 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. Inspect drip pans regularly to prevent accumulation of stormwater or other liquids, and dispose of any accumulated liquid appropriately.
- 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 used 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. Do not discharge any vehicular or shop pollutants to the trench drain.

Source Control BMPs

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.

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.

Note this applicable treatment BMP for contaminated stormwater.

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. Contact Ecology's Hazardous Waste & Toxics Reduction Program for recommendations on recycling or disposal of waste materials. (https://ecology.wa.gov/About-us/Get-to-know-us/Our-Programs/Hazardous-Waste-Toxics-Reduction)

- Do not mix dissimilar or incompatible waste liquids stored for recycling.

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 IV-7.1: Enclose the Activity). 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. (See Figure IV-7.2: Cover the Activity).
- Isolate and segregate pollutants as feasible. Convey the segregated pollutants to a sanitary sewer, process treatment, or a dead-end sump depending on available methods and applicable permit requirements.

Figure IV-7.1: Enclose the Activity

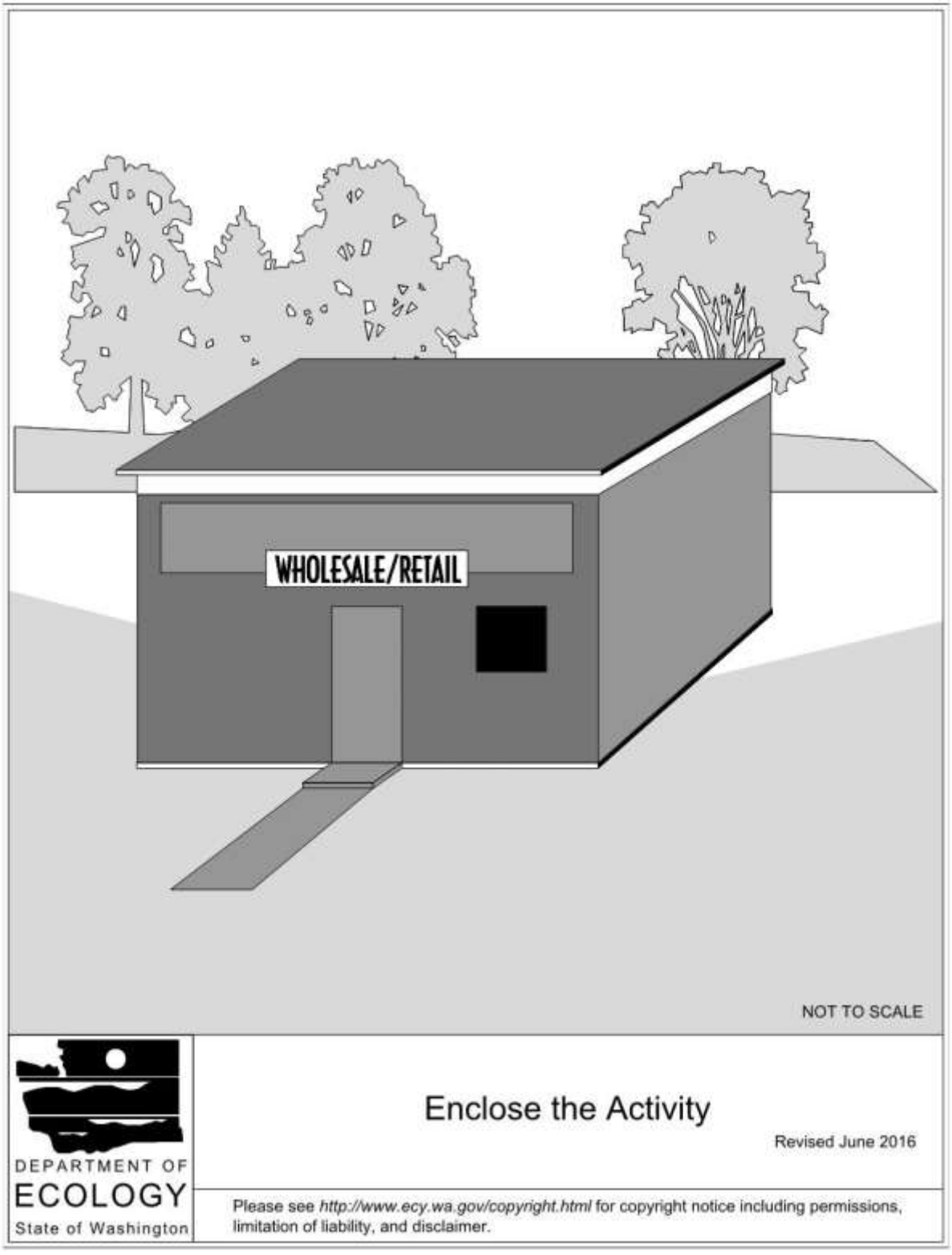

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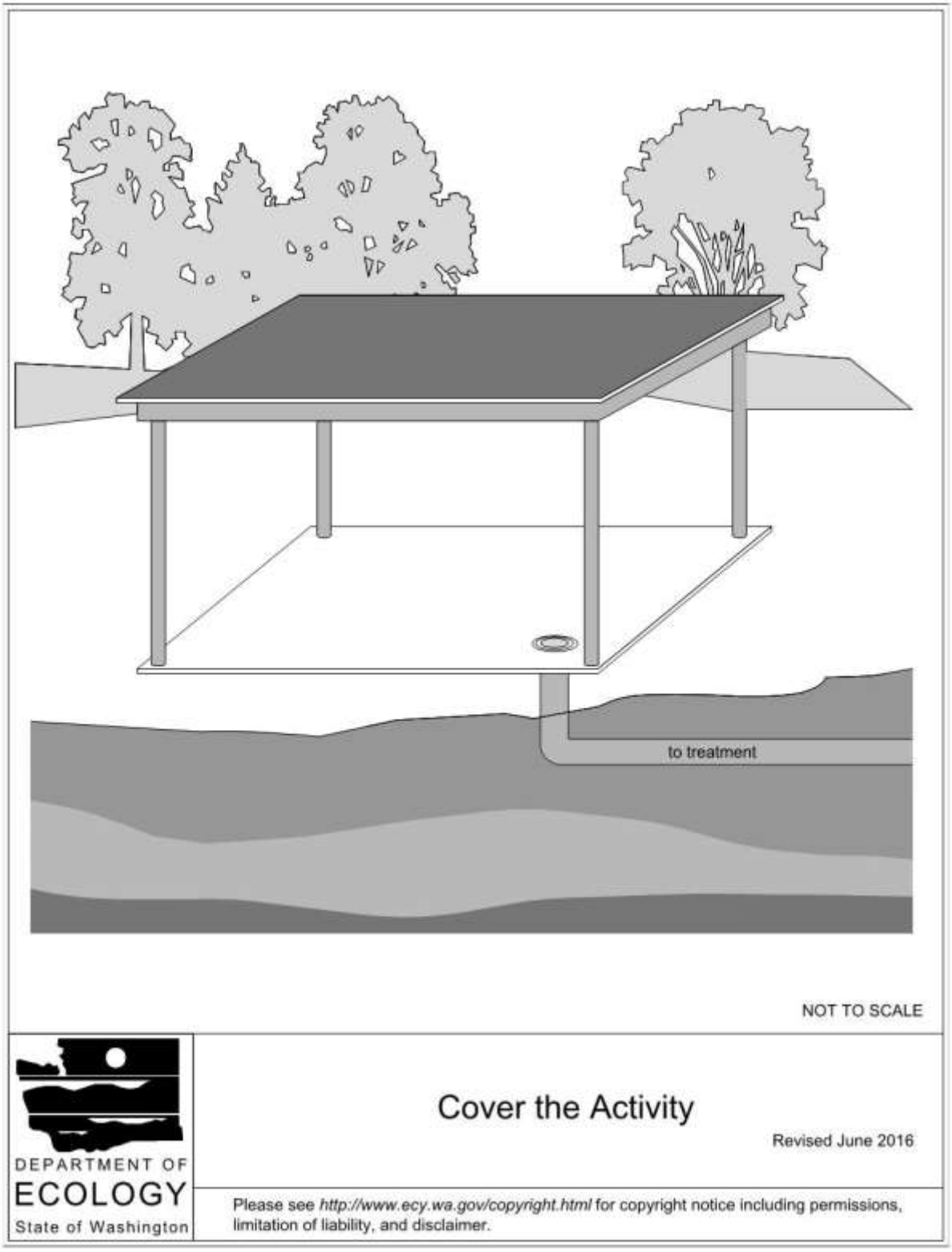
Figure IV-7.2: Cover the Activity



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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, and 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 dock areas sweep rather than hose down debris. Collect any hose water generated and convey to appropriate treatment and disposal.
- Use a catch basin cover, filter sock, or other 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 paintbrushes and tools covered with water-based paints in sinks connected to sanitary sewers. Do not dump pollutants collected in portable containers into a stormwater drain.
- 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) 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 Operational BMPs:

- 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.

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 used oil, solvents, degreasers, antifreeze solutions, chromate and other anti-rust compounds, dyes, 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.

Pollutant Control Approach: Apply good housekeeping and preventive maintenance practices to control leaks and spills of liquids in railroad yard areas.

Applicable Operational and Structural Source Control BMPs:

- Implement the applicable BMPs in this volume depending on the pollutant generating activities/sources at a railroad yard facility.
- Do not allow discharge to outside areas from toilets while a train is in transit. Use pumpout facilities to service these units.
- Use drip pans at hose/pipe connections during liquid transfer and other leak-prone areas.
- When undergoing routine maintenance, discharge locomotive cooling systems only after the locomotive has stopped and at a location where the coolant can be collected, managed, and then disposed of properly.

Source Control BMPs

- During maintenance, do not discard debris or waste liquids along the tracks or in railroad yards.
- Handle wastes generated from large-scale equipment cleaning, such as locomotive, track equipment, or axle cleaning operations, properly to avoid harming the environment and to comply with state and federal environmental regulations.
- Store any metal scrap generated from metal punching or other mechanical operations out of contact with stormwater. For larger metal scrap, see Applicable Treatment BMPs below.
- Do not dump, drain, or allow the discharge of any water-based coolant from multi-punch presses into storm drains.
- Place track mats under each rail/flange lubricator that is in service where track mats can be safely installed and maintained without danger to rolling stock or personnel.
- Select cost-effective rail/flange lubricant that provides safe and effective rail operation while considering adverse environmental impact. Consider both the chemical composition of the lubricant and the likelihood of transfer off of the rail during rain events.
- Inspect and replace track mats, as necessary. Routinely inspect all track mats for tears or saturation, and replace as necessary.
- Install spill containment pans/trays or track mat at designated locomotive and railcar maintenance facilities and fixed fueling areas, to reduce environmental impacts from potential spills under locomotives and other track equipment. Direct spill containment pans/trays to an oil / water separator where feasible for treatment or collect spilled chemicals for proper disposal.
- During locomotive fueling operations use drip pans or secondary containment to capture any fuel or oil seepage.
- Install track mats at designated Engine Tie-Up and/or outdoor locomotive parking locations (e.g., service tracks) located in SWPP permitted areas where locomotives are unattended and idle for extended periods of time.
- Do not conduct heavy/major locomotive engine repairs on the rail line. Conduct heavy/major engine repairs at an established railroad maintenance facility.
- Store creosote-treated railroad ties in locations that reduce the potential to impact stormwater runoff.

Source Control BMPs

Recommended Operational and Structural Source Control BMPs:

At each rail/flange lubricator that is in service use rain sensors to adjust the lubrication cycle accordingly to limit the amount of lubricant exposed to stormwater.

Applicable Treatment BMPs:

In areas subjected to leaks/spills of oils or other chemicals, convey stormwater to appropriate treatment such as a sanitary sewer, if approved by the appropriate sewer authority, or, to BMP T11.10: API (Baffle type) Separator, BMP T11.11: Coalescing Plate (CP) Separator, or other treatment, as approved by the local jurisdiction.

Recommended Treatment BMPs:

Store large metal scrap and materials that cannot be stored in covered areas because of their size, volume, and/or weight (for example rail and tie plates) in locations where stormwater runoff is managed, controlled, and directed to a Runoff Treatment BMP the meets the Enhanced Treatment Performance Goal.

Figure IV-7.3: Installed Railroad Track Mats

DEPARTMENT OF ECOLOGY
State of Washington

Installed Railroad Track Mats

Revised August 2017

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S423 BMPs for Recyclers and Scrap Yards

Description of Pollutant Sources: Includes businesses that reclaim various materials for resale or for scrap, such as vehicles and vehicle/equipment parts, construction materials, metals, beverage containers, and papers.

Potential sources of pollutants include paper, plastic, metal scrap debris, engines, transmissions, radiators, batteries, and other materials contaminated or that contain fluids. Other pollutant sources include leachate from metal components, contaminated soil, and the erosion of soil. Activities that can generate pollutants include the transfer, dismantling, and crushing of vehicles and scrap metal; the transfer and removal of fluids; maintenance and cleaning of vehicles, parts, and equipment; and storage of fluids, parts for resale, solid wastes, scrap parts, and materials, equipment and vehicles that contain fluids; generally, in uncovered areas.

Potential pollutants typically found at vehicle recycle and scrap yards include oil and grease, ethylene and propylene glycol, PCBs, total suspended solids, BOD, heavy metals, and acidic pH.

Applicable BMPs:

- For facilities subject to Ecology's Industrial Stormwater General Permit refer to *Vehicle and Metal Recyclers: A Guide for Implementing the Industrial Stormwater General National Pollutant Discharge Elimination System Permit Requirements* (Ecology, 2011). Apply the BMPs in that guidance document to scrap material recycling facilities depending on the pollutant sources existing at those facilities.
- Check incoming scrap materials, vehicles, and equipment for potential fluid contents and batteries.
- Drain and transfer fluids from vehicles and other equipment only in a designated area with a waste collection system or over drip pans.
- Remove batteries and store on the ground in a leak proof container and under cover.
- Cover and raise any materials that may contaminate stormwater. A tarp and pallet are acceptable.
- Cover and contain stockpiles of any material that has the potential to contaminate stormwater runoff.

Source Control BMPs

- All containers used to store fluids must comply with secondary containment requirements. Storage of flammable and combustible materials must comply with the appropriate Fire Codes.

Required Routine Maintenance:

- Inspect storage areas regularly and promptly clean up any leaks, spills, or contamination.
- Sweep scrap storage areas as needed. Do not hose down anything to a storm drain.
- Keep spill cleanup materials in a location known to all. Ensure that employees are familiar with the site's spill control plan and/or proper spill cleanup procedures.

Recommended BMPs:

- Install catch basin inserts to collect excess sediment and debris if necessary. Inspect and maintain catch basin inserts to ensure they are working correctly.
- Conduct automobile/vehicle metal-shredding inside enclosed buildings with HEPA air filtration systems to prevent the fugitive release of heavy metals and other potentially hazardous materials into the air.

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, paints, caulking, 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, PCBs, and organics are some of the pollutant constituents identified.

Ecology has performed a study on zinc in industrial stormwater. The study is presented in *Suggested Practices to Reduce Zinc Concentrations in Industrial Stormwater Discharges* (Ecology, 2008). 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 residual pollutants.
- 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 *Suggested Practices to Reduce Zinc Concentrations in Industrial Stormwater Discharges* (Ecology, 2008).

Source Control BMPs

Applicable Treatment BMPs:

Treat runoff from roofs to the appropriate level. The facility may use Enhanced Treatment BMPs as described in III-1.2 Choosing Your Runoff Treatment BMPs. Some facilities regulated by the Industrial Stormwater General Permit, or local jurisdiction, may have requirements than 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.

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.

Pollutant sources include drips of condensate or preservative after pressurized treatment; product washwater (in the treatment or storage areas), spills and leaks from process equipment and preservative tanks, fugitive emissions from vapors in the process, blowouts and emergency pressure releases, and kick-back from lumber (phenomenon where preservative leaks as it returns to normal pressure). Potential pollutants typically include the wood treating chemicals, BOD, suspended solids, oil and grease, benzene, toluene, ethylbenzene, phenol, chlorophenols, nitrophenols, heavy metals, and PAH depending on the chemical additive used.

Pollutant Control Approach: Cover and contain all wood treating facilities and prevent all leaching of and stormwater contamination by wood treating chemicals. Wood treating facilities may be covered by the Industrial Stormwater General Permit or by an individual permit. Individual permits covering wood treatment areas include applicable source control BMPs or require the development of BMPs or a SWPPP. Facilities covered under the Industrial Stormwater General Permit must prepare and implement a SWPPP. When developing a SWPPP or BMPs, wood treating facilities should include the applicable operational and structural source control BMPs listed below.

Applicable Operational BMPs:

- Use dedicated equipment for treatment activities to prevent the tracking of treatment chemicals to other areas on the site.
- Eliminate non-process traffic on the drip pad. Scrub down non-dedicated lift trucks on the drip pad.

- Immediately remove, contain, and properly dispose of soils with visible surface contamination (green soil) to prevent the spread of chemicals to ground water and/or surface water via stormwater runoff.
- If incidental drippage is discovered in the storage yard, relocate the wood to a concrete chemical containment structure until it is drip free.

Recommended Operational BMP:

Consider using preservative chemicals that do not adversely affect receiving surface water and ground water.

Applicable Structural Source Control BMPs:

- Cover and/or enclose, and contain with impervious surfaces, all wood treatment equipment and drip pads. Slope and drain areas around dip tanks, spray booths, retorts, and any other process equipment in a manner that allows return of treatment chemicals to the wood treatment process.
- Cover storage areas for freshly treated wood to prevent contact of treated wood products with stormwater. Segregate clean stormwater from process water. Convey all process water to an approved treatment system.
- Seal any holes or cracks in the asphalt areas that are subject to wood treatment chemical contamination.
- Elevate stored and/or treated wood products to prevent contact with stormwater run-on and runoff
- Place dipped lumber over the dip tank, or on an inclined ramp for a minimum of 30 minutes to allow excess chemical to drip back to the dip tank.
- Freshly treated lumber from dip tanks or retorts must be placed on a containment area until drippage has ceased prior to placement in outside storage areas.

S433 BMPs for Pools, Spas, Hot Tubs, and Fountains

Description of Pollutant Sources: This section includes BMPs for pools, spas, hot tubs, and fountains used for recreational and/or decorative purposes that may use chemicals and/or be heated. Industrial Stormwater Permittees that use pools, spas, hot tubs, and fountains as part of an industrial process should refer to their Industrial Stormwater Permit.

Discharge from pools, spas, hot tubs, and fountains can degrade ambient water quality. The waters from these sources typically contain bacteria that contaminate the receiving waters. Chemicals lethal to aquatic life such as chlorine, bromine and algaecides can be found in pools, spas, hot tubs, and fountains. These waters may be at an elevated temperature and can have negative effects on receiving waters and to aquatic life. Diatomaceous earth backwash from swimming pool filters can clog gills and suffocate fish.

Routine maintenance activities generate a variety of wastes. Chlorinated water, backwash residues, algaecides, and acid washes are a few examples. Direct disposal of these waters to drainage systems and waters of the State is not permitted without prior treatment and approval.

The quality of any discharge to the ground after proper treatment must comply with Ecology's Ground Water Quality Standards, Chapter 173-200 WAC.

The Washington State Department of Health and local health authorities regulate Water Recreation facilities which include pools, spas, and hot tubs. Owners and operators of those facilities must comply with those regulations, policies and procedures. Following the guidelines here does not exempt or supersede any requirements of the regulatory authorities.

Pollutant Control Approach: Many manufacturers do not recommend draining pools, spas, hot tubs or fountains; refer to the facility's operation and maintenance manual. If the water feature must be drained, convey discharges (within hoses or pipes) to a sanitary sewer if approved by the local sewer authority or to a storm sewer following the conditions outlined below. Do not discharge to a septic system, since it may cause the system to fail. No discharge to the ground or to surface water should occur, unless permitted by the proper regulatory authority.

Source Control BMPs

Applicable Operational BMPs:

- Clean the pool, spa, hot tub, or fountain regularly. Maintain proper chlorine levels and maintain water filtration and circulation. Doing so will limit the need to drain the facility.
- Manage pH and water hardness to reduce copper pipe corrosion that can stain the facility and pollute receiving waters.
- Before using copper algaecides, try less toxic alternatives. Only use copper algaecides if the others alternative do not work. Ask a maintenance service or pool chemical supplier for help resolving persistent algae problems without using copper algaecides.
- Develop, implement, and regularly update a facility maintenance plan that follows all discharge requirements.
- Dispose of unwanted chemicals properly. Many of them are hazardous wastes when discarded.
- Discharge waters originating from a pool, spa, hot tub, or fountain to a sanitary sewer, if approved by the local sewer authority, local health authority, or both. Do not discharge waters containing copper-based algaecides to storm sewer systems.
- Do not discharge water directly from a pool, spa, hot tub, fountain, process wastes, or wastewaters into storm drains except if the discharge water is:
    - Dechlorinated/debrominated to 0.1 ppm or less. Some guidance on dechlorination is provided in the Washington State Department of Health's *Water System Design Manual* (WSDOH, 2009). The *Water System Design Manual* (WSDOH, 2009) further references *C651-99: AWWA Standard for Disinfecting Water Mains* (AWWA, 1999) and *C652-02: AWWA Standard for Disinfection of Water-Storage Facilities* (AWWA, 2002) for more details. Contact a pool chemical supplier to obtain the neutralizing chemicals needed.
    - Free from sodium chloride.
    - pH-adjusted.
    - Reoxygenated if necessary.
    - Free of any coloration, dirt, suds, or algae.
    - Free of any filter media.
    - Free of acid cleaning wastes.

    - At a temperature that will prevent an increase in temperature in the receiving water. Cool heated water prior to discharge.
    - Released at a rate that can be accommodated by the receiving body (i.e. can infiltrate or be safely conveyed).
- Swimming pool cleaning wastewater and filter backwash shall not be discharged to the storm sewer.
- Bag diatomaceous earth (pool filtering agent) and dispose at a landfill.

Applicable Structural Source Control BMPs:

- Ensure that the pool, spa, hot tub, or fountain system is free of leaks and operates within the design parameters.
- Do not provide any permanent links to drainage systems. All connections should be visible and carefully controlled.
- If the dechlorination or cooling process selected requires the water to be stored for a time, it should be contained within the pool or appropriate temporary storage container.

S436 BMPs for Color Events

Description of Pollutant Sources: Color events are charity, religious, or commercial events that involve the use of powdered (typically cornstarch based) and/or liquid dyes. Because they typically occur outside, there is a high likelihood of the color material entering drainage systems and surface water unless measures are taken to prevent these illicit discharges from occurring.

“Biodegradable” and “non–toxic” do NOT mean that a substance can go into storm drains or water bodies. The dye material can harm aquatic organisms by altering water quality and chemistry. State and Federal environmental laws require local jurisdictions to prohibit non-stormwater discharges to storm drains. Dye material and any wash water are prohibited discharges.

Pollutant Control Approach: Plan for the event. Control the application areas for the powder or liquid dyes. Block off storm drain inlets prior to the event. Clean up the areas immediately after the event.

Figure IV-7.4: Powdered Dyes at Color Events

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Applicable Operational BMPs:

Pre-Event

- Create a map of your event that includes the following:
  - Event route.
  - Nearby streams, lakes, and ponds.
  - Start and finish areas.
  - Color application stations / areas.

  - Storm drain inlets and open stormwater system features (e.g., ditches, swales, bioretention, rain gardens) at the color application, start and finish areas.

- Create a Pollution Plan that details:
  - Measures taken to ensure that NO dye material, either during or after the event, will enter the drainage system.
  - How all dye material will be removed and disposed of.
  - What will happen in the event of rain (including addressing localized flooding, runoff, and collection of the stormwater).
  - Emergency numbers for the local city or county in case dye material does enter the storm drain or water body.

- Use handheld brooms to complete the initial cleanup of paved surfaces. Follow with use of a vacuum sweeper truck on roads.
- Contract with a commercial street sweeping firm to clean paved surfaces. Have a storm drain cleaning contractor on–call for discharges to storm drains or emergency clean–up if necessary.

- Ensure that the commercial street sweeping firm has a plan in place for the proper disposal of sweepings from the event and associated air filters.
- Ensure that all clean-up will be completed prior to the next forecasted rainfall, or no later than 24-hours after the race event, and that the contractor will have enough equipment and staff on hand for the clean-up.

- Request a copy of the dye product’s SDS (Safety Data Sheet) from the manufacturer or supplier. Review the SDS for potential safety and environmental hazards.

- Comply with local jurisdiction event permit requirements that contain stormwater pollution prevention BMPs. If no local event permit is required, provide to the local jurisdiction in charge of stormwater drainage and/or surface water management, in plenty of time (two weeks or more) prior to the event:
  - Copies of the map
  - Pollution prevention plan
  - Commercial cleaning contract
  - Dye SDSs

- Names and contact information of the event officials for both during and after the event.

Preventing Runoff from Entering Drainage Systems and Water Bodies

- Protect storm drains by using berms, covering the drains, and using catch basin covers.
- Use care when removing berms, covers, and tarps to ensure no dye enters the storm drains.
- Prohibit participants from throwing dye within 100 feet of any stream or other surface waterbody.

- Prohibit participants from throwing dye within 100 feet of any open stormwater feature (e.g,. ditch, swale, bioretention, rain garden, detention pond)
- Set up color stations at least 100 feet away from any surface water or open stormwater feature.
- The route, start, finish, and color application stations must be at least 100’ away from any permeable pavement or the permeable pavement must be completely covered.
- If the event will be held on a small, contained area, cordon off the area and place enough covers on the ground to cover the entire site. If possible, contain the color application to grassy areas where ground covers are unnecessary.

Event Clean-Up

- Dry off tarps and stained wet pavement with towels or absorbent pads.
- Use brooms or street sweepers to clean up paved areas. The fineness of the material may require sweepers with dust control systems.
- Do not use blowers to move dye material.
- Do not use hoses or pressure washers to rinse excess dye off of tarps, sidewalks or paved areas. If it becomes necessary to use water to clean surfaces, all the water must be collected and disposed of to the sanitary sewer system, with approval from the local sewer agency.
- Call the local spill response hotline immediately (24/7) if any colored water enters a storm drain or water body.
- Dispose of the collected sweeping materials, cleaning materials, and air filters appropriately.

Source Control BMPs

- All litter and debris must be picked up and properly disposed of.
- All clean-up must be done within 24-hours of the race event.

S438 BMPs for Construction Demolition

Description of Pollutant Sources: This activity applies to removal of existing buildings and other structures by controlled explosions, wrecking balls, or manual methods, and subsequent clearing of the rubble. The loose debris may contaminate stormwater.

Pollutants of concern include toxic organic compounds, hazardous wastes, high pH, heavy metals, and suspended solids.

Pollutant Control Approach: Do not expose hazardous materials to stormwater. Regularly clean up debris that can contaminate stormwater. Protect the drainage system from dirty runoff and loose particles. Sweep paved surfaces daily. Educate employees about the need to control site activities.

Applicable Operational BMPs:

- Identify, remove, and properly dispose of hazardous substances from the building before beginning construction demolition activities that could expose them to stormwater. Such substances could include PCBs, asbestos, lead paint, mercury switches, and electronic waste.
- Educate employees about the need to control site activities to prevent stormwater pollution, and also train them in spill cleanup procedures.
- Keep debris containers, dumpsters, and debris piles covered.
- Place storm drain covers, or a similarly effective containment device, on all nearby drains to prevent dirty runoff and loose particles from entering the drainage system.
    - Place the covers (or devices) at the beginning of the workday.
    - Collect and properly dispose of the accumulated materials before removing the covers (or devices) at the end of the workday.
    - Use dikes, berms, or other methods to protect overland discharge paths from runoff if stormwater drains are not present.
- Sweep street gutters, sidewalks, driveways, and other paved surfaces in the immediate area of the demolition at the end of each workday. Collect and properly dispose of loose debris and garbage.
- Lightly spray water (such as from a hydrant or water truck) throughout the site to help control windblown fine materials such as soil, concrete dust, and paint chips.

Control the amount of dust control water so that runoff from the site does not occur, yet dust control is achieved. Do not use oils for dust control.

Suggested Operational BMPs:

- Construct a screen to prevent stray building materials and dust from escaping the area during demolition. Size and orient the screen to capture wind-blown materials and contain them onsite.
- Schedule demolition to take place at a dry time of the year to prevent stormwater runoff from the demolition site.

S440 BMPs for Pet Waste

Description of Pollutant Sources: Pets and pet-care can generate pollutants from waste, animal washing, and cage or kennel cleaning. Pet waste that washes into lakes, streams or Puget Sound begins to decay, using up oxygen and releasing ammonia. Low oxygen levels and ammonia combined with warm water can kill fish. Pet waste also contains nutrients that encourage weed and algae growth, and contribute to low oxygen and high pH in waters we use for swimming, boating and fishing. Most importantly, pet waste can carry viruses and bacteria that could cause disease and lead to beach or shellfish harvesting closures.

Pollutant Control Approach: Use a plastic bag or pooper scooper to clean up after pets. Properly dispose of pet waste.

Recommended Operational BMPs for Pet Owners

- Regularly pick up and dispose of pet waste deposited on walks and at home.
- Put pet waste in a securely closed bag and deposit it in the trash. Do not place pet waste in yard waste containers because pet waste may carry diseases, and composting may not kill disease-causing organisms.
- Do not compost or use pet waste as fertilizer. Harmful bacteria, worms, and parasites that can transmit disease can live in the soil for years even after the solid portion of the pet waste has dissolved.
- Do not dispose of unused pet pharmaceuticals in a storm drain, in a toilet, or down a sink. Check with your local refuse collector for proper disposal locations of pet medications.
- When cleaning out cages and kennels, dispose of wash water down the toilet or a mop sink. Otherwise, wash directly over lawn areas or make sure the wash water drains to a vegetated area.
- Bathe pets indoors or in a manner that wash water won’t be discharged to storm drains, ditches, or surface waters of the state.

Recommended Operational BMPs for Recreation Areas and Multi-Family Properties

- Post signs at recreation areas and multi-family properties (that allow pets) reminding residents and visitors to pick up after their pets.

Source Control BMPs

- Carefully consider the placement of pet waste stations at recreation sites and near multi-family properties that allow pets. Choose locations convenient for dog walkers to pick up a bag at the start of their walk and locations for them to dispose of it at mid-walk or at the end of their walk.
- Check pet waste stations on a regular basis to keep pet waste bags stocked and disposal stations empty. Consider signage to keep regular trash out of pet waste disposal stations to avoid filling them too quickly. Make sure pet waste disposal stations have a cover to keep out water.
- At multi-family properties with roof-top dog runs, ensure that stormwater from the dog run is not discharged to the stormwater system. Check with the local jurisdiction regarding roof-top dog run connections to sanitary sewer.

Figure IV-7.5: Example of a Pet Waste Station

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S442 BMPs for Labeling Storm Drain Inlets On Your Property

Description of Pollutant Sources: Waste materials dumped into storm drain inlets can have severe impacts on receiving waters. Posting notices regarding discharge prohibitions at storm drain inlets can prevent waste dumping. Storm drain signs and stencils are highly visible source controls that are typically placed directly adjacent to storm drain inlets.

Pollutant Control Approach: The stencil, affixed sign, or metal grate contains a brief statement that prohibits dumping of improper materials into the urban runoff conveyance system. Storm drain messages have become a popular method of alerting the public about the effects of and the prohibitions against waste disposal.

Applicable Operational BMPs:

- Label storm drain inlets in residential, commercial, industrial areas, and any other areas where contributions or dumping to storm drains is likely.
- Stencil or apply storm drain markers adjacent to storm drain inlets to help prevent the improper disposal of pollutants. Or, use a storm drain grate stamped with warnings against polluting.
- Place the marker in clear sight facing toward anyone approaching the inlet from either side.
- Use a brief statement and / or graphical icons to discourage illegal dumping. Examples include:
    - “No Dumping – Drains to Stream”
    - “No Pollutants – Drains to Puget Sound”
    - “Dump No Waste – Drains to Lake”
    - “No Dumping – Puget Sound Starts Here”
- Check with your local government agency to find out if they have approved specific signage and / or storm drain message placards for use. Consult the local agency stormwater staff to determine specific requirements for placard types and methods of application.
- Maintain the legibility of markers and signs. Signage on top of curbs tends to weather and fade. Signage on face of curbs tends to be worn by contact with vehicle tires and sweeper brooms.

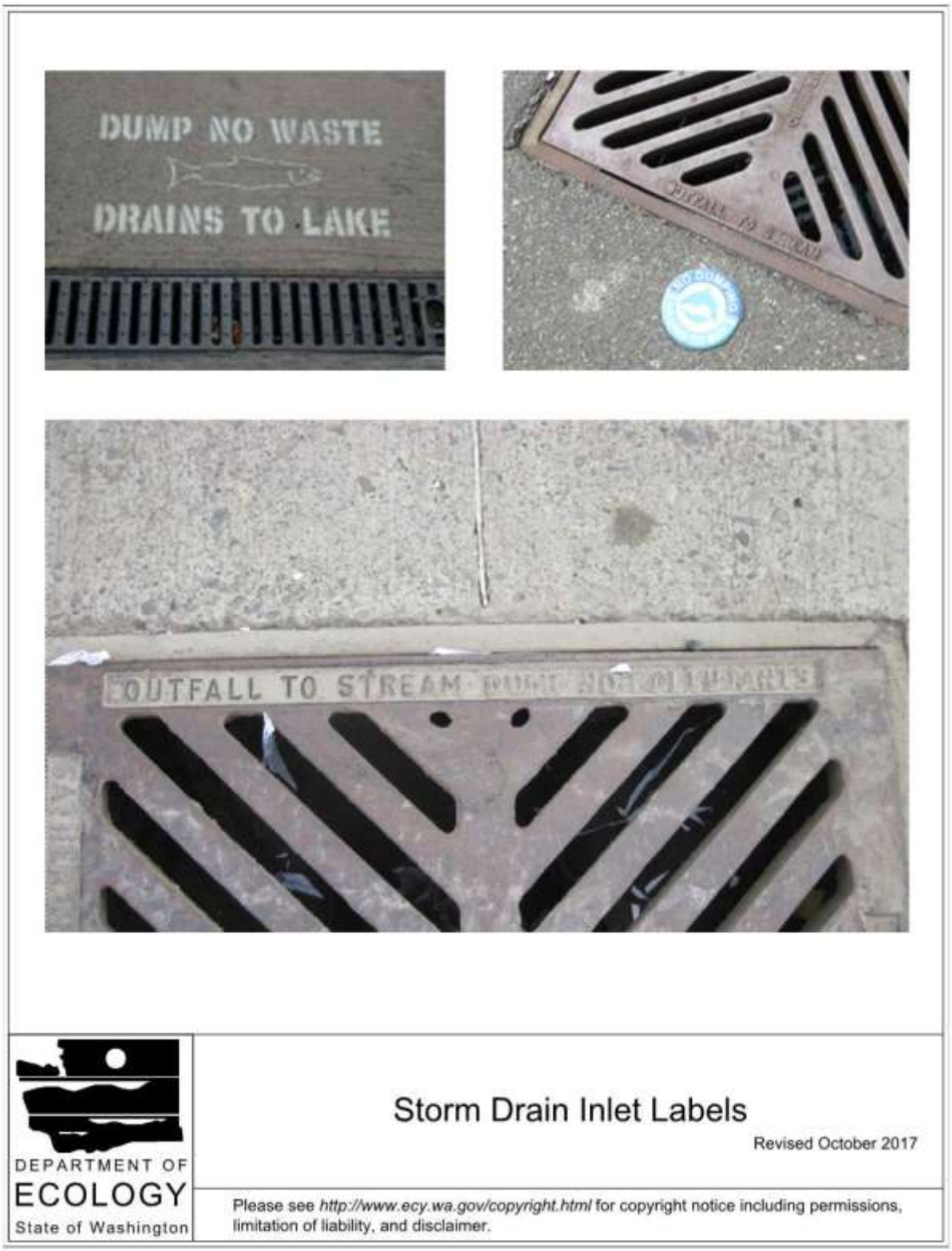
- When painting stencils or installing markers, temporarily block the storm drain inlet so that no pollutants are discharged from the labeling activities.

Optional Operational BMPs:

Use a stencil in addition to a storm drain marker or grate to increase visibility of the message.

Reference for this BMP: (CASQA, 2003)

Figure IV-7.6: Storm Drain Inlet Labels



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S443 BMPs for Fertilizer Application

Description of Pollutant Sources: Poor application of fertilizers can cause appreciable stormwater contamination. Fertilizers can leach phosphorous, nitrogen, and coliform bacteria. Fertilizers can contribute to algae blooms, increase nutrient concentrations, and deplete oxygen in receiving waters.

Pollutant Control Approach: Minimize the amount of fertilizer necessary to maintain vegetation. Control the application of fertilizer to prevent the discharge of stormwater pollution.

Applicable Operational BMPs:

- Apply the minimum amount of slow-release fertilizer necessary to achieve successful plant establishment.
- Do not fertilize when the soil is dry or during a drought.
- Never apply fertilizers if it is raining or about to rain.
- 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.
- Determine the proper fertilizer application for the types of soil and vegetation involved.
- Follow manufacturers' recommendations and label directions.
- Train employees on the proper use and application of fertilizers.
- Keep fertilizer granules off impervious surfaces. Clean up any spills immediately. Do not hose down to a storm drain, conveyance ditch, or water body.
- If possible, do not fertilize areas within 100 feet of water bodies including wetlands, ponds, and streams.
- Avoid fertilizer applications in stormwater ditches, stormwater facilities, and drainage systems.
- In areas that drain to sensitive water bodies, apply no fertilizer at commercial and industrial facilities, to grass swales, filter strips, or buffer areas unless approved by the local jurisdiction.
- Use slow release fertilizers such as methylene urea, isobutylidene, 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.

- Apply fertilizers in amounts appropriate for the target vegetation and at the time of year that minimizes losses to surface and ground waters.
- 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.
- Do not use turf fertilizers containing phosphorous unless a soil sample analysis taken within the past 36 months indicates the soil of the established lawn is deficient in phosphorus. For more information about restrictions on turf fertilizers containing phosphorus, see the following website:

  https://agr.wa.gov/departments/pesticides-and-fertilizers/fertilizers/fertilizers-containing-phosphorus

Recommended Operational BMPs:

Test soils to determine the correct fertilizer application rates.

- Evaluation of soil nutrient levels through regular testing ensures the best possible efficiency and economy of fertilization.
- Fertilization needs vary by site depending on plant, soil, and climatic conditions.
- Choose organic fertilizers when possible.
- For details on soils testing, contact the local Conservation District, a soils testing professional, or a Washington State University Extension office.

S446 BMPs for Well, Utility, Directional and Geotechnical Drilling

Description of Pollutant Sources: This activity applies to drilling water wells and utilities, environmental protection and monitoring wells, and geotechnical borings that use machinery in the drilling. It does not apply to the use of devices such as hand augers, or for large structural drilling such as drilled shafts.

Drilling activities can expose soil and contaminated soil. These activities may cause the discharge of stormwater contaminated with sediments and other contaminates. This risk increases when drilling in areas with contaminated soils.

Pollutant Control Approach: Reduce sediment runoff from drilling operations.

Applicable Operational BMPs:

- When drilling in areas of known or suspected soil contamination, test and characterize soil cuttings and accumulated sediment to determine proper management and disposal methods. If applicable, generator knowledge may be used to characterize the soil cuttings and accumulated sediment.
- Obtain permits for drilling activities, and for clearing and grading the access routes and the work site.
- Protect environmentally sensitive areas (streams, wetlands, floodplains, floodways, erosion hazards, and landslide hazards) within the area of influence of the work site.
- Mitigate potential impacts to surrounding areas and/or the drainage system.
- For horizontal directional drilling, take measures to capture and contain drilling fluids and slurry.
- Equip the driller to quickly respond to unusual conditions that may arise.
- Locate and prepare access roadways to minimize the amount of excavation and the potential for erosion.
- Contain accumulated uncontaminated water and sediment on site and pump into a storage tank or direct through a geotextile filtration system (or equivalent system) before discharging to the surrounding ground surface. Contaminants may include, but are not limited to, hydraulic fluids, contaminants in the soil and/or groundwater, polymers, and other drilling fluid additives.

Source Control BMPs

- Keep all sediment-laden water out of storm drains and surface waters. If sediment-laden water does escape from the immediate drilling location, block flow to any nearby waterways or catch basins using fabric, inlet protections, sand bags, erosion fences, or other similar methods. Immediately notify Ecology and the local jurisdiction if sediment-laden water impacts the storm sewer system or surface waters.
- Divert any concentrated flows of water into the site using sandbags or check dams up-slope from the site.
- Dispose of soil cuttings and accumulated sediment appropriately. If cuttings or other soils disturbed in the drilling process are to be temporarily stockpiled on site, they must be covered and surrounded by a berm or filter device. See S429 BMPs for Storage or Transfer (Outside) of Solid Raw Materials, Byproducts, or Finished Products.
- Stabilize exposed soils at the end of the job, using mulch or other erosion control measures. See S425 BMPs for Soil Erosion and Sediment Control at Industrial Sites.
- Contain spent drilling slurry on site and allow it to dewater, or haul to an appropriate, approved disposal site.
- Restore disturbed areas with mulch (see BMP C121: Mulching) and seeding or hydroseeding (see BMP C120: Temporary and Permanent Seeding).

S447 BMPs for Roof Vents

Description of Pollutant Sources: This activity applies to processes that vent emissions to the roof and/or the accumulation of pollutants on roofs. Processes of special concern are stone cutting, metal grinding, spray painting, paint stripping, galvanizing and electroplating. Pollutants from these processes may build up on roofs and may pollute stormwater roof runoff.

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

Applicable BMPs:

- Identify processes that are vented and may contribute pollutants to the roof. Pollutants of concern include and are not limited to:
    - Metal dust
    - Grease from food preparation
    - Solvents
    - Hydrocarbons
    - Fines
    - Stone dust
- Look for chemical deposition around vents, pipes, and other surfaces.
- Install and maintain appropriate source control measures such as air pollution control equipment (filters, scrubbers, and other treatment). (City of San José Environmental Services, 2004)
    - Check that your scrubber solution is appropriate for the chemistry of the fumes.
    - Install vent covers and drip pans where there are none.
    - Prevent leaks in pipefittings and containment vessels with routine maintenance.
- Consider instituting operational or process changes to reduce pollution.
- If proper installation and maintenance of air pollution control equipment does not prevent pollutant fallout on your roof, additional treatment of the roof runoff may be necessary.

    - Install/provide appropriate devices for roof runoff before it is discharged off site. This may include approved water quality treatment BMPs or structural stormwater treatment systems.
- Maintain air filters and pollution control equipment on a regular basis to ensure they are working properly. (The smell of odors from outside the building indicates that the pollution control equipment may need maintenance or evaluation.)
- When cleaning accumulated emissions from roof tops, collect the washwater and loose materials using a sump pump, wet vacuum or similar device. Discharge the collected runoff to the sanitary sewer after approval by the local sewer authority, or have a waste disposal company remove it.

S451 BMPs for Building, Repair, Remodeling, Painting, and Construction

Description of Pollutant Sources: This activity refers to:

- The construction of buildings and other structures.
- Remodeling of existing buildings and houses.
- General exterior building repair work.

Pollutants of concern include toxic hydrocarbons, hazardous wastes, toxic organics, suspended solids, heavy metals, pH, oils, and greases.

Pollutant Control Approach: Educate employees about the need to control site activities. Control leaks, spills, and loose material. Utilize good housekeeping practices. Regularly clean up debris that can contaminate stormwater. Protect the drainage system from dirty runoff and loose particles.

Applicable Operational BMPs:

- Identify, remove, and properly dispose of hazardous substances from the building before beginning repairing or remodeling activities that could expose them to stormwater. Such substances could include PCBs, asbestos, lead paint, mercury switches, and electronic waste.
- Educate employees about the need to control site activities to prevent stormwater pollution, and also train them in spill cleanup procedures.
- At all times, have available at the work site spill cleanup materials appropriate to the chemicals used on site.
- Clean up the work site at the end of each work day. Put away materials (such as solvents) indoors or cover and secure them, so that unauthorized personnal will not have access to them.
- Sweep the area daily to collect loose litter, paint chips, grit, and dirt.
- Do not dump any substance on pavement, on the ground, in the storm drain, or toward the storm drain, regardless of its content, unless it is clean water only.
- Place a drop cloth, where space and access permits, before beginning wood treating activities. Use drip pans in areas where drips are likely to occur if the area cannot be protected with a drop cloth.

Source Control BMPs

- Use ground or drop cloths underneath scraping and sandblasting work. Use ground cloths, buckets, or tubs anywhere that work materials are laid down.
- Clean paint brushes and other tools covered with water-based paints in sinks connected to sanitary sewers or in portable containers that can subsequently be dumped into a sanitary sewer drain.
- Clean brushes and tools covered with non-water-based finishes or other materials in a manner that enables collection of used solvents for recycling or proper disposal. Do not discharge non-water-based finishes or paints or used solvents into the sanitary sewer, or any other drain.
- Use storm drain covers, or similarly effective devices, to prevent dust, grit, washwater, or other pollutants from escaping the work area. Place the cover or containment device over the storm drain at the beginning of the work day. Collect and properly dispose of accumulated dirty runoff and solids before removing the cover or device at the end of each work day.
- Refer to S431 BMPs for Washing and Steam Cleaning Vehicles / Equipment / Building Structures for best management practices associated with power washing buildings.

Suggested Operational BMPs:

- Lightly spray water on the work site to control dust and grit that could blow away. Do not use oils for dust control. Never spray to the point of water runoff from the site.
- Clean tools over a ground cloth or within a containment device such as a tub.
- Consider using filtered vacuuming to collect waste that may be hard to sweep, such as dust on a drop cloth.
- If conducting work in wet weather conditions, consider setting up temporary cover when scraping or pressure-washing lead-based paint.

S452 BMPs for Goose Waste

Description of Pollutant Sources: Goose waste deposited near water or in water can contribute nutrients and algae growth. Goose feces may contain pathogens and contribute to the spread of diseases. Swimmers itch (schistosome or cercarial dermatitis) is caused by a parasite that can be spread by goose droppings, but does not mature or reproduce in humans.

Pollutant Control Approach: To help decrease geese pollution to water sources, remove waste periodically and use deterrent management practices.

Applicable Operational BMPs:

This BMP is for areas of chronic accumulation of goose waste that impact stormwater systems.

- If possible, pick up goose waste using shovels, brooms, rakes, power sweepers, and trash cans. Properly dispose of goose waste in the garbage.
- Do not blow, sweep, or wash goose waste into waterways or storm sewer systems.
- Regularly clean goose waste from areas of chronic deposition where deterrence measures are impractical.
- Do not feed wild geese or any other wild animals.
- In recreational areas post signs discouraging the feeding of geese and other wild animals.

Optional Operational BMPs:

- Change the habitat from goose friendly to goose resistant. Reduce lawn areas and increase the height of shoreline vegetation (tall grass, shrubs); as geese are reluctant to walk through tall vegetation.
- Create a natural geese barrier. 20 to 100 feet of herbaceous vegetation at least 3 feet in height to discourage geese . A narrow, winding path through the plantings will allow for beach access, while preventing geese from having a direct line of sight through the planted area.
- Make bank slopes steeper than 4:1 to discourage geese by preventing a clear view of the bank top and potential predators . Or, separate the beach from the

grass with a few steep steps, which makes the ascent too difficult for most geese.

- Narrow ponds to limit takeoff and landing opportunities .
- Where space is limited use one or two rows of shrub plantings combined with a fence. Fences can be made from woven wire, poultry netting, plastic netting, plastic snow fencing, monofilament line, or electrified wire. Fences should be at least 24 inches tall (3 feet may be better), firmly constructed, and installed to prevent the geese from walking around the ends. Lower openings should be no larger than 4 inches from the ground to prevent goslings from walking under or through the fence.
- Construct a grid of wire or line above the water's surface to prevent geese from flying into a pond that they have been accustomed to using. The grid should be one to two feet above the water surface, but may be taller if humans need access to the area under the grid. There should be no more than five feet of space between grid lines. To prevent geese from walking under the grid install a perimeter fence. Regularly monitor the grid for holes, trapped wildlife, and sagging.
- Canada geese are protected under federal and state law and a hunting license and open season are required to hunt them. Where lethal control of Canada geese is necessary outside of hunting seasons, it should be carried out only after the above nonlethal control techniques have proven unsuccessful and only under permits issued by the U.S. Fish and Wildlife Service. Currently, the only agency permitted for lethal removal is the U.S. Department of Agriculture's Wildlife Services. Lethal control techniques include legal hunting, shooting out of season by permit, egg destruction by permit, and euthanasia of adults by government officials.
- Scare geese away when they are around. Geese often learn quickly to ignore scare devices that are not a real physical danger. Vary the use, timing, and location of tactics. Take advantage of geese being fearful of new objects. Examples of harassment and scare tactics:
    - **Dog patrols:** When directed by a handler, dogs are the method of choice for large open areas. Results are often immediate. After an aggressive initial use (several times a day for one or two weeks), geese get tired of being harassed and will use adjacent areas instead. A dog can be tethered to a long lead (which may require relocating the dog and tether frequently to cover more area), be allowed to chase and retrieve a decoy

thrown over a large flock of geese, or be periodically released to chase the birds (if this is not against leash laws).

- **Eyespot Balloons:** Large, helium-filled balloons with large eye-like images. Tether balloons on a 20 to 40 foot monofilament line attached to a stake or heavy object. Locate balloons where they will not tangle with trees or utility lines.
- **Flags and Streamers:** Simple flags from plastic mounted on tall poles or mylar tape to make 6-foot streamers attached to the top of 8 foot long poles. Flags and streamers work best in areas where there is steady wind.
- **Scarecrows:** Effective in areas where geese view humans as dangerous predators. For maximum effect, the arms and legs should move in the wind, use bright colors, and large eyes. Large, blow-up toy snakes are reported to work as a type of scarecrow.
- **Noisemakers:** Devices that make a loud bang such as propane cannons, blanks, and whistle bombs can scare geese. Making the noise as soon as geese arrive and persistence are the keys to success when using these devices. Consult noise ordinances and other permitting authorities (such as the local police department) before using.
- **Lasers:** Relatively low-power, long-wavelength lasers provide an effective means of dispersing geese under low light conditions. The birds view the light as a physical object or predator coming toward them and generally fly away to escape. Never aim lasers in the direction of people, roads, or aircraft.

- Geese's favorite food is new shoots of grass. Low lying grass also allows easy access to the water for protection from predators. Let grass grow to six inches or taller. Stop fertilizing and watering the lawn to reduce the palatability of the lawn.
- Minimize open sight lines for geese to less than 30 feet.
- Plant shrubs or trees along ponds to limit takeoff and landing opportunities.

Refer to: http://www.humanesociety.org/assets/pdfs/wild_neighbors/canada_goose_guide.pdf and https://wdfw.wa.gov/species-habitats/species/branta-canadensis for additional information.

Appendix IV-A: Urban Land Uses and Pollutant Generating Sources

Use this appendix to identify pollutant-generating sources at various land uses (manufacturing, transportation, communication, wholesale, retail, service - based on the *North American Industry Classification System* (United States Census Bureau, 2017), and public agencies). Applicable operational and structural source control and treatment BMPs for each pollutant source may then be selected by referring to Volume IV. Other land uses not included in this appendix should also consider implementing applicable (mandatory) BMPs for their pollutant sources. Note that potentially polluting operations may not be limited to those examples identified with NAICS codes.

1. Manufacturing Businesses

Cement

NAICS 3273XX:*Cement and Concrete Product Manufacturing*

Description: These businesses primarily produce Portland cement, the binder used in concrete for paving, buildings, pipe, and other structural products. The three basic steps in cement manufacturing are: 1) proportioning, grinding, and blending raw materials; 2) heating raw materials to produce a hard, stony substance known as clinker; and 3) combining the clinker with other materials and grinding the mixture into a fine powdery form. The raw materials include limestone, silica, alumina, iron, chalk, oyster shell marl, or shale. Waste materials from other industries are often used such as slag, fly ash and spent blasting sand. Raw materials are crushed, mixed and heated in a kiln to produce the correct chemical composition. Kilns typically are coal, gas, or oil fired. The output of the kiln is a clinker that is ground to produce the final product.

The basic process may be wet or dry. In the wet process water is mixed with the raw ingredients in the initial crushing operation and in some cases is used to wash the material prior to use. Water may also be used in the air pollution control scrubber. The most significant waste material from cement production is the kiln dust. Concrete products may also be produced at ready-mix concrete facilities. Refer to Concrete Products for a description of the BMPs appropriate to these activities.

Potential Pollutant Generating Sources: Stormwater contamination may occur during the crushing, grinding, storage, and handling of kiln dust, limestone, shale, clay, coal, clinker, gypsum, anhydrite, slag, sand, and product and at the vehicle and equipment maintenance, fueling, and cleaning areas. Aluminum, iron, heavy metals, chemical oxygen demand (COD), pH, potassium, sulfate, oil & grease, and total suspended solids (TSS) are some of the potential pollutants.

Chemical Manufacturing

NAICS 325XXX:*Chemical Manufacturing*

Description: This group is engaged in the manufacture of chemicals, or products based on chemicals such as acids, alkalis, inks , chlorine, industrial gases, pigments,

chemicals used in the production of synthetic resins, fibers and plastics, synthetic rubber, soaps and cleaners, pharmaceuticals, cosmetics, paints, varnishes, resins, photographic materials, chemicals, organic chemicals, agricultural chemicals, adhesives, and sealants .

Potential Pollutant Generating Sources: Activities that can contaminate stormwater include bagging, blending, packaging, crushing, milling, shredding, granulation, grinding, storage, distribution, loading/unloading, and processing of materials; equipment storage; application of fertilizers; foundries; lime application; use of machinery; material handling and warehousing; cooling towers; fueling; boilers; dangerous waste treatment, storage and disposal; wastewater treatment; areas of past industrial activity; access roads and tracks; drum washing, and maintenance and repair.

Chemical businesses in the Seattle area surveyed for dangerous wastes were found to produce waste caustic solutions, soaps, heavy metal solutions, inorganic and organic chemicals, solvents, acids, alkalis, paints, varnishes, pharmaceuticals, and inks. The potential pollutants include biological oxygen demand (BOD), COD, oil & grease, pH, total phosphorus, ammonia,nitrates, nitrites, total Kjeldahl nitrogen (TKN), TSS, specific organics, and heavy metals.

Concrete Products

NAICS 3273XX:*Cement and Concrete Product Manufacturing*

NAICS 3274XX:*Lime and Gypsum Product Manufacturing*

Description: Businesses that manufacture ready-mix concrete, gypsum products, concrete blocks and bricks, concrete sewer or drainage pipe, septic tanks, and prestressed concrete building components. Concrete is prepared on-site and poured into molds or forms to produce the desired product. The basic ingredients of concrete are sand, gravel, Portland cement, crushed stone, clay, and reinforcing steel for some products. Admixtures including fly ash, calcium chloride, triethanolamine, lignosulfonic acid, sulfonated hydrocarbon, fatty acid glyceride, or vinyl acetate, may be added to obtain desired characteristics such as slower or more rapid curing times.

The first stage in the manufacturing process is proportioning cement, aggregate, admixtures and water, and then transporting the product to a rotary drum, or pan mixer.

The mixture is then fed into an automatic block-molding machine that rams, presses, or vibrates the mixture into its final form. The final product is then stacked on iron framework cars where it cures in four hours. After being mixed in a central mixer, concrete is molded in the same manner as concrete block. The concrete cures in the forms for a number of hours. Forms are washed for reuse, and the concrete products are stored until they can be shipped.

Potential Pollutant Generating Sources: Pollutant generating activities/sources include stockpiles of raw materials; washing of waste concrete from trucks, forms, equipment, and the general work area; and water from the curing of concrete products. Besides the basic ingredients for making concrete products, chemicals used in the curing of concrete and the removal of forms may end up in stormwater. These chemicals can include latex sealants, bitumastic coatings and release agents. Trucks and equipment maintained on-site may generate waste oil and solvents, and other waste materials. Potential pollutants include COD, BOD, TSS, total dissolved solids (TDS), pH, iron, lead, zinc, and oil & grease.

Electrical Products

NAICS 33324x:*Industrial Machinery Manufacturing*

NAICS 33331x:*Commercial and Service Industry Machinery Manufacturing*

NAICS 33341x:*Ventilation, Heating, Air Conditioning, and Commercial Refrigeration Equipment Manufacturing*

NAICS 3339xx:*Other General Purpose Machinery Manufacturing*

NAICS 334xxx:*Computer and Electronic Product Manufacturing*

NAICS 335xxx: *Electrical Equipment, Appliance, And component Manufacturing*

NAICS 336xxx:*Transportation Equipment Manufacturing*

NAICS 339xxx:*Miscellaneous Manufacturing*

Source Control BMPs

Description: A variety of products are produced including electrical transformers and switchgear, motors, generators, relays, and industrial controls; communications equipment for radio and TV stations and systems; electronic components and accessories including semiconductors; printed board circuits; electromedical and electrotherapeutic apparatus; and electrical instrumentation. Manufacturing processes include electroplating, machining, fabricating, etching, sawing, grinding, welding, and parts cleaning. Materials used include metals, ceramics, quartz, silicon, inorganic oxides, acids, alkaline solutions, arsenides, phosphides, cyanides, oils, fuels, solvents, and other chemicals.

Potential Pollutant Generating Sources: Most of the actual manufacturing and processing activity at the types of facilities discussed here normally occur indoors and will not be exposed to stormwater. The types of activities where exposure to stormwater may occur consist primarily of loading/ and unloading activities, and the storage and handling of raw materials, by-products, final products, or waste products. A wide variety of materials are used at these facilities, including metals, acids used for chemical etching, alkaline solutions, solvents, various oils and fuels, and miscellaneous chemicals. Tanks or drums of these materials may be exposed to stormwater during loading/ and un-loading operations, or through outdoor storage or handling.

Liquid wastes which may be exposed at least temporarily include spent solvents and acids, miscellaneous chemicals, and oily wastes. These wastes may be contaminated with a variety of heavy metals and chlorinated hydrocarbons. Used equipment, scrap metal and wire, soiled rags, and sanding materials may also be exposed to stormwater and constitute a potential source of pollutants. In addition, some facilities may have dumpsters containing nonhazardous wastes or manufacturing debris that may be exposed to stormwater.

Wastewater consists of solutions and rinses from electroplating operations and the wastewaters from cleaning operations. Water may also be used to cool saws and grinding machines. Sludges are produced by the wastewater treatment process. Potential pollutants include BOD, COD, oil & grease, organics, pH, TSS, TKN, nitrate and nitrite nitrogen, copper, lead, silver, and zinc.

Food and Kindred Products

NAICS 115114:*Postharvest Crop Activities (except Cotton Ginning)*

NAICS 311xxx:*Food Manufacturing*

NAICS 312xxx:*Beverage and Tobacco Product Manufacturing*

Description: Businesses in this category include facilities manufacturing or processing foods, beverages, and related products for human consumption, and prepared feeds for animals and fowls. Facilities engaged in manufacturing cigarettes, cigars, and other tobacco products are also included. Food processing typically occurs inside buildings. Exceptions are meat packing plants where live animals may be kept outside, and fruit and vegetable plants where the raw material may be temporarily stored outside. Meat production facilities include stockyards, slaughtering, cutting and deboning, meat processing, rendering, and materials recovery. Dairy production facilities include receiving stations, clarification, separation, and pasteurization followed by culturing, churning, pressing, curing, blending, condensing, sweetening, drying, milling, and packaging. Canned frozen and preserved fruits and vegetables are typically produced by washing, cutting, blanching, and cooking followed by drying, dehydrating, and freezing.

Grain mill products are processed during washing, milling, debranning, heat treatment, screening, shaping, and vitamin and mineral supplementing. Bakery products processing includes mixing, shaping, of dough, cooling, and decorating. Operations at an edible oil manufacturer include refining, bleaching, hydrogenation, fractionation, emulsification, deodorization, filtration, and blending. Beverage production includes brewing, distilling, fermentation, blending, and packaging. Wine processors often crush grapes outside the process building and/or store equipment outside when not in use. Some wine producers use juice from grapes crushed elsewhere. Some vegetable and fruit processing plants use caustic solutions.

Potential Pollutant Generating Sources: The nature of the business, and the required sanitary conditions, require that raw and processed materials be protected from stormwater. As such, the contamination of stormwater from these activities is primarily from the loading and unloading of products and raw materials; spillage and leaks from tanks and containers stored outdoors; waste management practices; pest control; and

improper connections to the storm sewer.. The following are the pollutants typically expected from this industry segment: BOD, fecal coliform, oil & grease, pH, TKN, TSS, copper, manganese, and pesticides.

Glass Products

NAICS 32721x:*Glass and Glass Product Manufacturing*

Description: The produced glass form may be flat or window glass, safety glass, container glass, tubing, glass wool, or fibers. The raw materials are sand mixed with a variety of oxides such as aluminum, antimony, arsenic, copper, cobalt oxide, barium, and lead. The raw materials are mixed and heated in a furnace. Processes that vary with the intended product shape the resulting molten material. The cooled glass may be edged, ground, polished, annealed and/or heat-treated to produce the final product. Air emissions from the manufacturing buildings are scrubbed to remove particulates.

Potential Pollutant Generating Sources: Raw materials are generally stored in silos except for crushed recycled glass and materials washed off recycled glass. Contamination of stormwater and/or ground water can be caused by raw materials lost during unloading operations, errant flue dust, equipment/vehicle maintenance and engine fluids from mobile lifting equipment that is stored outside. The maintenance of the manufacturing equipment will produce waste lubricants and cleaning solvents. The flue dust is likely to contain heavy metals such as arsenic, cadmium, chromium, mercury, and lead. Potential pollutants include oil & grease, high/low pH, lead, and heavy metals such as arsenic, cadmium, chromium, mercury, and lead.

Industrial Machinery & Equipment, Trucks & Trailers, Aircraft, Aerospace, & Railroad

NAICS 333xxx:*Machinery Manufacturing*

NAICS 336xxx:*Transportation Equipment Manufacturing*

Description: This category includes the manufacture of a variety of equipment including engines and turbines, farm and garden equipment, construction and mining machinery, metal working machinery, pumps, computers and office equipment, automatic vending machines, refrigeration and heating equipment, and equipment for

the manufacturing industries. This group also includes many small machine shops, and the manufacturing of trucks, trailers and parts, airplanes and parts, missiles, spacecraft, and railroad equipment and instruments.

Manufacturing processes include various forms of metal working and finishing, such as electroplating, anodizing, chemical conversion coating, etching, chemical milling, cleaning, machining, grinding, polishing, sand blasting, laminating, hot dip coating, descaling, degreasing, paint stripping, painting, and the production of plastic and fiberglass parts. Raw materials include ferrous and non-ferrous metals, such as aluminum, copper, iron, steel, and their alloys, paints, solvents, acids, alkalis, fuels, lubricating and cutting oils, and plastics.

Potential Pollutant Generating Sources: Potential pollutant sources include spills and leaks from fueling, maintenance shops, loading/unloading of materials, and outside storage of gasoline, diesel, cleaning fluids, equipment, solvents, paints, wastes, detergents, acids, other chemicals, oils, metals, and scrap materials. Air emissions from stacks and ventilation systems are potential areas for exposure of materials to rainwater.

Metal Products

NAICS 331xxx:*Primary Metal Manufacturing*

NAICS 332xxx:*Fabricated Metal Product Manufacturing*

NAICS 337124:*Metal Household Furniture Manufacturing*

NAICS 337214:*Office Furniture (except Wood) Manufacturing*

NAICS 339xxx:*Miscellaneous Manufacturing*

Description: This group includes mills that produce basic metals and primary products, as well as foundries, electroplaters, and fabricators of final metal products. Basic metal production includes aluminum, copper, and steel. Mills that transform metal billets, either ferrous or nonferrous such as aluminum, to primary metal products are included. Primary metal forms include sheets, flat bar, building components such as columns, beams and concrete reinforcing bar, and large pipe.

Source Control BMPs

Steel mills in the Pacific Northwest primarily use recycled metal and electric furnaces. The molten steel is cast into billets or ingots that may be reformed on site or taken to rolling mills that produce primary products. As iron and steel billets may sit outside before reforming, surface treatment to remove scale may occur prior to reforming. Foundries pour or inject molten metal into a mold to produce a shape that cannot be readily formed by other processes. The metal is first melted in a furnace. The mold is made of sand or metal die blocks that are locked together to make a complete cavity. The molten metal is ladled in and the mold is cooled. The rough product is finished by quenching, cleaning and chemical treatment. Quenching involves immersion in a plain water bath or water with an additive.

Businesses that fabricate metal products from metal stock provide a wide range of products. The raw stock is manipulated in a variety of ways including machining of various types, grinding, heating, shearing, deformation, cutting and welding, soldering, sand blasting, brazing, and laminating. Fabricators may first clean the metal by sand blasting, descaling, or solvent degreasing. Final finishing may involve electroplating, painting, or direct plating by fusing or vacuum metalizing. Raw materials, in particular recycled metal, are stored outside prior to use, as are billets before reforming. The descaling process may use salt baths, sodium hydroxide, or acid (pickling).

Primary products often receive a surface coating treatment. Prior to the coating the product surface may be prepared by acid pickling to remove scale or byalkaline cleaning to remove oils and greases. The two major classes of metallic coating operations are hot and cold coating. Aluminum, tin, and zinc coatings are applied in molten metal baths. Chromium and tin are usually applied electrolytically from plating solutions.

Potential Pollutant Generating Sources: Potential pollutant generating sources include outside storage of chemicals, metal feedstock, byproducts (fluxes), finished products, fuels, lubricants, waste oil, sludge, waste solvents, dangerous wastes, piles of coal, coke, dusts, fly ash, baghouse waste, slag, dross, sludges, sand refractory rubble, and machining waste; unloading of chemical feedstock and loading of waste liquids such as spent pickle liquor by truck or rail; material handling equipment such as cranes, conveyors, trucks, and forklifts; particulate emissions from scrubbers, baghouses or electrostatic precipitators; fugitive emissions; maintenance shops; erosion of soil from plant yards; and floor, sink, and process wastewater drains.

Paper, Pulp, and Paperboard Mills

NAICS 3221xx:*Pulp, Paper, and Paperboard Mills*

Description: Large industrial complexes in which pulp and/or paper, and/or paperboard are produced. Products also include newsprint, bleached paper, glassine, tissue paper, vegetable parchment, and industrial papers. Raw materials include wood logs, chips, wastepaper, jute, hemp, rags, cotton linters, bagasse, and esparto. The chips for pulping may be produced on-site from logs, and/or imported.

The following manufacturing processes are typically used: raw material preparation, pulping, bleaching, and papermaking. All of these operations use a wide variety of chemicals including caustic soda, sodium and ammonium sulfites, chlorine, titanium oxide, starches, solvents, adhesives, biocides, hydraulic oils, lubricants, dyes, and many chemical additives.

Potential Pollutant Generating Sources: The large process equipment used for pulping is not enclosed. Thus, precipitation falling over these areas may become contaminated. Maintenance of the process equipment produces waste products similar to that produced from vehicle and mobile equipment maintenance. Logs may be stored, debarked and chipped on site. Large quantities of chips are stored outside. Although this can be a source of pollution, the volume of stormwater flow is relatively small because the chip pile retains the majority of the precipitation. Mobile equipment such as forklifts, log stackers, and chip dozers are sources of leaks/spills of hydraulic fluids. Vehicles and equipment are fueled and maintained on-site.

Paper Products

NAICS 3222xx:*Converted Paper Product Manufacturing*

Description: Included are businesses that take paper stock and produce basic paper products such as cardboard boxes and other containers, and stationery products such as envelopes and bond paper. Wood chips, pulp, and paper can be used as feedstock.

Potential Pollutant Generating Sources: Potential pollutant generating sources include outside loading and unloading orf solid and/or liquid materials; outside storage and handling of dangerous wastes, liquid, and/or solid materials; maintenance and

fueling activities for forklifts and other vehicles and equipment; and outside processing activities related to paper production.

Petroleum Products

NAICS 3241xx:*Petroleum and Coal Products Manufacturing*

Description: The petroleum refining industry manufactures gasoline, kerosene, distillate and residual oils, lubricants, and related products from crude petroleum, and asphalt paving and roofing materials. Although petroleum is the primary raw material, petroleum refineries also use other materials such as natural gas, benzene, toluene, chemical catalysts, caustic soda, and sulfuric acid. Wastes may include filter clays, spent catalysts, sludges, and oily water.

Asphalt paving products consist of sand, gravel and petroleum-based asphalt that serves as the binder. Raw materials include stockpiles of sand and gravel and asphalt emulsions stored in aboveground tanks.

Potential Pollutant Generating Sources: Potential pollutant generating sources include outside processing such as distillation, fractionation, catalytic cracking, solvent extraction, coking, desulfuring, reforming, and desalting; petrochemical and fuel storage and handling; outside liquid chemical piping and tankage; mobile liquid handling equipment such, as tank trucks, forklifts, etc.; maintenance and parking of trucks and other equipment; waste piles, and handling and storage of asphalt emulsions, cleaning chemicals, and solvents; and waste treatment and conveyance systems.

The following are potential pollutants at oil refineries: oil & grease, BOD, COD, total organic carbon (TOC), phenolic compounds, polyaromatic hydrocarbons (PAH), ammonia nitrogen, TKN, sulfides, TSS, low and high pH, and chromium (total and hexavalent).

Printing

NAICS 323xxx:*Printing and Related Support Activities*

Description: This industrial category includes the production of newspapers, periodicals, commercial printing materials and bybusinesses that do their own printing

and those that perform services for the printing industry, for example bookbinding. Processes include typesetting, engraving, photoengraving, and electrotyping.

Potential Pollutant Generating Sources: Various materials used in modifying the paper stock include inorganic and organic acids, resins, solvents, polyester film, developers, alcohol, vinyl lacquer, dyes, acetates, and polymers. Waste products may include waste inks, ink sludge, resins, photographic chemicals, solvents, acid and alkaline solutions, chlorides, chromium, lead, silver, zinc, spent formaldehyde, plasticizers, and used lubricating oils. As the printing operations occur indoors, the only likely points of potential contact with stormwater are the outside temporary storage of waste materials, offloading of chemicals at external unloading bays, and vehicle/equipment repair and maintenance. Pollutants of concern include COD, heavy metals, oil & grease, pH, and TSS.

Rubber and Plastic Products

NAICS 3252xx:*Resin, Synthetic Rubber, and Artificial and Synthetic Fibers and Filaments Manufacturing*

NAICS 326xxx:*Plastics and Rubber Products Manufacturing*

Description: Products in this category include rubber tires, hoses, belts, gaskets, seals, plastic sheet, film, tubes, pipes, bottles, cups, ice chests, packaging materials, and plumbing fixtures. The rubber and plastics industries use a variety of processes ranging from polymerization to extrusion using natural or synthetic raw materials. These industries use natural or synthetic rubber, plastics components, pigments, adhesives, resins, acids, caustic soda, zinc, paints, fillers, and curing agents.

Potential Pollutant Generating Sources: Pollutant generating sources/activities include storage of liquids, other raw materials or by-products, scrap materials, oils, solvents, inks and paints; unloading of liquid materials from trucks or rail cars; washing of equipment; waste oil and solvents produced by cleaning manufacturing equipment; used equipment that could drip oil and residual process materials; and maintenance shops.

Potential pollutants are BOD, COD, nitrate and nitrite nitrogen, TKN, total phosphorus, TSS, pH, trichloroethane, methylene chloride, toluene, zinc, and oil & grease.

Ship and Boat Building and Repair Yards

NAICS 3366xx:*Ship and Boat Building*

Description: Businesses that build or repair ships and boats. Typical activities include hull scraping, sandblasting, finishing, metal fabrication, electrical repairs, engine overhaul, welding, fiberglass repairs, hydroblasting, and steam cleaning.

Potential Pollutant Generating Sources: Outside boatyard activities that can be sources of stormwater pollution include pressure washing, surface preparation, paint removal, sanding, painting, engine/vessel maintenance and repairs, and material handling and storage.

Secondary sources of stormwater contaminants are cooling water, pump testing, gray water, sanitary waste, washing down the work area, and engine bilge water. Engine room bilge water and oily wastes are typically collected and disposed of through a licensed contracted disposal company. Two prime sources of copper are leaching of copper from anti-fouling paint and wastes from hull maintenance. Wastes generated by boatyard activities include spent abrasive grits, spent solvent, spent oils, fuel, ethylene glycol, washwater, paint overspray, various cleaners/detergents and anti-corrosive compounds, paint chips, scrap metal, welding rods, wood, plastic, resins, glass fibers, dust, and miscellaneous trash such as paper and glass.

Ecology, local shipyards, and METRO have sampled pressure-wash wastewater. The effluent quality has been variable and frequently exceeded water quality criteria for copper, lead, tin, and zinc. From monitoring results received to date, metal concentrations typically range from 5 to 10 mg/L, but have gone as high as 190 mg/L copper with an average 55 mg/L copper.

Wood

NAICS 321xxx (except 321114):*Wood Product Manufacturing (except Wood Preservation)*

Description: This group includes sawmills, and all businesses that make wood products using cut wood, with the exception of wood treatment businesses. Wood treatment as well as log storage and sorting yards are covered in other sections of this

appendix. Included in this group are planing mills, millworks, and businesses that make wooden containers and prefab building components, mobile homes, and glued-wood products like laminated beams, office and home furniture, partitions, and cabinets. All businesses employ cutting equipment whose by-products are chips and sawdust. Finishing is conducted in many operations.

Potential Pollutant Generating Sources: Businesses may have operations that use paints, solvents, wax emulsions, melamine formaldehyde, and other thermosetting resins, and produce waste paints, paint thinners, turpentine, shellac, varnishes and other waste liquids. Outside storage, trucking, and handling of these materials can also be pollutant sources.

Potential pollutants are BOD, COD, nitrate and nitrite nitrogen, TKN, total phosphorus, TSS, arsenic, copper, total phenols, oil & grease, and pH.

Wood Treatment

NAICS 321114:*Wood Preservation*

Description: This group includes both anti-staining and wood preserving. Some wood trimming may occur. After treatment, the lumber is typically stored outside. Forklifts are used to move both the raw and finished product. Wood treatment consists of a pressure process using the chemicals described below. Anti-staining treatment is conducted using dip tanks or by spraying. Wood preservatives may include creosote, creosote/coal tar, pentachlorophenol, copper naphthenate or inorganic arsenicals such as chromated copper arsenate dissolved in water. The use of pentachlorophenol is declining in the Puget Sound region.

Potential Pollutant Generating Sources: Potential pollutant generating sources/activities include the retort area, handling of the treated wood, outside storage of treated materials and products, equipment/vehicle storage and maintenance, and the unloading, handling, and use of the preservative chemicals. Based on (USEPA, 1995) the following stormwater contaminants have been reported: BOD, COD, TSS, and the specific pesticide(s) used for the wood preservation.

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2. Transportation and Communication

Airfields and Aircraft Maintenance

NAICS 481xxx:*Air Transportation*

NAICS 4881xx:*Support Activities for Air Transportation*

Description: Industrial activities include vehicle and equipment fueling, maintenance and cleaning, and aircraft/runway deicing.

Potential Pollutant Generating Sources: Fueling is accomplished by tank trucks at the aircraft and is a source of spills. Dripping of fuel and engine fluids from the aircraft and at vehicle and equipment maintenance/ cleaning areas, and application of deicing materials to the aircraft and the runways are potential sources of stormwater contamination. Aircraft maintenance and cleaning produces a wide variety of waste products, similar to those found with any vehicle or equipment maintenance, including: used oil and cleaning solvents, paints, oil filters, soiled rags, and soapy wastewater. Deicing materials used on aircraft and/or runways include ethylene and propylene glycol, and urea. Other chemicals currently considered for ice control are sodium and potassium acetates, isopropyl alcohol, and sodium fluoride. Pollutant constituents include BOD, COD, oil & grease, pH, TSS, TKN, and specific deicing components such as glycol and urea.

Fleet Vehicle Yards

NAICS 484xxx:*Truck Transportation*

NAICS 485xxx:*Transit and Ground Passenger Transportation*

NAICS 4871xx:*Scenic and Sightseeing Transportation, Land*

NAICS 4884xx:*Support Activities for Road Transportation*

NAICS 492xxx:*Couriers and Messengers*

NAICS 5321xx:*Automotive Equipment Rental and Leasing*

NAICS 621910:*Ambulance Services*

Description: Includes all businesses that own, operate and maintain or repair large vehicle fleets, including cars, buses, trucks and taxis, as well as the renting or leasing of cars, trucks, and trailers.

Potential Pollutant Generating Sources: Potential pollutant generating sources include spills/leaks of fuels, used oils, oil filters, antifreeze, solvents, brake fluid, and batteries, sulfuric acid, battery acid sludge, and leaching from empty contaminated containers and soiled rags; leaking underground storage tanks that can cause ground water and/or soil contamination; dirt, oils, and greases from outside steam cleaning and vehicle washing; dripping of liquids from parked vehicles; solid and liquid wastes that are not properly stored outside; and loading and unloading areas.

Potential pollutants from this section may include BOD, heavy metals, oil & grease, TSS, organics, and pH.

Railroads

NAICS 482xxx:*Rail Transportation*

NAICS 4882xx:*Support Activities for Rail Transportation*

Description: Railroad activities are spread over a large geographic area: along railroad lines, in switching yards, and in maintenance yards. Railroad activity occurs on both property owned or leased by the railroad and at the loading or unloading facilities of its customers. Employing BMPs at commercial or public loading and unloading areas is the responsibility of the particular property owner.

Potential Pollutant Generating Sources: The following are potential sources of pollutants: dripping of vehicle fluids onto the road bed, leaching of wood preservatives from the railroad ties, human waste disposal, litter, locomotive sanding areas, locomotive/railcar/equipment cleaning areas, fueling areas, outside material storage areas, the erosion and loss of soil particles from the bed, and herbicides used for vegetation management.

Maintenance activities include maintenance shops for vehicles and equipment, track maintenance, and ditch cleaning. In addition to the railroad stock, the maintenance shops service highway vehicles and other types of equipment. Waste materials can include waste oil, solvents, degreasers, antifreeze, radiator flush, acid solutions, brake fluids, soiled rags, oil filters, sulfuric acid and battery sludge, and machine chips with residual machining oil and any toxic fluids or solids lost during transit. The following are potential pollutants at railyards: BOD, heavy metals, oil & grease, TSS, organics, and pesticides.

Warehouses and Mini-Warehouses

NAICS 493xxx:*Warehousing and Storage*

Description: Businesses that store goods in buildings and other structures.

Potential Pollutant Generating Sources: The following are potential pollutant sources from warehousing operations: Loading and unloading areas, outside storage of materials and equipment, and fueling and maintenance areas. Potential pollutants include oil & grease and TSS.

Other Transportation and Communication

NAICS 2211xx:*Electric Power Generation, Transmission, and Distribution*

NAICS 515xxx:*Broadcasting (except Internet)*

NAICS 517xxx:*Telecommunications*

NAICS 518xxx:*Data Processing, Hosting, and Related Services*

NAICS 519xxx:*Other Information Services*

NAICS 5615xx:*Travel Arrangement and Reservation Services*

Description: This group includes travel agencies, communication services such as TV and radio stations, cable companies, and electric and gas services. It does not include railroads, airplane transport services, airlines, pipeline companies, and airfields.

Source Control BMPs

Potential Pollutant Generating Sources: Gas and electric services are likely to own vehicles that are washed, fueled and maintained on site. Communication service companies can generate used oils and dangerous wastes. The following are the potential pollutants: BOD, heavy metals, oil & grease, and TSS.

3. Retail and Wholesale Businesses

Gas Stations

NAICS 447xxx:*Gasoline Stations*

Refer to S409 BMPs for Fueling At Dedicated Stations to select applicable BMPs.

Recyclers and Scrap Yards

NAICS 423140:*Motor Vehicle Parts (Used) Merchant Wholesalers*

NAICS 423930:*Recyclable Material Merchant Wholesalers*

Refer to S423 BMPs for Recyclers and Scrap Yards

Commercial Composting

NAICS 325314:*Fertilizer (Mixing Only) Manufacturing*

Description: This typically applies to businesses that have numerous compost piles that require large open areas to break down the wastes. Composting can contribute nutrients, organics, coliform bacteria, low pH, color, and suspended solids to stormwater runoff.

Potential Pollutant Generating Sources: The compost must be contained, but may be a cause for concern during loading and unloading. Compost can have high levels of nutrients, organics, coliform bacteria, low pH, color concerns and suspended solids. Composting requires heavy equipment such as trucks and loaders. The equipment can generate oil & grease.

Restaurants/Fast Food

NAICS 711110:*Theater Companies and Dinner Theaters*

NAICS 722xxx:*Food Services and Drinking Places*

Description: Businesses that provide food service to the general public, including drive through facilities.

Potential Pollutant Generating Sources: Potential pollutant sources include high-use customer parking lots, outdoor used grease storage, and garbage dumpsters. The cleaning of roofs and other outside areas of restaurant and cooking vent filters into the parking lot can cause cooking grease to be discharged to the storm drains. The discharge of washwater or grease to storm drains or surface water is not allowed.

Retail/General Merchandise

NAICS 442xxx:*Furniture and Home Furnishings Stores*

NAICS 443xxx:*Electronics and Appliance Stores*

NAICS 444xxx:*Building Material and Garden Equipment And Supplies Dealers*

NAICS 445xxx:*Food and Beverage Stores*

NAICS 446xxx:*Health and Personal Care Stores*

NAICS 447xxx:*Gasoline Stations*

NAICS 448xxx:*Clothing and Clothing Accessories Stores*

NAICS 451xxx:*Sporting Goods, Hobby, Musical Instrument, and Book Stores*

NAICS 452xxx:*General Merchandise Stores*

NAICS 453xxx:*Miscellaneous Store Retailers*

NAICS 454xxx:*Nonstore Retailers*

Description: This group includes general merchandising stores such as department stores, shopping malls, variety stores, 24-hour convenience stores, and general retail stores that focus on a few product types such as clothing and shoes. It also includes furniture and appliance stores.

Potential Pollutant Generating Sources: Of particular concern are the high-use parking lots of shopping malls and 24-hour convenience stores. Furniture and appliance stores may provide repair services in which dangerous wastes may be produced.

Retail/Wholesale Vehicle and Equipment Dealers

NAICS 423110:*Automobile and Other Motor Vehicle Merchant Wholesalers*

NAICS 4238xx:*Machinery, Equipment, and Supplies Merchant Wholesalers*

NAICS 441xxx:*Motor Vehicle and Parts Dealers*

NAICS 453930:*Manufactured (Mobile) Home Dealers*

NAICS 5321xx:*Automotive Equipment Rental and Leasing*

NAICS 5324xx:*Commercial & Industrial Machinery & Equipment Rental & Leasing*

Description: This group includes all retail and wholesale businesses that sell, rent, or lease cars, trucks, boats, trailers, mobile homes, motorcycles and recreational vehicles. It includes both new and used vehicle dealers. It also includes sellers of heavy equipment for construction, farming, and industry. These businesses generally have large parking lots. Most retail dealers that sell new vehicles and large equipment also provide repair and maintenance services.

Potential Pollutant Generating Sources: Oil and other materials that have dripped from parked vehicles can contaminate stormwater at high-use parking areas. Vehicles are washed regularly generating vehicle grime and detergent pollutants. The storm or washwater runoff will contain oils and various organics, metals, and phosphorus. Repair and maintenance services generate a variety of waste liquids and solids including used oils and engine fluids, solvents, waste paint, soiled rags, and dirty used engine parts. Many of these materials are dangerous wastes.

Retail/Wholesale Nurseries and Building Materials

NAICS 4233xx:*Lumber and Other Construction Materials Merchant Wholesalers*

NAICS 4237xx:*Hardware and Plumbing and Heating Equipment and Supplies Merchant Wholesalers*

NAICS 4238xx:*Machinery, Equipment, and Supplies Merchant Wholesalers*

NAICS 424930:*Flower, Nursery Stock, & Florists' Supplies Merchant Wholesalers*

NAICS 444xxx:*Building Equipment and Garden Equipment and Supplies Dealers*

Description: These businesses are in a separate group because they are likely to store much of their merchandise outside of the main building. They include nurseries, and businesses that sell building and construction materials and equipment, paint, and hardware.

Potential Pollutant Generating Sources: Some businesses may have small fueling capabilities for forklifts and may also maintain and repair their vehicles and equipment. Some businesses may have unpaved areas, with the potential to contaminate stormwater by leaching of nutrients, pesticides, and herbicides. Businesses in this group surveyed in the Puget Sound area for dangerous wastes were found to produce waste solvents, paints and used oil. Storm runoff from exposed storage areas can contain suspended solids, and oil & grease from vehicles, forklifts, and high-use customer parking lots. Runoff from nurseries may contain nutrients, pesticides and/or herbicides.

Retail/Wholesale Chemicals and Petroleum

NAICS 4246xx:*Chemical and Allied Products Merchant Wholesalers*

NAICS 4247xx:*Petroleum and Petroleum Products Merchant Wholesalers*

NAICS 447xxx:*Gasoline Stations*

NAICS 454310:*Fuel Dealers*

Description: These businesses sell plastic materials, chemicals and related products. This group also includes the bulk storage and selling of petroleum products such as diesel oil, automotive fuels, etc.

Potential Pollutant Generating Sources: The general areas of concern are the spillage of chemicals or petroleum during loading and unloading, and the washing and maintenance of tanker trucks and other vehicles. Also the fire code requires that vegetation be controlled within a tank farm to avoid a fire hazard. Herbicides are typically used. The concentration of oil in untreated stormwater has been known to exceed the water quality effluent guideline for oil and grease. Runoff is also likely to contain significant concentrations of benzene, chloroform, phenol, lead, and zinc.

Retail/Wholesale Foods and Beverages

NAICS 4244xx:*Grocery and Related Product Merchant Wholesalers*

NAICS 4248xx:*Beer, Wine, & Distilled Alcoholic Beverage Merchant Wholesalers*

NAICS 445xxx:*Food and Beverage Stores*

NAICS 447110:*Gasoline Stations with Convenience Stores*

NAICS 4523xx:*General Merchandise Stores, including Warehouse Clubs and Supercenters*

NAICS 4542xx:*Vending Machine Operators*

NAICS 454390:*Other Direct Selling Establishments*

Description: Included are businesses that provide retail food including general groceries, fish and seafood, meats and meat products, dairy products, poultry, soft drinks, and alcoholic beverages.

Potential Pollutant Generating Sources: Vehicles may be fueled, washed and maintained at the business. Spillage of food and beverages may occur. Waste food and broken contaminated glass may be temporarily stored in containers located outside. High-use customer parking lots may be sources of oil and other contaminants

Other Retail/Wholesale Businesses

NAICS 423xxx:*Merchant Wholesalers, Durable Goods*

Source Control BMPs

NAICS 424xxx:*Merchant Wholesalers, Nondurable Goods*

NAICS 425xxx:*Wholesale Electronic Markets and Agents and Brokers*

NAICS 441xxx:*Motor Vehicle and Parts Dealers*

NAICS 442xxx:*Furniture and Home Furnishing Stores*

NAICS 443xxx:*Electronic and Appliance Stores*

NAICS 444xxx:*Building Material and Garden Equipment and Supplies Dealers*

NAICS 446xxx:*Health and Personal Care Stores*

NAICS 448xxx:*Clothing and Clothing Accessories Stores*

NAICS 451xxx:*Sporting Goods, Hobby, Musical Instrument, and Book Stores*

NAICS 452xxx:*General Merchandise Stores*

NAICS 453xxx:*Miscellaneous Store Retailers*

Description: Businesses in this group include sellers of vehicle parts, tires, farm supplies, hand and garden tools, furniture and home furnishings, photographic and office equipment, electrical goods, sporting goods and toys, paper products, drugs, and apparel.

Potential Pollutant Generating Sources: Pollutant sources include loading/unloading areas, high-use parking lots, and delivery vehicles that may be fueled, washed, and maintained on premises.

4. Service Businesses

Animal Care Services

NAICS 1152xx:*Support Activities for Animal Production*

NAICS 45391x:*Pet and Pet Supplies Stores*

NAICS 54194x:*Veterinary Services*

NAICS 711212:*Racetracks*

NAICS 71329x:*Other Gambling Industries*

NAICS 81291x:*Pet care (except Veterinary) Services*

Description: This group includes racetracks, kennels, fenced pens, veterinarians and businesses that provide boarding services for animals including horses, dogs, and cats.

Potential Pollutant Generating Sources: The primary sources of pollution include animal manure, washwaters, waste products from animal treatment, runoff from pastures where larger livestock may roam, and vehicle maintenance and repair shops. Pastures may border streams and direct access to the stream may occur. Both surface water and ground water may be contaminated. Potential stormwater contaminants include BOD, fecal coliform, nutrients, oil & grease, and TSS.

Commercial Car and Truck Washes

NAICS 48849x:*Other Support Activities for Road Transportation*

NAICS 488999:*All Other support Activities for Transportation*

NAICS 811192:*Car Washes*

Description: Facilities include automatic systems found at individual businesses or at gas stations and 24-hour convenience stores, as well as self-service. There are three main types: tunnels, rollovers and hand-held wands. The tunnel wash, the largest, is housed in a long building through which the vehicle is pulled. At a rollover wash the

vehicle remains stationary while the equipment passes over. Wands are used at self-serve car washes. Some car washing businesses also sell gasoline.

Potential Pollutant Generating Sources: Wash wastewater may contain detergents and waxes. Wastewater should be discharged to sanitary sewers. In self-service operations a drain is located inside each car bay. Although these businesses discharge the wastewater to the sanitary sewer, some washwater can find its way to the storm drain, particularly with the rollover and wand systems. Rollover systems often do not have air-drying. Consequently, as it leaves the enclosure the car sheds water to the pavement. With the self-service system, washwater with detergents can spray outside the building and drain to storm sewer. Users of self-serve operations may also clean engines and change oil, dumping the used oil into the storm drain. Potential pollutants include BOD, detergents, oil & grease, soaps, and TSS.

Equipment Repair

NAICS 532xxx:*Rental and Leasing Services*

NAICS 8112xx:*Electronic and Precision Equipment Repair and Maintenance*

NAICS 8113xx:*Commercial and Industrial Machinery and Equipment (except Automotive and Electronic) Repair and Maintenance*

NAICS 8114xx:*Personal and Household Goods Repair and Maintenance*

Description: This group includes several businesses that specialize in repairing different equipment including communications equipment, radio, TV, household appliances, and refrigeration systems. Also included are businesses that rent or lease heavy construction equipment as miscellaneous repair and maintenance may occur on site.

Potential Pollutant Generating Sources: Potential pollutant sources include storage and handling of fuels, waste oils and solvents, and loading/unloading areas. Potential pollutants include oil & grease, low/high pH, and TSS.

Laundries and Other Cleaning Services

NAICS 5612xx:*Facilities Support Services*

NAICS 56174x:*Carpet and Upholstery Cleaning Services*

NAICS 8123xx:*Drycleaning and Laundry Services*

Description: This category includes all types of cleaning services such as laundries, linen suppliers, diaper services, coin-operated laundries, dry cleaners, and carpet and upholstery services. Wet washing may involve the use of acids, bleaches and/or multiple organic solvents. Dry cleaners use an organic-based solvent, although small amounts of water and detergent are sometimes used. Solvents may be recovered and filtered for further use. Carpets and upholstery may be cleaned with dry materials, hot water extraction process, or in-plant processes using solvents followed by a detergent wash.

Potential Pollutant Generating Sources: Wash liquids are discharged to sanitary sewers. Stormwater pollutant sources include: loading and unloading of liquid materials, particularly at large commercial operations, disposal of spent solvents and solvent cans, high-use customer parking lots, and outside storage and handling of solvents and waste materials. Potential stormwater contaminants include chlorinated and other solvents, oil & grease, soaps and detergents, low/high pH, and TSS.

Marinas and Boat Clubs

NAICS 713930:*Marinas*

Description: Marinas and yacht clubs provide moorage for recreational boats. Marinas may also provide fueling and maintenance services. Other activities include cleaning and painting of boat surfaces, minor boat repair, and pumping of bilges and sanitary holding tanks. Not all marinas have a system to receive pumped bilge water.

Potential Pollutant Generating Sources: Both solid and liquid wastes are produced as well as stormwater runoff from high-use customer parking lots. Waste materials include sewage and bilge water. Maintenance by the tenants will produce used oils, oil filters, solvents, waste paints and varnishes, used batteries, and empty contaminated

containers and soiled rags. Potential stormwater contaminants include heavy metals, oil & grease, low/high pH, and TSS.

Golf and Country Clubs

NAICS 713910:*Golf Courses and Country Clubs*

Description: Public and private golf courses and parks are included.

Potential Pollutant Generating Sources: Maintenance of grassed areas and landscaped vegetation has historically required the use of fertilizers and pesticides. Golf courses contain small lakes that are sometimes treated with algaecides and/or mosquito larvicides. The fertilizer and pesticide application process can lead to inadvertent contamination of nearby surface waters by overuse, misapplication, or the occurrence of storms shortly after application. Heavy watering of surface greens in golf courses may cause pesticides or fertilizers to migrate to surface and shallow ground water resources. The use of pesticides and fertilizers generates waste containers. Equipment must be cleaned and maintained.

Miscellaneous Services

NAICS 54192x:*Photographic Services*

NAICS 5617xx:*Services to Buildings and Dwellings*

NAICS 562xxx:*Waste Management and Remediation Services*

NAICS 712xxx:*Museums, Historical Sites, And Similar Institutions*

NAICS 713xxx:*Amusement, Gambling, and Recreation Industries*

NAICS 8122xx:*Death Care Servies*

NAICS 8129xx:*Other Personal Services*

Description: This group includes photographic studios, commercial photography, funeral services, amusement parks, furniture and upholstery repair, pest control services, and other professional offices. Pollutants from these activities can include

pesticides, waste solvents, heavy metals, pH, suspended solids, soaps and detergents, and oil & grease.

Potential Pollutant Generating Sources: Leaks and spills of materials from the following businesses can be sources of stormwater pollutants:

1. Building maintenance produces wash and rinse solutions, oils, and solvents.
2. Pest control produces rinsewater with residual pesticides from washing application equipment and empty containers.
3. Outdoor advertising produces photographic chemicals, inks, waste paints, and organic paint sludges containing metals.
4. Funeral services produce formalin, formaldehyde, and ammonia.
5. Upholstery and furniture repair businesses produce oil, stripping compounds, wood preservatives and solvents.

Professional Services

NAICS 52xxxx:*Finance and Insurance*

NAICS 54xxxx:*Professional, Scientific, and Technical Services*

NAICS 55xxxx:*Management of Companies and Enterprises*

NAICS 561xxx:*Administrative and Support Services*

NAICS 61xxxx:*Education Services*

NAICS 62xxxx:*Health Care and Social Assistance*

NAICS 71xxxx:*Arts, Entertainment, And Recreation*

NAICS 72xxxx:*Accommodation and Food Services*

NAICS 8121xx:*Personal Care Services*

NAICS 8129xx:*Other Personal Services*

NAICS 813xxx:*Religious, Grantmaking, Civic, Professional, & Similar Organization*

Description: The remaining service businesses include theaters, hotels/motels, finance, banking, hospitals, medical/dental laboratories, medical services, nursing homes, schools/universities, and legal, financial and engineering services. Stormwater from parking lots will contain undesirable concentrations of oil & grease, suspended particulates, and metals such as lead, cadmium and zinc. Dangerous wastes might be generated at hospitals, nursing homes and other medical services.

Potential Pollutant Generating Sources: The primary concern is runoff from high use parking areas, spills from vehicle or equipment fueling or repair at maintenance shops, loading/unloading areas, and storage and handling of dangerous wastes.

Vehicle Maintenance and Repair

NAICS 8111xx:*Automotive Repair and Maintenance*

NAICS 8113xx:*Commercial and Industrial Machinery and Equipment (except Automotive and Electronic) Repair and Maintenance*

Description: This category includes businesses that paint, repair and maintain automobiles, motorcycles, trucks, and buses and battery, radiator, muffler, lube, tune-up and tire shops, excluding those businesses listed elsewhere in this manual.

Potential Pollutant Generating Sources: Pollutant sources include storage and handling of vehicles, solvents, cleaning chemicals, waste materials, vehicle liquids, batteries, and washing and steam cleaning of vehicles, parts, and equipment. Potential pollutants include waste oil, solvents, degreasers, antifreeze, radiator flush, acid solutions with cadmium, chromium, copper, lead, and zinc, brake fluid, soiled rags, oil filters, sulfuric acid and battery sludge, and machine chips in residual machining oil.

Source Control BMPs

Multifamily Residences

NAICS 53111x:*Lessors of Residential Buildings and Dwellings*

NAICS 531311:*Residential Property Managers*

NAICS 7213xx:*Rooming and Boarding Houses, Dormitories, and Workers' Camps*

Description: Multifamily residential buildings such as apartments and condominiums. The activities of concern are vehicle parking, vehicle washing, oil changing, minor repairs, and temporary storage of garbage.

Potential Pollutant Generating Sources: Stormwater contamination can occur at vehicle parking lots and from washing of vehicles. Runoff from parking lots may contain undesirable concentrations of oil & grease, TSS, and metals such as cadmium, lead, and zinc.

Construction Businesses

NAICS 23xxxx:*Construction*

NAICS 5617xx:*Services to Buildings and Dwellings*

NAICS 562xxx:*Waste Management and Remediation Services*

Description: This category includes builders of homes, commercial and industrial buildings, and heavy equipment as well as plumbing, painting, paper hanging, carpentry, electrical, roofing and sheet metal, wrecking and demolition, stonework, drywall, and masonry contractors. It does not include construction sites.

Potential Pollutant Generating Sources: Potential pollutant sources include leaks/spills of used oils, solvents, paints, batteries, acids, strong acid/alkaline wastes, paint/varnish removers, tars, soaps, coatings, asbestos, lubricants, anti-freeze compounds, litter, and fuels at the headquarters, operation, staging, and maintenance/repair locations of the businesses.

Demolition contractors may store reclaimed material before resale. Roofing contractors generate residual tars and sealing compounds, spent solvents, kerosene, and soap

cleaners, as well as non- dangerous waste roofing materials. Sheet metal contractors produce small quantities of acids and solvent cleaners such as kerosene, metal shavings, adhesive residues, enamel coatings, and asbestos residues that have been removed from buildings. Asphalt paving contractors are likely to store application equipment such as dump trucks, pavers, tack coat tankers and pavement rollers at their businesses. Stormwater passing through this equipment may be contaminated by the petroleum residuals. Potential pollutants include BOD, COD, heavy metals, oil & grease, organic compounds, pH, TSS, etc.

5. Public Agency Activities

Introduction

Local, state, and federal governments conduct many of the pollutant generating activities conducted at business facilities. Local governments include cities and counties, also single-purpose entities such as fire, sewer and water districts.

Public Facilities and Streets

Description: Included in this group are public buildings. Also included are maintenance (deicing), and repair of streets and roads.

Potential Pollutant Generating Sources: Wastes generated include deicing and anti-icing compounds, solvents, paint, acid and alkaline wastes, paint and varnish removers, and debris. Large amounts of scrap materials are also produced throughout the course of construction and street repair. Potential pollutants include suspended solids, oil & grease, and low/high pH.

Maintenance of Open Public Space Areas

Description: The maintenance of large open spaces covered by expanses of grass and landscaped vegetation. Examples are zoos and public cemeteries. Golf courses and parks are covered in S411 BMPs for Landscaping and Lawn / Vegetation Management.

Potential Pollutant Generating Sources: Maintenance of grassed areas and landscaped vegetation has historically required the use of fertilizers and pesticides. Golf courses contain small lakes that are sometimes treated with algaecides and/or mosquito larvicides. The application of pesticides can lead to inadvertent contamination of nearby surface waters by overuse, misapplication, or the occurrence of storms shortly after application. Heavy watering of surface greens in golf courses may cause pesticides or fertilizers to migrate to surface and shallow ground water resources. The application of pesticides and fertilizers generates waste containers. Equipment must be cleaned and maintained. Maintenance shops where the equipment is maintained must comply with the BMPs specified under S414 BMPs for Maintenance and Repair of Vehicles and Equipment.

Maintenance of Public Stormwater Pollutant Control Facilities

Description: Facilities include roadside catch basins on arterials and within residential areas, conveyance pipes, detention facilities such as ponds and vaults, oil and water separators, biofilters, settling basins, infiltration systems, and all other types of stormwater Runoff Treatment BMPs presented in Volume V.

Potential Pollutant Generating Sources: Research has shown that roadside catch basins can remove from 5 to 15 percent of the pollutants present in stormwater. However, to be effective they must be cleaned. Research has indicated that once catch basins are about 60 percent full of sediment, they cease removing sediments. Generally in urban areas, catch basins become 60 percent full within 6 to 12 months.

Water and solids produced during the cleaning of stormwater treatment systems, including oil/water separators, can adversely affect both surface and ground water quality if disposed improperly. Ecology has documented water quality violations and fish kills due to improper disposal of decant water (water that is removed) and catch basin sediments from maintenance activities. Disposal of decant water and solids shall be conducted in accordance with local, state, and federal requirements.

Historically, decant water from trucks has been placed back in the storm drain. Solids have been disposed in permitted landfills and in unpermitted vacant land including wetlands. Research has shown that these residuals contain pollutants at concentrations that exceed water quality criteria. For example, limited sampling by King County and the Washington State Department of Transportation of sediments removed from catch basins in residential and commercial areas has found the petroleum hydrocarbons to frequently exceed 200 mg/gram. Above this concentration, regulations require disposal at a lined landfill.

Water and Sewer Districts and Departments

Description: The maintenance of water and sewer systems can produce residual materials that, if not properly handled, can cause short-term environmental impacts in adjacent surface and/or ground waters. With the exception of a few simple processes, both water and sewage treatment produce residual sludge that must be disposed properly. However, this activity is controlled by other Ecology regulatory programs and

is not discussed in this manual. Larger water and sewer districts or departments may service their own vehicles.

Potential Pollutant Generating Sources: Maintenance operations of concern include the cleaning of sewer, water lines, and water reservoirs, general activities around treatment plants, disposal of sludge, and the temporary shutdown of pump stations for either normal maintenance or emergencies. During the maintenance of water transmission lines and reservoirs, water district/departments must dispose of wastewater, both when the line or reservoir is initially emptied, as well as when it is cleaned and then sanitized. Sanitation requires chlorine concentrations of 25 to 100 ppm, considerably above the normal concentration used to chlorinate drinking water. These waters are discharged to sanitary sewers where available.

However, transmission lines from remote water supply sources often pass through both rural and urban-fringe areas where sanitary sewers are not available. In these areas, chlorinated water may need to be discharged to a nearby stream or storm drain, particularly since the emptying of a pipe section occurs at low points that frequently exist at stream crossings. Although prior to disposal the water is dechlorinated using sodium thiosulfate or a comparable chemical, malfunctioning of the dechlorination system can kill fish and other aquatic life. The drainage from reservoirs located in unsewered areas is conveyed to storm drains. The cleaning of sewer lines and manholes generates sediments. These sediments contain both inorganic and organic materials and may be contaminated with microorganisms and heavy metals. Activities around sewage treatment plants can be a source of non-point pollution. Besides the normal runoff of stormwater from paved surfaces, grit removed from the headworks of the plant is stored temporarily in dumpsters that may be exposed to the elements. Maintenance and repair shops may produce waste paints, used oil, cleaning solvents, and soiled rags.

Port Districts

Description: The port districts considered here include the following business activities: recreational boat marinas and launch ramps, airfields, container trans-shipment, bulk material import/export including farm products, lumber, logs, alumina, cement; and break-bulk (piece) material such as machinery, equipment, and scrap metals. Port districts frequently have tenants whose activities are not marine-dependent.

Source Control BMPs

Potential Pollutant Generating Sources: Marine terminals require extensive use of mobile equipment that may drip liquids. Waste materials associated with containers/vehicle/equipment washing/steam cleaning, maintenance and repair may be generated at a marine terminal. Debris can accumulate in loading/unloading or open storage areas, providing a source of stormwater contamination. Wooden debris from the crating of piece cargo crushed by passing mobile loading equipment leaches soluble pollutants when in contact with pooled stormwater. Log sorting yards produce large quantities of bark that can be a source of suspended solids and leached pollutants. Potential pollutants include oil & grease, heavy metals, organics, and TSS.

Appendix IV-B: Management of Street Waste Solids and Liquids

Source Control BMPs

Introduction

This appendix addresses street waste as defined in chapter 173-350 WAC, Solid waste handling standards. WAC 173-350 is the governing rule for management of typical street waste solids. Ecology adopted revisions to this rule that became effective September 1, 2018, in part to provide clarity on managing soils impacted by release of contaminants, such as street waste. Ecology has solid waste guidance to help ensure handlers of street waste manage it in accordance with WAC 173-350. End users and other authorities may have their own requirements for street waste reuse and handling.

- Per WAC 173-350:
    - **"Street waste"** means solids or dewatered materials collected from stormwater catch basins and similar stormwater treatment and conveyance structures, and materials collected during street and parking lot sweeping.

"Street waste," as defined here, does not include solids and liquids from street washing using detergents, cleaning of electrical vaults, vehicle wash sediment traps, restaurant grease traps, industrial process waste, sanitary sewage, mixed process, or combined sewage/stormwater wastes. Wastes from oil/water separators at sites that load fuel are not included as street waste. Street waste also does not include flood debris, landslide debris, and chip seal gravel.

Regulations for Street Waste Management

Street waste is solid waste. While street waste from routine road maintenance is likely not dangerous waste, it is presumed to be solid waste under WAC 173-350. This Rule classifies Street Waste as a likely “contaminated soil," which is included in the definition of “solid waste.” Since stormwater conveyance structures are places where contaminants from streets can accumulate at concentrations that could be harmful for indiscriminant placement, material from such structures is presumed to be “contaminated soil.”

- Per WAC 173-350:
    - **"Contaminated soil"** means soil containing one or more contaminants from a release and when moved from one location to another for placement on or into the ground:

a. Contains contaminants at concentrations that exceed a cleanup level under chapter 173-340 WAC, Model Toxics Control Act—Cleanup, that would be established for existing land use at the location where soil is placed; or
b. Contains contaminants that affect pH, and pH of the soil is below 4.5 or above 9.5 or is not within natural background pH limits that exist at the location where soil is placed.

Unless excluded in WAC 173-350-020, contaminated soil is solid waste and must be managed at a solid waste handling facility in conformance with this chapter or chapter 173-351 WAC, Criteria for municipal solid waste landfills. Characterization of material may be required based on solid waste facility acceptance standards. Examples of potentially contaminated soil may include, but are not limited to, street waste, petroleum contaminated soil, engineered soil, and soil likely to have contaminants from a release associated with industrial or historical activities.

Based on test results, street waste could contain contaminants at concentrations that would require either disposal at a permitted solid waste disposal facility, or treatment at a permitted solid waste handling facility for use.

Owners/operators storing or treating street waste prior to disposal or use are typically subject to permitting under the section in WAC 173-350 dealing with “piles used for storage and treatment,” since most storage and treatment takes place in outdoor piles. Indoor or other storage or treatment is subject to permitting under the section dealing with “transfer stations and drop boxes.” To obtain a permit, an owner/operator will need to meet design standards, operating requirements, including characterization procedures and concentration limits if propose to use materials, and record keeping and reporting.

Note: Decant facilities are not subject to solid waste permitting if they will not have intermediate storage or treatment of decanted solids between the decant part of a facility operating in conformance with water quality rules and placement into transfer vehicles going to permitted solid waste facilities.

Source Control BMPs

Street waste solids may contain contaminants at levels too high to allow unrestricted use. Street waste will need to meet the definition in WAC 173-350 for “clean soil” in order for its management or use outside of permitted solid waste handling facilities. “Clean soil” is tied to meeting contaminant concentrations so as not to create a cleanup site where placement of materials would occur.

- Per WAC 173-350:
    - **"Clean soil"** means soil that does not contain contaminants from a release. It also includes soil that contains one or more contaminants from a release and when moved from one location to another for placement on or into the ground:
        a. Does not contain contaminants at concentrations that exceed a cleanup level under chapter 173-340 WAC, Model Toxics Control Act—Cleanup, that would be established for existing land use at the location where soil is placed; or
        b. Contains contaminants that affect pH, but pH of the soil is between 4.5 and 9.5 or within natural background pH limits that exist at the location where soil is placed.

        Examples of potentially clean soil may include, but are not limited to, soil from undeveloped lands unlikely to have impacts from release of contaminants associated with area-wide or local industrial or historical activities. This includes similar soils over which development may have occurred but land use is unlikely to have led to a release, such as use for residential housing, or over which development provided protection from impacts from a release, such as coverage by pavement. Soil with substances from natural background conditions, as natural background is defined in WAC 173-350-100, is clean soil under this section.

Street waste that will go directly to a permitted landfill or transfer station is not subject to the standards of WAC 173-350, though operators will need to adhere to receiving facility acceptance criteria. For street waste that will not go directly to a permitted landfill or transfer station, an operator needs to consult with their jurisdictional health department to see what solid waste regulations apply to street waste management. In

Washington, chapter 70.95 RCW, Solid waste management – Reduction and recycling, gives jurisdictional health departments primary authority over solid waste handling and permitting.

As stated earlier, guidance will be available soon with more specificity on how to manage “contaminated soil” under the recently revised WAC 173-350.

Contaminants in Street Waste Solids

Street waste does not typically classify as dangerous waste. The owner of the stormwater facility and/or collector of street waste is considered the waste generator and responsible for deciding whether the waste designates as dangerous waste. However, sampling has historically shown that material from routine maintenance of roads and stormwater facilities does not classify as dangerous waste.

It is possible that street waste from spill sites has high enough concentration of contaminants to classify it as dangerous waste. Street waste suspected to be dangerous waste should not be collected with other street waste to avoid creating a larger volume of dangerous waste. Street waste with obvious contamination (unusual color, staining, corrosion, unusual odors, fumes, and oily sheen) should be left in place or segregated until tested. Base testing activities on probable contaminants. If collecting potentially dangerous waste because of emergency conditions, or if the waste becomes suspect after it is collected, an owner/operator should handle and store it separately until a determination as to proper disposal is made. Dangerous waste must be handled following chapter 173-303 WAC, Dangerous waste regulations.

Test results from sampling street waste show that it contains contaminants including total petroleum hydrocarbons (TPH), carcinogenic polycyclic aromatic hydrocarbons (c-PAHs), and several metals. These contaminants can be at concentrations high enough to be harmful to human health and the environment unless managed appropriately. The following tables provide a summary of some past test results.

Table IV-B.1: **Typical TPH Levels in Street Sweeping and Catch Basin Solids**

Reference	Street Sweeping (mg/kg)	Catch Basin Solid (mg/kg)
Snohomish County (1) (Landau, 1995)	390 - 4300	
King County (1) (Herrera, 1995)		123 - 11049 (Median 1036)
Snohomish County & Selected Cities (1) (W&H Pacific, 1994)	163 - 1500 (Median 760)	163 -1562 (Median 760)
City of Portland (2) (Bretsch, 2000)		MDL - 1830 (Median 208)
City of Seattle - Diesel Range (2) (Seattle Public Utilities and Herrera, 2009)	330 - 520	780 - 1700
City of Seattle - Motor Oil (2) (Seattle Public Utilities and Herrera, 2009)	2000 - 2800	3500 - 7000
Oregon (1) (Collins, 1998)	1600 - 2380	
Oregon (3) (Collins, 1998)	98 - 125	

(1) Method WTPH 418.1; does not incorporate new methods to reduce background interference due to vegetative material

(2) Method NWTPH-Dx

Table IV-B.1: **Typical TPH Levels in Street Sweeping and Catch Basin Solids**

Reference	Street Sweeping (mg/kg)	Catch Basin Solid (mg/kg)
(3) Method WTPH - HCID		

Table IV-B.2: **Typical c-PAH Values in Street Waste Solids and Related Materials**

Sample Source	City of Everett					WSDOT	
Analyte	Street Sweepings	Soil	3-Way Topsoil	Vactor Solids	Leaf & Sand	Sweepings - Fresh	Sweepings - Weathered
Benzo(a)anthracene	0.1U	0.076 U	0.074 U	0.21	0.45	0.56	0.40
Chrysene	0.14	0.09	0.074 U	0.32	0.53	0.35	0.35
Benzo(b)fluoranthene	0.11	0.076 U	0.074 U	0.27	0.52	0.43	0.51
Benzo(k)fluoranthene	0.13	0.076 U	0.074 U	0.25	0.38	0.39	0.40
Benzo(a)pyrene	0.13	0.076 U	0.074 U	0.26	0.5	0.41	0.33U
Indeno(1,2,3-cd)pyrene	0.1U	0.076 U	0.074 U	0.19	0.39	NR	NR
Dibenzo(a,h)anthracene	0.1U	0.076 U	0.074 U	0.081	0.12	0.39	0.33U
Revised MTCA Benzo(a)pyrene	0.215	0.134	0.134	0.388	0.727	0.708	0.597

Table IV-B.2: **Typical c-PAH Values in Street Waste Solids and Related Materials**

Sample Source	City of Everett					WSDOT	
Analyte	**Street Sweepings**	**Soil**	**3-Way Topsoil**	**Vactor Solids**	**Leaf & Sand**	**Sweepings - Fresh**	**Sweepings - Weathered**
[ND=PQL]							
Benzo(a)pyrene [ND = 1/2 PQL]	0.185	0.069	0.067	0.388	0.727	0.708	0.366
Benzo(a)pyrene [See * below]	0.185	0.069	0	0.388	0.727	0.708	0.366
Benzo(a)pyrene [ND = 0]	0.155	0.001	0	0.388	0.727	0.708	0.135

* If the analyte was not detected for any PAH, then ND=0; If analyte was detected in at least 1 PAH, then ND=1/2PQL; If the average concentration (using ND=1/2 PQL) is greater than the maximum detected value, then ND=Maximum value.

Table IV-B.3: **Typical Metals Concentrations in Catch Basin Sediments**

PARAMETER	Ecology 1993	Thurston 1993	King County 1995	King county 1995	City of Seattle 2003 through 2011
Metals: Total (mg/kg)	**(Min - Max)**	**(Min - Max)**	**(Min - Max)**	**Mean**	**Min - Max (Mean)**
As	< 3 - 24	.39 - 5.4	4 -56	0.250	<5 - 50 (9.3)
Cd	0.5 - 2.0	< 0.22 - 4.9	0.2 - 5.0	0.5	

Table IV-B.3: **Typical Metals Concentrations in Catch Basin Sediments**

PARAMETER	Ecology 1993	Thurston 1993	King County 1995	King county 1995	City of Seattle 2003 through 2011
Metals: Total (mg/kg)	(Min - Max)	(Min - Max)	(Min - Max)	Mean	Min - Max (Mean)
Cr	19 - 241	5.9 - 71	13 - 100	25.8	
Cu	18 - 560	25 - 110	12 - 730	29	9.1 - 3,280 (166)
Pb	24 - 194	42 - 640	4 - 850	80	3 - 3,690 (154)
Ni	33 - 86	23 - 51	14 - 41	23	
Zn	90 - 558	97 - 580	50 - 2000	130	44 - 4170 (479)
Hg	0.04 - 0.16	0.24 - 0.193			<0.03 - 3.8 (0.16)

Table IV-B.4: **Pollutants in Catch Basin Solids - Comparison to Dangerous Waste Criteria**

PARAMETER	Range of Values in Catch Basin Waste	Range of Values in Catch Basin Waste	Dangerous Waste Criteria
METALS	Total Metals (mg/kg)	TCLP Metals (mg/kg)	TCLP values (mg/l)
As	<3 - 56	< 0.02 - 0.5	5.0
Cd	< 0.22 - 5	0.0002 - 0.03	1.0

Table IV-B.4: **Pollutants in Catch Basin Solids - Comparison to Dangerous Waste Criteria**

PARAMETER	Range of Values in Catch Basin Waste	Range of Values in Catch Basin Waste	Dangerous Waste Criteria
METALS	**Total Metals (mg/kg)**	**TCLP Metals (mg/kg)**	**TCLP values (mg/l)**
Cr	5.9 - 241	0.0025 - 0.1	5.0
Cu	12 - 730	0.002 - 0.88	none
Pb	4 - 850	0.015 - 3.8	5.0
Ni	23 - 86	< 0.01 - 0.36	none
Zn	50 - 2,000	0.04 - 6.7	none
Hg	0.02 - 0.19	0.0001 - 0.0002	0.2
Data from (Thurston County, 1993), (Herrera, 1995) and (Serdar, 1993)			

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, which include eductor and street sweeping truck decant and drainage from piles and containers, usually contain high amounts of suspended and total solids and adsorbed metals. Treatment requirements depend on the discharge location.

The entity responsible for operation and maintenance of the system must approve discharges to sanitary sewer and storm sewer systems. 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 this manual.

Listed below is the required order of preference for disposal of liquid from collection of Street Wastes.

1. **Discharge of Street Waste liquids to a municipal sanitary sewer connected to a Public Owned Treatment Works (POTW).** 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. Following the local sewer authority's conditions is a permit requirement.

2. **Discharge of Street Waste liquids may be allowed into a Basic or Enhanced Runoff Treatment BMP, if option 1 is not available.** Only discharge street waste liquid into the storm sewer system under the following conditions:
    - The preferred disposal option of discharge to sanitary sewer is not reasonably available.
    - The discharge is to a Basic or Enhanced Runoff Treatment BMP. If pretreatment does not remove visible sheen from oils, the Runoff Treatment BMP must be able to prevent the discharge of oils causing a visible sheen.
    - The discharge from the eductor truck is as near to the inlet of the Runoff Treatment BMP as practical, to minimize contamination or recontamination of the collection system.
    - The storm sewer system owner/operator has granted approval and has determined that the Runoff Treatment BMP will accommodate the increased loading. Part of the approval process may include pretreatment conditions to protect the Runoff Treatment BMP. Following local pretreatment conditions is a requirement of this permit.
    - Ecology must approve in advance flocculants for the pretreatment of street waste liquids. The liquids must be non-toxic under the circumstances of use.

The discharger shall determine if reasonable availability of sanitary sewer discharge exists, by evaluating such factors as distance, time of travel, load restrictions, and capacity of the Runoff Treatment BMP.

3. **Operators may return water removed from stormwater ponds, vaults, and oversized catch basins to the storm sewer system.** Stormwater ponds, vaults, and oversized catch basins contain substantial amounts of liquid, which hampers the collection of solids and poses problems in hauling the removed waste away from the site. Water removed from these facilities may be discharged back into the pond, vault, or catch basin provided:
    - Operators may discharge clear water removed from a stormwater treatment structure 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 storm sewer system owner/operator must approve the discharge.

Table IV-B.5: **Typical Street Waste Decant Values Compared to Surface Water Quality Criteria**

PARAMETER	State Surface Water Quality Criteria		Range of Values Reported	
METALS	Freshwater Acute (ug/l - dissolved metals)	Freshwater Chronic (ug/l - dissolved metals)	Total Metals (ug/l)	Dissolved Metals (ug/l)
Arsenic	360	190	100 - 43,000	60 - 100

Table IV-B.5: **Typical Street Waste Decant Values Compared to Surface Water Quality Criteria**

PARAMETER	State Surface Water Quality Criteria		Range of Values Reported	
METALS	Freshwater Acute (ug/l - dissolved metals)	Freshwater Chronic (ug/l - dissolved metals)	Total Metals (ug/l)	Dissolved Metals (ug/l)
Cadmium*	2.73	0.84	64 - 2,400	2 - 5
Chromium (total)			13 - 90,000	3 - 6
Chromium (III)*	435	141		
Chromium (VI)	0.5	10		
Copper*	13.04	8.92	81 - 200,000	3 - 66
Lead*	47.3	1.85	255 - 230,000	1 - 50
Nickel*	1114	124	40 - 330	20 - 80
Zinc*	90.1	82.3	401 - 440,000	1,900 - 61,000
Mercury	2.10	0.012	0.5 - 21.9	

**Hardness dependent; hardness assumed to be 75 mg/L*

Table IV-B.6: **Typical Values for Conventional Pollutants in Street Waste Decant**

PARAMETER	Ecology 1993	(Min - Max)	King County 1995	(Min - Max)
Values as mg/l; except where stated	Mean		Mean	
pH	6.94	6.18 - 7.98	8	6.18 - 11.25
Conductivity (umhos/cm)	364	184 - 1,110	480	129 - 10,100
Hardness (mg/l CaCO3)	234	73 - 762		
Fecal Coliform (MPN/100 ml)	3,000			
BOD	151	28 - 1,250		
COD	900	120 - 26,900		
Oil & Grease	11	7.0 - 40	471	15 - 6,242
TOC	136	49 - 7,880	3,670	203 - 30,185
Total Solids	1,930	586 - 70,400		
Total Dissolved Solids	212	95 - 550		
Total Suspended Solids	2,960	265 - 111,000		
Settleable Solids (ml/l/hr)	27	2 - 234	57	1 - 740

Table IV-B.6: **Typical Values for Conventional Pollutants in Street Waste Decant**

PARAMETER	Ecology 1993	(Min - Max)	King County 1995	(Min - Max)
Values as mg/l; except where stated	Mean		Mean	
Turbidity (ntu)	1,000	55 - 52,000	4,673	43 - 78,000

Table IV-B.7: **Street Waste Decant Values Following Settling**

PARAMETER; Total Metals in mg/l	Portland - Inverness Site Min - Max	King County - Renton Min - Max	METRO Pretreatment Discharge Limits
Arsenic	0.0027 - 0.015	< MDL - 0.12	4
Cadmium	0.0009 - 0.0150	< MDL - 0.11	0.6
Chromium	0.0046 - 0.0980	0.017 - 0.189	5
Copper	0.015 - 0.8600	0.0501 - 0.408	8
Lead	0.050 - 6.60	0.152 - 2.83	4
Nickel	0.0052 - 0.10	0.056 - 0.187	5
Silver	0.0003 - 0.010	< MDL	3
Zinc	0.130 - 1.90	0.152 - 3.10	10
Settleable Solids; ml/L	No Data	0.02 - 2.0	7
Nonpolar FOG	5.7 - 25	5 - 22	100

Table IV-B.7: **Street Waste Decant Values Following Settling**

PARAMETER; Total Metals in mg/l	Portland - Inverness Site Min - Max	King County - Renton Min - Max	METRO Pretreatment Discharge Limits
Ph (std)	6.1 - 7.2	6.74 - 8.26	5.0 - 12.0
TSS	2.8 - 1310		
Recorded Total Monthly Flow; Gallons	Data not available	31,850 - 111,050	
Recorded Max. Daily Flow; Gallons	Data not available	4,500 - 18,600	25,000 GPD
Calculated Average Daily Flow; GPD	Data not available	1,517 - 5,428	
1) Data from King County's Renton Facility (data from 1998 - 1999) and the City of Portland's Inverness Site (data from 1999 - 2001); detention times not provided			

Collection Site Assessment

Ecology suggests a collection site assessment to identify spills or locations that potentially contain dangerous wastes.

The collection site assessment will aid in determining if waste is a dangerous waste and in deciding what to test for if dangerous waste is suspected. The collection site assessment will also help determine if the waste meets the requirements of the receiving facility.

There are three steps to a collection site assessment:

1. A **historical review** of the site for spills, previous contamination and nearby cleanup sites or dangerous waste facilities.

The historical review will be easier if done on an area wide basis prior to scheduling any waste collection. The historical review should be more thorough for operators who have never collected waste at the site before. At a minimum, the historical review should include operator knowledge of the area's collection history or records from previous waste collections.

Private operators should ask the owner of the site for records of previous contamination and the timing of the most recent cleaning. Ecology's Hazardous Substance Information Office maintains a Toxic Release Inventory and a Facility/Site Database, tracking more than 15,000 sites.

Ecology's online Facility/Site Database is available at www.ecy.wa.gov/fs/.

The database allows anyone with web-access to search for facility information by address, facility name, town, zip code, and SIC code, etc. It lists why Ecology is tracking each one (NPDES, TSCA, RCRA, Clean Air Act, etc.), as well as who to call within Ecology to find out more about the given facility. EPA's toxic release website is http://iaspub.epa.gov/triexplorer/tri_release.chemical

2. A **visual inspection** for potential contaminant sources such as a past fire, leaking tanks and electrical transformers, and surface stains.

   Take a look at the area for contaminant sources prior to collection of the waste. If the inspection finds a potential contaminant source, delay the waste collection until the potential contaminant is assessed.

   A second portion of the visual inspection is a good housekeeping assessment of the area. Locations with poor housekeeping commonly cut corners in less obvious places. Inspect these sites in greater detail for illegal dumping and other contamination spreading practices.

3. **Sweeping route, catch basin, waste, and container inspection** before and during collection.

   The inspection of the waste and catch basin or vault is the last and perhaps most critical step in the collection site assessment.

For example, if the stormwater facility has an unusual color in or around it, then it is possible someone dumped something near it or into it. Some colors to be particularly wary of are yellow/green from antifreeze dumping and black and rainbow sheen from oil and/or grease dumping. In addition, if the inspector observes any staining or corrosion, then a solvent may have been dumped.

Fumes are also good indicators of potential contamination. Avoid deliberate smelling of catch basins for worker safety, but suspicious odors may be encountered from catch basins thought to be safe. Some suspicious odors are rotten eggs (hydrogen sulfide is present), gasoline or diesel fumes, or solvent odors. If unusual odors are noted, contact a dangerous waste inspector before cleaning the basin.

Finally, operator experience is the best guide to avoid collection of contaminated waste.