FACT SHEET

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NEPA Call-In

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Storm Water Pollution Prevention

Introduction

Storm water from urban runoff is one of the leading causes of pollution in rivers and lakes. In fields and forests, most rain is absorbed by the soil or is taken up by plants and trees. However, developed areas contain many impermeable surfaces like roofs, parking lots and streets. In developed areas, rainwater often travels over paved areas, settles in gutters and ditches, and flows through concrete storm drains. Rainwater that flows overland is called *storm water* or *storm water runoff.*

Storm water can quickly become polluted by chemicals, fertilizers, pesticides, and litter it picks up while traveling overland. Even small amounts of pollutants that accumulate on roads, parking lots, and sidewalks are quickly transported into nearby streams and rivers, causing major water quality problems. Identifying sources of storm water pollution and keeping them off the ground (away from storm drains or roadside ditches) is the best and most economical way to keep storm water clean.

The purpose of this fact sheet is to describe the significance of storm water pollution, its effects, and ways to reduce this water quality problem. The following discusses common storm water pollutants, activities that pollute storm water, ways to prevent storm water pollution, storm water pollution laws, and GSA's storm water pollution prevention (P2) requirements.

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Common Storm Water Pollutants

Common storm water pollutants are:

- *Oil and grease*--Oil from vehicles storage tanks and machinery, and grease from kitchen waste and engine lubricants can be carried by storm water into streams. Oil and grease float on the water's surface and block sunlight needed by underwater fish and plants. Oil and grease can also damage stream habitat and sensitive spawning areas when they cling to sand and gravel particles that settle at the bottom of streambeds.
- *Heavy metals*--Heavy metals like lead, zinc, and mercury, are ingredients in many commonly used products like batteries, fuels, paints, pesticides, and cleaners (e.g. algaecides). They can also be found in industrial-strength materials like rubber. When these products are spilled or improperly disposed of and when materials containing heavy metals break down, they leave behind pollutants that can be readily transported into streams by storm water. Heavy metals can be toxic to fish and other aquatic life in streams.
- *Nutrients*--Nutrients like phosphorus and nitrogen are transported into streams when storm water picks up fertilizer and animal manure residues on the ground. When excessive amounts of nutrients end up in

water bodies, they accelerate algae growth and cause *eutrophication*, which disrupts life in ponds and streams.

- *Chemicals*--Toxic chemicals in fuels, paints, cleaning products, and pesticides (used at work and home) can harm not only users but also water quality and aquatic life when they are improperly handled. Chemicals, especially organic chemicals, have a wide range of toxic effects on fish and aquatic life, including causing tumors and skin lesions and disrupting reproductive functions.
- *Mud and sediment*--These are readily carried by storm and flood waters, causing excessive buildup (commonly called *sedimentation*). When storm water flows across construction sites and unplanted fields, it picks up loose dirt, creating mud, which is quickly carried into streams where it causes sedimentation pollution. When too much sediment accumulates on streambeds, it damages fish-spawning areas, alters habitat where bottom-dwelling organisms live and reproduce, and interferes with fish migration. In addition, dirt and sand often pick up oil and grease in their path, which introduces additional chemical contaminants that are toxic to fish and other aquatic organisms.
- *Litter*--Debris that overflows from trash cans and litter thrown onto the ground are readily carried by storm water into streams and rivers where they harm fish and aquatic life, hinder sunlight penetration, and interfere with fish movement and migration.
- *Abnormal pH*--When storm water mixes with chemicals or chemical products that are acidic or alkaline, the pH of the water is changed. When acid rain and other forms of acid precipitation collect in streams and ponds, it also alters the pH. Acidic or alkaline conditions in streams harm fish, especially sensitive juvenile fish, and other organisms.
- *Coliform bacteria*--At high levels, naturally occurring coliform bacteria from human and animal wastes can contaminate water. Picking up and disposing of pet feces helps prevent bacteria pollution and eutrophication in streams.

Activities That Pollute Storm Water

Leading sources of storm water pollution are:

- Refueling, engine repair, equipment washing, and painting activities, especially when these activities occur outdoors or when wastewater is released outside.
- Roads, parking lots, and other paved surfaces where fluids have leaked, hazardous materials have spilled, or litter, particles, and sediments have accumulated.
- Outdoor vehicle, equipment, and material storage that exposes spilled, leaked, and overflowing fluids and chemicals to rain and storm water runoff.
- Outdoor cleaning and maintenance activities like power washing, sandblasting, and car washing that produce large volumes of wastewater.
- Construction activities that excavate land, exposing loose dirt and sand.
- Farming and agricultural activities that add fertilizer, pesticide, nutrient, and sediment pollutants to the watershed.
- Commercial properties and residential lawns where fertilizers and pesticides are used.
- Mismanaged landfills, trash storage areas, and waste handling, and disposal activities.

Wastes, residues, and by-products from these activities enter storm drains and flow into streams, creeks, and tributaries, harming fish and other aquatic life.

Indicators of Storm Water Pollution

The following are indicators of storm water pollution:

- An oil sheen on the water's surface
- Stains on and around the ground and storm drains
- Unusual discoloration of grass, plants, and vegetation
- Distressed vegetation and plants

- Poorly maintained, corroded, or damaged drums and machinery
- Uncovered and improperly maintained storage areas and dumpsters

Preventing Storm Water Pollution

There are both simple and complex ways to prevent and control storm water pollution. Individual efforts, like those below, may seem trivial but collectively add up to considerable storm water P2.

- Dispose of litter properly.
- Keep storm drains clear of debris, dirt, sand, silt, and wastes.
- Catch fluids and recycle or properly dispose of them when changing a car's oil, antifreeze, and other fluids. Participate in the facility's oil recycling program. Contact your facility's coordinator for more information on recycling vehicle fluids.
- Wash cars or other greasy equipment at facilities, such as commercial car washes, that collect wastewater and discharge it into a sanitary sewer where detergent and oily pollutants can be removed at sewage treatment plants.
- Reduce or eliminate chemical pesticides and fertilizers for landscaping and lawns.
- Plant around or pave areas prone to erosion to reduce the chance that loose dirt, soil, and sand will be carried away by storm water runoff.

GSA's Storm Water P2 Requirements

Storm water pollution is controlled by the Clean Water Act Amendments of 1987 (CWAA). These amendments authorized the U.S. Environmental Protection Agency (EPA) to expand the National Pollutant Discharge Elimination System (NPDES) program to cover storm water discharges. EPA has delegated authority for implementing the NPDES program to the states. The following states or other jurisdictions do not have approved EPA NPDES permitting programs:

- Alaska (contact EPA Region X)
- Arizona (contact EPA Region IX)
- Idaho (contact EPA Region X)
- Maine (contact EPA Region I)
- Massachusetts (contact EPA Region I)
- New Hampshire (contact EPA Region I)
- New Mexico (contact EPA Region VI)
- District of Columbia (contact EPA Region III)
- Puerto Rico (contact EPA Region II)
- Pacific Territories (contact EPA Region IX)
- Federal Indian Reservations (contact EPA regional office where tribe is located).
- Texas has a partial EPA-approved program, but EPA Region VI should be contacted first.

A complete list of contacts to state NPDES program representatives and EPA regional representatives can be found on the EPA's world wide web server located at (http://www.epa.gov/owm/faq.htm).

Prior to the CWAA, the NPDES program only issued permits for *end-of-pipe* waste water discharge, which is waste water that is discharged, or released, out the end of a pipe directly into a body of water from an industrial facility or sewage treatment plant (classified as "Phase I"). Regulations covering storm water are classified as Phase II. NPDES storm water discharge permits are required for several activities and land uses:

- Construction sites that disturb five or more acres of land
- Storm drain systems from large municipalities (populations greater than 100,000)
- Industrial activities with the potential to pollute storm water from outdoor manufacturing, processing, shipping, receiving, and storage activities.

Title 40 Code of Federal Regulations (CFR) Part 122.26(b)(14) lists the types of industrial activities that require an NPDES permit. These activities include, but are not limited to, storage

facilities, especially hazardous waste or materials storage, maintenance or repair shops, printing shops, motor pools, construction activities that disturb at least five acres of land, steam-generating facilities, transportation facilities, marina operation (including maintenance of boats), and most manufacturing facilities. The burden is on each individual facility to determine if there is an activity at the facility that meets the definition "industrial," and would therefore require a NPDES permit. Most Federal facilities will probably need to comply with the requirements of some type of NPDES permit.

Any facility that discharges storm water associated with an industrial activity must submit a Notice of Intent (NOI) to EPA to be covered by a general permit. EPA issues four different types of general permits: (1) the Baseline Industrial, (2) Baseline Construction, (3) Baseline Multi-Sector, and (4) Multi-Sector Separate Storm Sewer (MS-4). A component of the NOI to comply with one of these permits is the Storm Water Pollution Prevention Plan.

Storm Water P2 Plans

Storm water P2 plans consists of steps to identify a facility's potential sources of pollution or contamination and methods to prevent or control storm water pollution. The steps are grouped into five phases:

1. Planning and organization
2. Assessment
3. Best Management Practices (BMP) identification
4. Implementation
5. Evaluation/monitoring

A key component of storm water P2 plans is employing BMPs to improve storm water quality and promote P2 education. BMPs are designed to remove pollutants from storm water before they reach waterways. There are two types: non-structural and structural BMPs. Non-structural BMPs, also known as *good housekeeping practices*, are operating procedures that prevent storm water pollution. *Non-Structural P2 BMPs* are procedures proven to reduce storm water pollution. They include:

- *Preventive Maintenance* of pipes, pumps, storage tanks, and storm water management devices ensures equipment and structures are in good condition and will not pollute storm water. This maintenance includes replacing worn gaskets and valves before leaks occur and removing trash and residue from overflowing containers and receptacles.

- *Routine Inspections* ensure equipment, machinery, vehicles, and storage tanks are not leaking. These inspections include performing routine visual inspections and integrity tests, conducting inspections in areas prone to leaks and in material storage, processing, and waste generation areas, and monitoring storage tanks, dumpsters, and equipment for rust and wear.

- *Spill Response Planning* establishes spill prevention and cleanup procedures by identifying all potential spill areas and developing procedures for avoiding and responding to spills should they occur.

- *Erosion Control Measures* such as employing sediment and erosion control practices in areas where soil has been disturbed, including construction and demolition areas. These measures minimize erosion by maintaining planted areas and designing landscapes to reduce the amount of soil and dirt exposed to storm water runoff.

Structural BMPs are structures that remove pollutants from storm water and usually include specially constructed devices/systems. Traditionally, structural BMPs included storm water ponds that collected storm water runoff and used oil-grit or oil-water separators to filter out oil and sand (a.k.a. grit) from storm water runoff in parking lots. Now, many new structures that manage and reduce pollution in storm water are designed and constructed to use innovative techniques. For example, BMPs often rely on the

natural filtering capacity of the ground and the absorption capabilities of plants to help with the removal of pollutants. Some filter pollutants from storm water by using natural and manmade materials such as straw bales, semi-porous plastic filter fabric, and silt fences. Common examples are:

- *Retention Structures* are pond-like storm water control structures that act like natural ponds by slowing the flow of water and storing storm water behind an embankment. They serve the dual purpose of collecting and recirculating process water from the building. These pond-like structures allow heavier suspended matter to settle out of the storm water before it is discharged into a storm drain or stream. Retention structures are only minimally effective in removing dissolved pollutants and microorganisms.

- *Infiltration Structures* catch storm water and help it filter into the ground. Pollutants are removed from runoff that would otherwise discharge directly into a stream. These devices may include manmade materials like filter fabric, perforated pipes, and natural elements like certain types of soil, gravel, and sand to physically remove pollutants from storm water. Unlike retention structures that store and release storm water to surface water bodies, infiltration structures direct the flow of storm water into channels and other designated areas that permit storm water to gradually soak deeper into the ground. Infiltration structures are effective in removing suspended solids, bacteria, undissolved nutrients, oil and grease, and floating wastes, but are less effective in removing dissolved nutrients, some toxic pollutants, and chlorides (road salts). Local conditions are considered when designing an infiltration structure to ensure pollutants are not reintroduced to groundwater or surface waters.

- *Vegetative Structures* rely on natural plantings and vegetation to remove pollutants such as suspended matter, undissolved metals, and bacteria from storm water. Because some plants can readily absorb certain pollutants (without plant risk), they are used to remove pollutants from storm water. For example, sunflowers and cattails can absorb low levels of dissolved metals without toxic effects. Natural wetlands and bogs are also very effective at filtering pollution from storm water. *Grassed swales* and *filter strips* are two types of storm water control structures that rely on plants and the ground surface to remove and filter pollutants from storm water.

Although these methods can effectively remove storm water pollutants, the best control is to prevent pollution in the first place. Prevention can be obtained through proper training and education. Remember, storm water P2 is proactive, not reactive.

For More Information

For more information, contact NEPA Call-In at 202-208-6228 or one of the following organizations (EPA has published the second code of practice for storm water P2, *Storm Water Pollution Prevention Code of Practice for Local, State and Federal Government*, which gives useful information including pertinent legislation and construction works):

- **U.S. Environmental Protection Agency**
  401 M Street, SW
  Washington, DC 20460
  (202) 260-9534

- **Water Environment Federation**
  601 Wythe Street
  Alexandria, VA 22314-1994
  703-684-2400

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