Pollutants of Concern

Benzo(a)pyrene

Benzo(a)pyrene is a member of a group of chemicals known as polycyclic aromatic hydrocarbons (PAHs) and which is a known hazardous substance that can cause cancer and other adverse health effects in humans. It is released into the air via both natural sources (such as forest fires) and anthropogenic sources including stoves and furnaces burning fossil fuels (especially wood and coal), crude oils, shale oils, coal tars, motor vehicle exhaust, cigarettes, and various industrial combustion processes (HSDB, 2012) (ATSDR, 1995).

Several studies have reported that stormwater runoff into receiving waters from asphalt treated with coats of coal-tar emulsion seal could account for a large proportion of PAHs in many watersheds (Rowe and O'Connor, 2011; Van Metre and Mahler, 2010; Mahler et al., 2005). The major sources of nonoccupational exposure are ingestion of contaminated food and water, as well as tobacco products, and inhalation of polluted air.

MS4 permit conditions that regulate this parameter:

- Improper Disposal of Waste Ordinance
- Street Sweeping Program
- Roadside Erosion Control
- BMPs at Municipal Maintenance Yards
- Inspection and Maintenance of Stormwater Facilities
- Illicit Discharge Detection and Elimination Program

Cadmium

Cadmium is an elemental metal with small amounts naturally occurring in the environment, while manmade sources include automobile parts and fluids, as well as industrial discharges and mining wastes. Cadmium is one of the more dangerous toxic metals because it is readily taken up by plants and can cause chronic pain and other diseases in humans or animals that ingest those plants. Cadmium also affects the aquatic ecosystem by harming aquatic plants and animals and changing the macroinvertebrate profile of a waterbody.

Cadmium is transported into the receiving waters from various ground surfaces including roadways and parking lots when stormwater comes into contact with fluids or total suspended solids (TSS) particulates containing cadmium.

MS4 permit conditions that regulate this parameter:

- Litter Control Ordinance
- Improper Disposal of Waste Ordinance
- Yard Waste Ordinance

- Street Sweeping Program
- Storm Drain Inlet Retrofitting
- Herbicide Application Management
- Roadside Vegetative Waste Management
- Inspection and Maintenance of Stormwater Facilities
- BMPs at Municipal Maintenance Yards
- Illicit Discharge Detention and Elimination Program

Chloride

Chlorides are the most common forms of ions found in water as TDS, frequently combining with sodium, calcium, magnesium, and potassium to form salts which are key components of road salts. These chloride compounds are highly soluble in water making them great at de-icing surfaces in the winter, but at high concentrations they can cause adverse health effects to humans, aquatic vegetation, and wildlife. Increasing trends in chloride concentrations have been observed in waterbodies around the globe and attributed, at least in part, to road salt influence. Road de-icing by cities, counties, and state agencies accounts for a significant portion of road salt applications, but road salt is also used by many public and private organizations and individuals to de-ice parking lots, walkways, and driveways. Green infrastructure investments for stormwater management may also be at risk from salinity driven degradation.

Chlorides are discharged into the surface and ground receiving waters via stormwater runoff, resulting in concentrations of chloride that can exceed water quality standards intended to protect human and aquatic life. Additionally, the presence of chloride increases the potential corrosivity of the water, which adversely affects drinking water infrastructure and water quality.

MS4 permit conditions that regulate this parameter:

- Privately-Owned Salt Storage Ordinance
- Excess De-Icing Material Management
- BMPs at Municipal Maintenance Yards

Chromium

Chromium is an elemental metal that is necessary in trace amounts in the diets of humans and animals but can become carcinogenic and toxic to the health of humans and animals in higher doses. If too much is ingested through the respiratory or digestive tracts, it could be lethal for humans and animals alike. Chromium is used in the manufacturing of many products, including automobile parts and fluids, paint and cement pigments, wood preservatives, stainless steel, rubber, and other common sources such as chemical manufacturing and the combustion of coal, oil, and natural gas.

Chromium tends to latch onto soil and is transported into the receiving waters from various ground surfaces including roadways and parking lots when stormwater comes into contact with fluids or TSS particulates containing chromium.

MS4 permit conditions that regulate this parameter:

- Litter Control Ordinance
- Improper Disposal of Waste Ordinance
- Yard Waste Ordinance
- Street Sweeping Program
- Storm Drain Inlet Retrofitting
- Herbicide Application Management
- Roadside Vegetative Waste Management
- Inspection and Maintenance of Stormwater Facilities
- BMPs at Municipal Maintenance Yards
- Illicit Discharge Detention and Elimination Program

Copper

Copper is a naturally occurring elemental metal that is necessary in low amounts in the diets of humans and animals but can become toxic to the health of humans and animals in higher doses, and extremely toxic to fish and other aquatic organisms.

Copper is involved in the manufacturing of many products, such as plumbing, wiring, roofing materials, and pesticides, and can end up in stormwater from many sources, such as roadways from automobile parts and fluids, runoff from building structures where copper was used in roofing materials, gutters, or other architectural features. Copper can also enter waterways from domestic waste from illicit connections. Copper can dissolve easily in water and can attach strongly to soil particles which are then discharged via stormwater runoff into the receiving waters.

MS4 permit conditions that regulate this parameter:

- Litter Control Ordinance
- Improper Disposal of Waste Ordinance
- Yard Waste Ordinance
- Street Sweeping Program
- Storm Drain Inlet Retrofitting
- Herbicide Application Management
- Roadside Vegetative Waste Management
- Inspection and Maintenance of Stormwater Facilities
- BMPs at Municipal Maintenance Yards
- Illicit Discharge Detention and Elimination Program

Dissolved Oxygen

Dissolved oxygen (DO) refers to the concentration of oxygen gas incorporated into the water. Oxygen enters the water by direct absorption from the atmosphere and is enhanced by turbulence. Running water, such as that of a swift moving stream, normally contains more dissolved oxygen than the still water of a pond or lake. Water also absorbs oxygen released by aquatic plants during photosynthesis. Sufficient DO is essential to growth and reproduction of aerobic aquatic life (e.g., see Murphy 2006, Giller and Malmqvist 1998, Allan 1995; https://www.epa.gov/caddis-vol2/dissolved-oxygen). Low levels of oxygen (hypoxia) or no oxygen levels (anoxia) can occur when excess organic materials are decomposed by microorganisms. During this decomposition process, the DO in the water is consumed. In some water bodies, DO levels fluctuate periodically, seasonally, and even as part of the natural daily ecology of the aquatic resource. As DO levels drop, some sensitive animals may move away, decline in health, or even die. DO is considered an important measure of water quality as it is a direct indicator of an aquatic resource's ability to support aquatic life. While each organism has its own DO tolerance range, generally, DO levels below 3 milligrams per liter (mg/L) are of concern and waters with levels below 1 mg/L are considered hypoxic and are usually devoid of life.

Stormwater runoff containing nutrients such as nitrate, phosphorus, and organic TSS matter and animal and pet waste cause the levels of dissolved oxygen to decrease in the receiving waters. An increase in these materials transported via stormwater runoff will have a greater impact on receiving waters.

MS4 permit conditions that regulate this parameter:

- Pet Waste Ordinance
- Wildlife Feeding Ordinance
- Litter Control Ordinance
- Improper Disposal of Waste Ordinance
- Yard Waste Ordinance
- Street Sweeping Program
- Herbicide Application Management
- Roadside Vegetative Waste Management
- Roadside Erosion Control
- Inspection and Maintenance of Stormwater Facilities
- Stream Scouring Program
- Illicit Discharge Detection and Elimination Program

Lead

Lead is a naturally occurring elemental metal that is extremely toxic to humans and animals. Some common uses of lead today are lead acid batteries, including those used in automobiles, bullets and shotgun shot, fishing sinkers, industrial grade and non-domestic paint, boat keels, radiation shielding, and soldering.

Lead enters the environment through the manufacture and use of consumer products and by contamination of soils and water. Any lead occurring in soils can be mobilized into waterbodies through stream scouring and erosion. Lead in these forms makes its way into waterbodies, including those used for drinking water sources, through stormwater runoff. The Tier A MS4 permit prohibits the improper disposal of waste, such as paint, as well as a program to detect and eliminate illicit discharges.

MS4 permit conditions that regulate this parameter:

- Litter Control Ordinance
- Improper Disposal of Waste Ordinance
- Storm Drain Inlet Retrofitting
- Roadside Erosion Control
- BMPs at Municipal Maintenance Yards
- Stream Scouring Program
- Illicit Discharge Detention and Elimination Program

Nickel

Nickel is an abundant natural elemental metal and is necessary in many organism's diets but can become carcinogenic and toxic to health in high doses. Nickel is used in manufacturing, in combination with other metals, such as iron, copper, chromium, and zinc, to form many alloys used to make products such as stainless steel, vehicle brakes, fertilizers, ceramic paint, jewelry, kitchen ware, batteries, textiles, and coins. Nickel is transported into the receiving waters from various ground surfaces, including roadways and parking lots, when stormwater dissolves nickel from products. Stormwater also comes into contact with TSS containing particulates from these products, as well as through air deposition on the ground surface by vehicle exhaust, power plants, metal factories and waste incinerators, which is then transported to the receiving waters in the stormwater runoff. Stormwater runoff that travels through metal pipes may also pick up nickel along the way to surface water bodies.

High levels of nickel can cause harm to organisms, such as mammals, algae, fish, birds, and plants, impact drinking water, cause adverse effects on the overall quality of surface water, and can also pose a threat to soil health by stunting root growth resulting in ground erosion.

MS4 permit conditions that regulate this parameter:

- Litter Control Ordinance
- Improper Disposal of Waste Ordinance
- Yard Waste Ordinance
- Street Sweeping Program
- Storm Drain Inlet Retrofitting
- Herbicide Application Management
- Roadside Vegetative Waste Management
- Inspection and Maintenance of Stormwater Facilities

- BMPs at Municipal Maintenance Yards
- Illicit Discharge Detention and Elimination Program

Nitrate

Nitrate is a compound that is formed naturally when nitrogen combines with oxygen or ozone and is essential for all living things. Nitrates are also made in large amounts by plants and animals and are released in smoke and industrial or automotive exhaust. Nitrate is picked up by municipal stormwater runoff when it comes into contact with sources such as lawn and garden fertilizers, pet waste, illicit connections, leaking septic tanks and atmospherically deposited emissions from vehicle exhaust. Grass clippings and other plant and leaf litter also release nitrates when they decompose, which are then transported through stormwater runoff to waterbodies.

High levels of nitrate in drinking water can be dangerous to human and aquatic health. The concerns are highest for infants and pregnant women. Babies who are fed formula mixed with drinking water with high nitrate levels have an increased risk of getting methemoglobinemia (also known as blue baby syndrome.) Higher concentrations of nitrate in drinking water can also cause other human health issues, including symptoms connected to methemoglobinemia in older populations such as decreased blood pressure, increased heart rate, headaches, stomach cramps, and vomiting. Swimming in or drinking water with high concentrations of nitrate from stormwater runoff can lead to an increased risk of certain cancers. High nitrate levels are especially harmful to young fish and will negatively affect their growth. Furthermore, the same conditions that cause elevated nitrate often cause decreased oxygen levels, which will further stress fish populations. Nitrates are used as fertilizer by aquatic plants, but if allowed to accumulate nitrates contribute to unsightly algae growth and HABs.

MS4 permit conditions that regulate this parameter:

- Pet Waste Ordinance
- Wildlife Feeding Ordinance
- Litter Control Ordinance
- Improper Disposal of Waste Ordinance
- Yard Waste Ordinance
- Street Sweeping Program
- Herbicide Application Management
- Roadside Vegetative Waste Management
- Roadside Erosion Control
- Inspection and Maintenance of Stormwater Facilities
- Stream Scouring Program
- Illicit Discharge Detection and Elimination Program

Pathogens (Enterococcus, E. Coli, Fecal Coliform, Total Coliform)

Pathogens, including enterococcus, E. Coli, fecal coliform, and total coliform, enter the receiving waters when stormwater comes into contact with sources of these pathogens, such as pet waste, animal waste from geese and other wildlife, some farming activities, illicit discharges, failing sewage conveyance systems and septic systems, combined sewage overflows, and sanitary sewer overflows (SSOs). While sewage treatment plants contribute a steady input of treated sewage to their receiving waters, stormwater runoff is the primary contributor to pathogen loads in the surface waters of the state.

Many of these pathogens affect the designated uses of the receiving waters and are harmful to human or animal health when ingested causing intestinal disease. Pathogens can attack the immune system and cause infections that may result in abdominal issues, respiratory problems, fever, headache, skin rashes, etc. (Water Quality Topics: Pathogens | US EPA).

When receiving surface waters include shellfish harvesting as a designated use, pathogens also pose additional concerns. Proximity to potential sources such as marinas, development served by septic systems and concentrated stormwater outfall locations warrant precautionary closures of shellfish waters on a seasonal or full-time basis. The National Shellfish Sanitation Program has established criteria for pathogens that are used to determine support of the shell fishing use.

MS4 permit conditions that regulate this parameter:

- Pet Waste Ordinance
- Wildlife Feeding Ordinance
- Litter Control Ordinance
- Improper Disposal of Waste Ordinance
- Yard Waste Ordinance
- Street Sweeping Program
- Herbicide Application Management
- Roadside Vegetative Waste Management
- Roadside Erosion Control
- Inspection and Maintenance of Stormwater Facilities
- Stream Scouring Program
- Illicit Discharge Detection and Elimination Program

pH

pH (scientifically referred to as the Potential of Hydrogen) measures the concentration of hydrogen ions in a solution and is the indicator of the acidity or alkalinity of a substance, representing its ability to donate or accept hydrogen ions. pH values can range from 0 to 14, with 0 representing the most acidic and 14 representing the most basic. Fluctuations in pH and pH levels outside of the typical levels for a waterbody can negatively impact aquatic life, including reduced biodiversity if those values exceed critical thresholds. These impacts happen when the receiving waters experience even slight changes in pH

levels that negatively impact reproduction, growth, and the ability to sustain life for species that live within them.

Pure water has a neutral pH equal to 7 but when chemicals or pollutants are mixed with stormwater runoff, the mixture can become either acidic or basic. Such is the case when stormwater comes into contact with ammonia, sulfur, battery acids, lime, cement, wet or fresh concrete, fertilizers, compost, and other pollutants. This mixing can happen on the ground with runoff, or can happen in the atmosphere with air pollutants causing "acid rain." When acid rain or pH impacted storm water runoff collect in streams and ponds, the pH of that water body is changed. Microsoft Word - Rain Events Newsletter - June 2010 - CA (wgr-sw.com)

MS4 permit conditions that regulate this parameter:

- Pet Waste Ordinance
- Wildlife Feeding Ordinance
- Litter Control Ordinance
- Improper Disposal of Waste Ordinance
- Yard Waste Ordinance
- Street Sweeping Program
- Herbicide Application Management
- Roadside Vegetative Waste Management
- Roadside Erosion Control
- Inspection and Maintenance of Stormwater Facilities
- BMPs at Municipal Maintenance Yards
- Stream Scouring Program
- Illicit Discharge Detection and Elimination Program

Phosphorous/Total Phosphorous

Phosphorus is a key nutrient for plant growth and is often the limiting nutrient in a freshwater setting. Total phosphorous is the sum of particulate and dissolved phosphorous which includes the total amount of phosphorous in both organic and inorganic forms. High concentrations of phosphorus in receiving waters may result from stormwater runoff due to poor agricultural practices, urban areas, leaking septic systems, illicit discharges or SSOs. Additional stormwater runoff sources of phosphorous include the breakdown of plant and leaf litter (including grass clippings), soil particles, pet and animal waste, fertilizer from lawns, and atmospheric deposition of phosphorus particles. Contribution from runoff from lawns and roads accounts for the greatest loading in many receiving waters. An excess of phosphorus into a water body can have a detrimental effect on designated uses related to both public health and aquatic health. For instance, too much phosphorus in a surface water can cause increased growth of algae and large aquatic plants (a process called eutrophication) causing significant swings in pH and dissolved oxygen, which can in turn result in the violation of surface water quality criteria for these parameters and adversely affect the aquatic community.

Additionally, high levels of phosphorus can also lead to HABs, that produce toxins which can be harmful to human and animal health. The presence of excessive plant biomass can also interfere with other designated uses, such as swimming or boating. When algae are present in large amounts, drinking water purveyors must also increase the use of disinfectants and oxidants to treat the algae, which can lead to an increase in disinfection byproducts such as trihalomethanes, listed as likely carcinogens by EPA.

MS4 permit conditions that regulate this parameter:

- Pet Waste Ordinance
- Wildlife Feeding Ordinance
- Litter Control Ordinance
- Improper Disposal of Waste Ordinance
- Yard Waste Ordinance
- Street Sweeping Program
- Herbicide Application Management
- Roadside Vegetative Waste Management
- Roadside Erosion Control
- Inspection and Maintenance of Stormwater Facilities
- Stream Scouring Program
- Illicit Discharge Detection and Elimination Program

Polychlorinated Biphenyls (PCBs)

The term 'PCBs' (Polychlorinated Biphenyls) represents a broad class of toxic industrial chemicals first discovered and synthesized in the late 19th century. Their novel chemical properties led to widespread industrial production and usage peaking between the 1930's and late-1960's. Some products may continue to contain PCBs, including electrical equipment, motor and hydraulic oils, oil-based paint, and some plastics. The recognition of PCB associated health hazards were first noted in the 1960's and their production finally banned in 1979. PCBs can accumulate in the leaves and above-ground parts of plants and food crops. They are also taken up into the bodies of small organisms and fish. As a result, people who ingest fish may be exposed to PCBs that have bioaccumulated in the fish they are ingesting. Their oily nature allows them to accumulate in fatty animal tissues and bioaccumulate up the global food chain where they contribute to organ damage and carcinogenesis in higher-tiered species.

PCBs are easily carried away as TSS by stormwater runoff from products containing the compounds which are exposed to stormwater and known and unknown contaminated areas. PCBs have a moderate level of volatility, which means that their vapors are also readily carried aloft by the wind. They are then deposited on exposed surfaces via air deposition.

MS4 permit conditions that regulate this parameter:

- Improper Disposal of Waste Ordinance
- Yard Waste Ordinance

- Roadside Vegetative Waste Management
- Inspection and Maintenance of Stormwater Facilities
- BMPs at Municipal Maintenance Yards
- Illicit Discharge Detection and Elimination Program

Temperature

The concentration of dissolved oxygen in the receiving waters is also affected by the temperature of the water. Cold water holds more dissolved oxygen than warm water, so in New Jersey during winter and early spring, the dissolved oxygen concentration in the surface waters is relatively high. However, in summer and fall, the dissolved oxygen concentration is often lower and therefore can pose a risk to designated uses associated with aquatic life. Deeper water also tends to be colder and hold more dissolved oxygen than shallower waters. Yet, turbid waters will absorb more heat. The elevated temperatures are especially harmful to cold water fish, such as trout.

Temperature impairments in the receiving waters can be due to heating of stormwater runoff as it runs across hot paved areas, such as roadways and parking lots, overflow of heated stormwater ponded in basins, stream bank erosion that widens the stream and creates more shallow stream beds, and increased solar incidence in areas where shading vegetation is lacking in the riparian buffer. In addition to the other Tier A permit conditions noted below, the increased temperature impacts associated with stormwater runoff can also be mitigated by implementing green infrastructure measures to manage stormwater runoff at the source rather than direct it into the MS4 and receiving waterbodies, providing proper stormwater management practices, and conducting streambank restoration projects where needed.

MS4 permit conditions that regulate this parameter:

- Pet Waste Ordinance
- Wildlife Feeding Ordinance
- Litter Control Ordinance
- Improper Disposal of Waste Ordinance
- Yard Waste Ordinance
- Street Sweeping Program
- Herbicide Application Management
- Roadside Vegetative Waste Management
- Roadside Erosion Control
- Inspection and Maintenance of Stormwater Facilities
- Stream Scouring Program
- Illicit Discharge Detection and Elimination Program

Total Dissolved Solids (TDS)

Total Dissolved Solids (TDS) is the measure of the concentration of dissolved inorganic substances, such as calcium, chlorides nitrate, phosphorus, iron, sulfur, and other ion particles, in water that can pass through a filter with pores of approximately 0.002 cm. TDS differs from TSS in that TSS particles will not pass through the same filter. TDS affects aquatic and human health by altering the water balance in the cells of organisms. For instance, when an aquatic organism is placed in water with very low TDS, such as distilled water, it will swell up because water will tend to move into its cells, which have a higher concentration of solids. Conversely, an organism placed in water with high TDS will shrink somewhat because the water in its cells will tend to move out. This will in turn affect the organism's ability to maintain the proper cell density, making it difficult to keep its position in the water column by causing it to float up or sink down to depths to which it is not adapted, and it might not survive. High concentrations of TDS may also cause adverse health effects due to the chemicals making up the TDS, make drinking water unpalatable and cause additional adverse health effects on people who are not used to drinking such water. Levels of TDS that are too high or too low can also adversely affect industrial processes that use raw water.

TDS is discharged into the receiving waters via stormwater as the runoff picks up various substances on the ground surface, such as salts and brine solutions used for de-icing of motor vehicle surfaces and walkways, fertilizers, motor vehicle parts and fluids, illicit connections, and soil particles through erosion.

MS4 permit conditions that regulate this parameter:

- Pet Waste Ordinance
- Wildlife Feeding Ordinance
- Litter Control Ordinance
- Improper Disposal of Waste Ordinance
- Yard Waste Ordinance
- Street Sweeping Program
- Herbicide Application Management
- Roadside Vegetative Waste Management
- Roadside Erosion Control
- Inspection and Maintenance of Stormwater Facilities
- BMPs at Municipal Maintenance Yards
- Stream Scouring Program
- Illicit Discharge Detection and Elimination Program

Total Suspended Solids (TSS)

Stormwater runoff can pick up particulates, also known as Total Suspended Solids (TSS), from the land surface and carry the particulates into the receiving waterbodies. TSS is one of the most common pollutants found in stormwater runoff. TSS originates from many sources including areas such as roadways, parking lots and developments, erosion of pervious surfaces such as construction sites and dust, litter and other particles deposited on

impervious surfaces from human activities. TSS can be made up of particles from pavement (from wear), vehicle exhaust emissions, vehicle parts, building and construction material, road salt, road paint, pedestrian debris, soil material, plant and leaf litter, and may contain heavy metals as well as atmospheric deposition of particles that may be transported from outside of the municipality (Hopke et al., 1980; Taylor and Owens, 2009; Total Suspended Solids (TSS) in stormwater - Minnesota Stormwater Manual (state.mn.us)).

High concentrations of TSS in the receiving waters can cause problems and negatively impact multiple designated uses, including those related to human health and aquatic life. Excessive TSS can bury benthic organisms and affect the viability of organisms that reside in the water column. These materials can easily become suspended due to stormwater runoff, erosion, and resuspension from seasonal water flow. TSS can impact not only aquatic organisms but drinking water as well. Organic TSS, such as decomposing matter or sewage effluent from illicit connections and/or SSOs include high levels of microorganisms such as protozoa, bacteria, and viruses. Such pathogens contribute to waterborne diseases like cryptosporidiosis, cholera, and giardiasis. Turbid water, whether due to organic or inorganic material, cannot be easily disinfected at potable water treatment facilities, as the suspended particles will "hide" these microorganisms. Turbidity may also reduce visibility of underwater structures such as logs or large boulders, negatively affecting a water body's recreational use.

MS4 permit conditions that regulate this parameter:

- Pet Waste Ordinance
- Wildlife Feeding Ordinance
- Litter Control Ordinance
- Improper Disposal of Waste Ordinance
- Yard Waste Ordinance
- Street Sweeping Program
- Herbicide Application Management
- Roadside Vegetative Waste Management
- Roadside Erosion Control
- Inspection and Maintenance of Stormwater Facilities
- Stream Scouring Program
- Illicit Discharge Detection and Elimination Program

Turbidity

Turbidity refers to water's transparency and the amount of TSS that the water contains and is measured by how well light can pass through water. Turbid waters containing a larger amount of TSS have a low transparency and visibility, which can allow the waterbody to absorb more heat from the sunlight, thus increasing the temperature and decreasing the dissolved oxygen. High turbidity can negatively impact a waterbody's designated uses by reducing the ability of the waterbody to support aquatic life due to these effects, reducing the aesthetic quality of the receiving water, having a harmful impact on recreation and tourism, and increasing the cost of water treatment for drinking and industrial uses such as

food processing. Municipal stormwater runoff can create turbid conditions in water when it picks up particulate debris from hard surfaces and transports it to water bodies. Turbidity in stormwater runoff is usually made up of rock and soil fragments, dirt and debris from roads and vehicles, and other materials as noted under TSS.

MS4 permit conditions that regulate this parameter:

- Pet Waste Ordinance
- Wildlife Feeding Ordinance
- Litter Control Ordinance
- Improper Disposal of Waste Ordinance
- Yard Waste Ordinance
- Street Sweeping Program
- Herbicide Application Management
- Roadside Vegetative Waste Management
- Roadside Erosion Control
- Inspection and Maintenance of Stormwater Facilities
- Stream Scouring Program
- Illicit Discharge Detection and Elimination Program

Volatile Organic Compound (VOCs)

Volatile Organic Compounds (VOCs) is the name given to a large group of chemical compounds that vaporize into the air and can dissolve into the water from certain solids or liquids at varying rates. VOCs are released or "off-gassed" into the air by many products that are used to build and maintain motor vehicles and houses, such as paints, glues, caulk, solvents, fuels and other vehicle fluids, cleansers and disinfectants, aerosol sprays, pesticides, and wood preservatives. Common examples of VOCs are benzene, ethylene glycol, formaldehyde, methylene chloride, tetrachloroethylene, toluene, xylene, and 1,3-butadiene. While many VOCs can cause adverse effects on aquatic life, there are also several adverse human health risks associated with encountering VOCs, including worsening asthma symptoms, cancer, liver and kidney damage, and central nervous system damage.

Stormwater can come in contact with VOCs from vehicle surfaces, roads, parking lots, driveways, and litter or other wastes. Once these improperly disposed materials containing VOCs encounter stormwater runoff they are discharged to the surface and ground waters of the state which are in turn used for drinking water supplies and the protection and propagation of aquatic life.

Surface water quality criteria serve to protect water quality for designated uses such as supporting the survival, growth, and reproduction of aquatic life, protecting the quality of drinking water sources, maintaining good water quality for primary and secondary contact recreational uses, and keeping fish safe for human consumption.

MS4 permit conditions that regulate this parameter:

- Litter Control Ordinance
- Improper Disposal of Waste Ordinance
- Street Sweeping Program
- Herbicide Application Management
- Inspection and Maintenance of Stormwater Facilities
- BMPs at Municipal Maintenance Yards
- Illicit Discharge Detection and Elimination Program