



Focus on: Municipal Stormwater and 6PPD

Understanding 6PPD

6PPD is a chemical that prevents tires from breaking down and helps them last longer. When this chemical is exposed to air, it reacts with ozone to create 6PPD-quinone or 6PPD-q. Recent research has shown that 6PPD-q is lethal to salmon, especially coho. This is a problem, as 6PPD-q can move from paved surfaces into waterbodies and harm aquatic life.

Specific to local salmon runs, research shows that 6PPD-q is responsible for the death of coho salmon migrating back to spawning grounds.

Research is ongoing for all of the potential impacts of 6PPD and 6PPD-q, including studying the effectiveness of different stormwater treatments in preventing 6PPD-q from reaching the water.

To learn more about all of Ecology's work on 6PPD, visit ecology.wa.gov/6PPD.

Washington's Municipal Stormwater Program

Stormwater runoff is a leading pollution threat to clean water in urban areas of Washington. As rain and snowmelt runs off buildings, paved roads, and parking lots, it increases in speed and volume, and can pick up pollution such as oil, fertilizers, pesticides, tire wear, trash, and pet waste. These pollutants and higher flows are carried into local water bodies, where they can harm water quality and habitat.

To manage this stormwater, Ecology has municipal stormwater permits for the state's most populated cities and counties. The permits are aimed at reducing stormwater pollution at its source, treating it, and controlling volume and flow, so cleaner water goes into creeks, rivers, lakes, groundwater, and Puget Sound.

The regulatory approach in these permits is a programmatic and a holistic approach to

stormwater management, which is different from the typical water quality permit. Municipal stormwater permittees are required to develop and implement Stormwater Management programs. These are comprehensive toolboxes of stormwater best management practices (BMPs) known to be effective at preventing, controlling and treating runoff from urbanized landscapes.

We update the municipal stormwater permits every five years. The most recent permit updates were issued on July 1, 2024 and are effective from Aug. 1, 2024 to July 31, 2029.

To address 6PPD and 6PPD-q pollution, Ecology made updates to the municipal permits and the stormwater manuals that support permit implementation.

Updating permits for 6PPD and 6PPD-q

The best way to prevent pollution from reaching stormwater and local waterways is to control it at the source. For example, street sweeping, a commonly used source control best management practice (BMP), removes tire particles, heavy metals, sediment and other pollutants from the roadway before they move downstream by stormwater. Stormwater treatment BMPs remove many kinds of pollutants, including 6PPD-q, from stormwater before it is discharged to surface waters.

There are existing BMPs in the permits and manuals that are effective at addressing tire wear particles. Initial research shows these are effective BMPs for 6PPD and 6PPD-q. These BMPs were designed to address many different pollutants, from metals to fertilizers to tire wear particles, even before we knew about 6PPD.

The following permit changes will help further reduce pollution, including 6PPD, from reaching local waters in the near term and long term:

- Requiring more new development and redevelopment projects to incorporate Runoff Treatment and Flow Control BMPs.
- Increasing the amount of stormwater retrofits required for existing development, to address areas without adequate stormwater treatment.
- Adding a street sweeping requirement to collect pollutants before they are washed into downstream waters.
- Including a new emphasis on transportation-related projects in Stormwater Management Action Plans, as those are likely to generate tire particles and 6PPD-q. These plans also include planning for high priority receiving waters and identifying priority stormwater management activities.

One of the biggest issues when it comes to addressing 6PPD and 6PPD-q are areas without effective stormwater treatment. This will continue to improve as local governments install more stormwater treatment through retrofits of existing development and more stormwater management BMPs as a result of permit requirements.

What stormwater BMPs help with 6PPD and 6PPD-q?

There are a few types of common stormwater BMPs that initial research shows help with 6PPD and 6PPD-q. Research is ongoing to better understand just how effective these BMPs are and what other BMPs might be helpful. We issued our first report on the potential effectiveness of stormwater management BMPs for 6PPD-q in 2022. More information is in our report [focus sheet](#). The report looked at:

Stormwater source control BMPs: prevent stormwater contamination with methods such as street sweeping to remove 6PPD-q and tire wear

particles from roadways before they are washed into downstream waters.

Flow control BMPs: slow runoff down and reduce runoff volumes by holding stormwater back with structures such as ponds, infiltration basins, and bioretention.

Runoff treatment BMPs: remove 6PPD-q from stormwater runoff through physical filtration or chemical sorption media like biofiltration swales, bioretention, and certain manufactured treatment devices.

Ecology is funding BMP effectiveness research for 6PPD and 6PPD-q. Focus areas include: stormwater characterization, crumb rubber, street sweeping, decant facilities, soil and media mixes, swales, and embankments.

How communities are monitoring for 6PPD-q

A regional monitoring collective, the [Stormwater Action Monitoring](#) (SAM) program, remains the most effective monitoring option for municipal stormwater permittees.

SAM conducts long-term regional status and trends monitoring studies in western Washington. These studies aim to understand how collective stormwater management efforts are positively impacting streams and marine waters. Additionally, SAM and municipal stormwater permittees are researching the effectiveness of stormwater BMPs. SAM is studying 6PPD-q in some of its long-running and newer projects.

A SAM project starting in 2024 will analyze stormwater outfall samples from 16 basins across the Puget Sound. This analysis will focus on several Contaminants of Emerging Concern, including 6PPD-q. The study results will inform us of 6PPD-q concentrations in stormwater coming from industrial, commercial, and residential areas.

Related Information

- [Municipal Stormwater General Permits](#)
- [Stormwater Manuals](#)



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To request an ADA accommodation, contact Ecology by phone at 360-407-6600 or email at Jessica.Shook@ecy.wa.gov, or visit <https://ecology.wa.gov/accessibility>. For Relay Service or TTY call 711 or 877-833-6341.