

Focus on: Best Management Practices for 6PPD-q



The 6PPD-q stormwater problem

In 2020, scientists at the University of Washington-Tacoma, Washington State University, and other collaborators [identified the transformation product 6PPD-quinone](#), or 6PPD-q, as the chemical culprit causing acute Coho salmon death in small streams after rain events. 6PPD-q comes from 6PPD, a chemical preservative found in tires used to increase tire lifespan. Currently, 6PPD is used in all tires, is found in recycled tire products, and can contaminate stormwater anywhere tires are used.

Rain falls on tires and roads, washing tire particulates, which includes 6PPD and 6PPD-q, into the stormwater system. Without stormwater management, the chemicals may flow into waterbodies where contact with Coho salmon has proven to be fatal at very low concentrations. Runoff that travels from paved surfaces unmanaged into the water is currently considered to be the main source of tire wear debris and 6PPD-q contamination. Stormwater management is achieved using best management practices (BMPs) to control sources of contaminants, control flows and volumes of stormwater, and to treat stormwater prior to release in the stormwater system.

While manufacturers work to find alternative rubber preservatives, stormwater managers in Washington state are seeking solutions to prevent 6PPD-q contamination in runoff and to determine the best options to reduce concentrations for existing and future infrastructure.

2022 Stormwater BMP Evaluation

In June 2022, with legislative funds, Ecology procured engineering consultants to provide best professional judgment, reported in [Stormwater Treatment of Tire Contaminants - Best Management Practices Effectiveness](#), on existing BMP options and their likelihood to manage particulate tire wear, 6PPD, and 6PPD-quinone. The report explores all categories of stormwater BMPs in Ecology's manuals, including:

Stormwater source control BMPs: prevent stormwater contamination with methods such as roof or street sweeping to control runoff from tires, tire products, and tire wear particulates.

Flow control BMPs: slow runoff down and reduce runoff volumes by holding water back via infiltration methods such as ponds, infiltration basins, and bioretention.

Runoff treatment BMPs: reduce concentrations of the targeted pollutants, typically through physical filtration or chemical sorption media like biofiltration swales, bioretention, and manufactured treatment devices.

In October 2022, we published a [legislative report](#) with this BMP information and the work done to identify where the co-occurrence of salmon, particularly Coho, and road runoff are most likely to be problematic. These reports provide our best professional judgment on potentially effective BMPs based on what we know now and represent our current guidance to inform local decisions on new and redevelopment projects.

Current and future stormwater BMP studies

Ecology is working to identify and test the effectiveness of BMPs to address 6PPD-q in stormwater runoff. Ongoing funding will help continue research on the ability of stormwater systems to filter out this toxic tire chemical and to develop BMPs to treat contaminated stormwater.

Over the next year, with support from the legislature, Ecology will:

- Begin to assess how many and which BMPs reduce the toxicity in the different urban landscapes. More than one BMP may be needed in some settings.
- Continue to provide technical assistance updates and guidance to municipalities.
- Fill 6PPD and 6PPD-q data gaps as defined in the consultant report.
- Begin to characterize how much 6PPD, 6PPD-q, and tire wear particles are in stormwater across different urban landscapes, storm events, seasons, and years.
- Continue to fund retrofit projects through stormwater grants.



Ecology continues to convene with local governments, stakeholders, and community members to ensure up-to-date information is shared and discussed. BMP research is essential to provide sound guidance on how to manage tire wear particles, 6PPD and 6PPD-q. We are advancing the science on stormwater source control, capture, and treatment of these pollutants through our stormwater BMP studies.

Our goal is to continue this research with the additional funding Ecology requested from the Legislature. We have started studies on the effectiveness of sorption to natural and commercial media materials, effectiveness of street sweeping, and longevity of bioretention media.

With support from the Legislature, we will launch an evaluation program to solicit new studies on effective solutions to manage 6PPD and 6PPD-q in stormwater statewide.

Related Information

- [Ecology's 6PPD webpage](#)
- [Stormwater Treatment of Tire Contaminants - Best Management Practices Effectiveness](#)
- [6PPD in Road Runoff: Assessment and Mitigation Strategies](#)



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