July 15, 2024

Submitted electronically
Lucienne Banning
Department of Ecology
PO Box 47696
Olympia, WA 98504-7696

Re: Washington Department of Ecology's Draft Industrial Stormwater General Permit

Dear Ms. Banning,

The U.S. Tire Manufacturers Association (USTMA) appreciates the opportunity to provide comments on Washington Department of Ecology's (Washington Ecology) draft 2025 Industrial Stormwater General Permit (hereinafter referred to as the "draft 2025 ISGP"). USTMA is the national trade association of tire manufacturers that produce tires in the United States. Domestic tire manufacturing is responsible for more than 291,000 jobs and has an annual economic footprint of $170.6 billion in the United States. The tires from our member companies make mobility possible and keep the U.S. economy moving.

USTMA members are committed to sustainable practices in every aspect of their businesses and embrace a shared responsibility of helping to achieve a more sustainable society. As part of this, we remain committed to understanding any potential impacts of our tires on the environment. USTMA advances a sustainable tire manufacturing industry through a commitment to science-based public policy advocacy. USTMA is pleased to provide input on this draft ISGP, which includes an important addition of sampling requirements for N-(1,3-dimethylbutyl)-N'-phenyl-p-phenylenediamine quinone (6PPDQ).

The use of N-(1,3-dimethylbutyl)-N'-phenyl-p-phenylenediamine (6PPD) in tires serves an essential safety function, protecting the components of the tire from attack by ozone and oxygen and has been used for decades. Without 6PPD, a tire's integrity would be severely and quickly compromised, jeopardizing driver and passenger safety. Since 6PPDQ, a transformation product of 6PPD, was first identified in Tian et al. (2021)[1], USTMA has engaged with Washington state, federal, and Tribal agencies, researchers, and other stakeholders to identify and support existing and future research related to 6PPDQ and to ensure research utilizes the most robust methodologies. USTMA continues to support the use of the best available, peer-reviewed science to inform regulatory actions. The association's members are committed to working with Washington Ecology, to fill knowledge gaps in existing research.

[1] Zhenyu Tian *et al.* A ubiquitous tire rubber–derived chemical induces acute mortality in coho salmon. *Science* **371**,185-189(2021).DOI:10.1126/science.abd6951

The draft 2025 ISGP, which is a reissuance of an existing permit, now includes a requirement for certain transportation facilities and warehousing and storage facilities to sample for 6PPDQ. USTMA appreciates that Washington Ecology has acknowledged the benefit of a "report only" framework for collecting 6PPDQ characterization data and assessing the effectiveness of best management practices (BMPs) during the next general permit term. This will allow facilities to gather stormwater data under existing conditions supporting informed decision making for BMP implementation.

To support the collection of high-quality data for evaluation, USTMA recommends that Washington Ecology develop sampling guidance or a standard operating procedure for sites required to collect and analyze stormwater samples for 6PPDQ. This will help permittees to collect the most useful data, which can be more efficiently analyzed and duplicated to inform future permits issued by the agency. One possible avenue would be to update the Stormwater Sampling Manual, which serves as a guide for collecting stormwater sampling requirements under the ISGP. Currently, the manual gives substantial leeway in how permittees are able to sample, which could introduce more variability in 6PPDQ measurements. While not a mandatory requirement, a more comprehensive guidance document would encourage permittees to follow a more standardized collection method.

We support the inclusion of evaluating the effectiveness of existing BMPs in the draft 2025 ISGP and the emphasis on using the latest scientific data. However, we encourage expanding the reference to current literature within the companion document fact sheet (2025 ISGP Fact Sheet). Currently, only the agency's 2022 Stormwater Treatment of Tire Contaminants Best Management Practices (BMP) Effectiveness Report is referenced. We recommend that the agency include some of the recent studies for 6PPDQ mitigation.

For example, within the draft 2025 ISGP Fact Sheet, it is mentioned that bioretention soil mixes are the only BMP in the literature reported to reduce 6PPDQ exposure and mortality in fish. While bioretention has shown significant effectiveness, it is important to acknowledge that permeable pavement has also demonstrated potential to reduce 6PPDQ concentrations in stormwater discharge (Mitchell & Jayakaran, 2024).[2]

[2]Mitchell, C. J., & Jayakaran, A. D. (2024). Mitigating tire wear particles and tire additive chemicals in stormwater with permeable pavements. *Science of The Total Environment*, *908*, 168236. https://doi.org/10.1016/j.scitotenv.2023.168236

To illustrate the types of current research that could be referenced, we suggest including the following articles:

- McIntyre et al., 2023:[3]
    - Tested the efficiency of bioretention soil media (46 cm layer of 60% sand/40% compost mix with a 8 cm mulch layer) and exposed coho embryos to unfiltered runoff and bioretention effluent.
    - Collected highway runoff was filtered through drums containing bioretention media in a lab-based setting.
    - Found that filtering stormwater with bioretention significantly reduced developmental effects and prevented mortality in alevin (embryos exposed to stormwater had no significant mortality prior to hatching).
- Long Live the Kings, 2023:[4]
    - Aimed to test the effectiveness of Cedar Grove's compost-based containerized mobile biofiltration system in capturing and filtering stormwater runoff, particularly focusing on the removal of 6PPDQ and excess phosphorous.
    - A biofiltration system was installed along a highway in Washington and the bioretention media was composed of a 60/40 ratio of mineral aggregate to compost product. A secondary phosphorus polishing layer consisted of a mixture of sand, alumina, and iron.
    - Found that filtering highway runoff through the biofiltration system resulted in an average reduction efficiency of 92.5% for 6PPDQ. Zebrafish embryo survival was high (>95%) across all treatments, and the filtered effluent showed reduced development effects.
    - The use of compost in biofiltration media could potentially be challenging with respect to nutrient export, particularly phosphorus. This would prevent this system from passing the Washington State Technology Assessment Protocol – Ecology (TAPE) requirements. However, the system still showed significant reduction in 6PPDQ, and potential additions (such as a polishing layer) may provide improvement for nutrient management.

[3] McIntyre, J. K., Spromberg, J., Cameron, J., Incardona, J. P., Davis, J. W., & Scholz, N. L. (2023). Bioretention filtration prevents acute mortality and reduces chronic toxicity for early life stage coho salmon (Oncorhynchus kisutch) episodically exposed to urban stormwater runoff. Science of The Total Environment, 902, 165759. https://doi.org/10.1016/j.scitotenv.2023.165759

[4] Long Live the Kings. (2023). *Ohop Creek Stormwater Management Pilot Project*.

- Rodgers et al., 2023:[5]
    - Investigated the fate and transport of 6PPDQ in an existing bioretention pond with plants and modeled its performance under different hydrologic scenarios.
    - Conducted a spike and recovery experiment using artificial stormwater to represent the largest rainfall event that would fill the pond without overflowing the system.
    - Found that 6PPDQ infiltrated the system and was mostly bound to the soil, with little plant uptake or remobilization.
    - The model predicted that bioretention cells reduce mass-loadings of 6PPDQ by >90% for storm events with a recurrent period of ≤ 2-years, and >95% reduction in annual mass loadings in an "average" water year.
- Rodgers et al., 2024:[6]
    - Modeled various bioretention design modifications to evaluate how certain design features of a bioretention pond affect its ability to remove 6PPDQ from stormwater.
    - Determined that increasing the pond's surface area, depth, or infiltration rate increased the effectiveness of the pond.
    - Results showed that increasing more than one feature can have an antagonistic effect and that high infiltration rates can lead to 6PPDQ leaching to the outflow drain.
- Mitchell & Jayakaran, 2024:[2]
    - Investigated the ability of permeable pavement to remove tire particles and leachable tire chemicals in stormwater, including 6PPDQ.
    - Conducted three experiments at a high school in Tacoma, Washington, testing permeable pavement formulations (concrete and asphalt, with and without cured carbon fibers).
    - The results showed that porous pavements can reduce 6PPDQ by up to 100% and tire particle concentrations by up to 96%. On average, the porous pavements reduced 6PPDQ by 68%, and while only one pavement removed 6PPDQ to

[5] Rodgers, T. F. M., Wang, Y., Humes, C., Jeronimo, M., Johannessen, C., Spraakman, S., Giang, A., & Scholes, R. C. (2023). Bioretention Cells Provide a 10-Fold Reduction in 6PPD-Quinone Mass Loadings to Receiving Waters: Evidence from a Field Experiment and Modeling. Environmental Science & Technology Letters, acs.estlett.3c00203. https://doi.org/10.1021/acs.estlett.3c00203

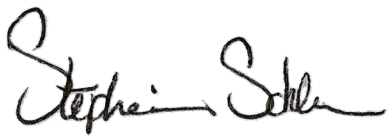
[6] Rodgers, T. F. M., Spraakman, S., Wang, Y., Johannessen, C., Scholes, R. C., & Giang, A. (2024). Bioretention Design Modifications Increase the Simulated Capture of Hydrophobic and Hydrophilic Trace Organic Compounds. Environmental Science & Technology, 58(12), 5500–5511. https://doi.org/10.1021/acs.est.3c10375

concentrations below detection, the highest treated effluent concentration was 42 ng/L, which is less than half the reported LC50 for coho salmon (LC50 = 95 ng/L).

USTMA believes that incorporating recent reference to studies such as those provided above would provide additional clarity as to the mitigation options and their efficacy, ensuring that permittees have access to the latest and most relevant scientific data to guide their stormwater management practices.

USTMA appreciates the opportunity to comment on the draft 2025 ISGP. The association looks forward to continuing its work with Washington Ecology and other partners on issues related to 6PPDQ in the environment. Please contact me with any questions about these comments at sschlea@ustires.org or 1-202-682-4836.

Respectfully Submitted,



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