LOI # 16

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Organization: King County Water and Land Resources Division

Study Title: Testing Efficacy and Feasibility of Tire Particle Collectors to Mitigate Tire Wear Emissions from Fleet Vehicles

Which topics from the SWG's priority list (Appendix A) do you propose to address?

Permits #1, Source Control #4. Rationale: This study would pilot a new potential BMP for tire wear and 6PPDQ source control (Permits #1). In this pilot we will quantify the mass and particle characteristics of the collected tire particles (Source Control #4). We will compare the mass of collected tire particles to the change in tire weight over the course of the study to calculate emissions reductions and determine whether these collectors mitigate any additional tire emissions beyond what is generated by the vehicles with the pilot devices (Permits #1). This pilot will address the data gap of tire wear particle emissions rates of typical fleet vehicles in our region. This data could be used to improve models that estimate 6PPDQ hotspots based on traffic data, by providing locally relevant tire wear estimates. These models will be useful in identifying at risk areas and prioritizing treatment, like bioretention. (Source Control #4).

What type of project is being proposed?

BMP effectiveness pilot test

Short description of the proposed project

Tire wear is a complex source of contaminants including 6PPDQ, heavy metals, PAHs, and rubber additives. It is also a major source of microplastics. To address the pollution problems associated with tires, we will need to implement source control beyond a 6PPD alternative. In this project we will pilot test retrofit devices for vehicles that capture tire wear emissions. This technology exploits the electrostatic charge of friction-generated tire particles to collect them while driving. We would like to pilot these devices on several King County Fleet vehicles. This technology could be used by regional permittees to mitigate the release of tire wear particles from agency vehicles, thus reducing stormwater pollution and improving air quality. It could also be a future source control BMP for commercial and transit fleets. This pilot would assess the mitigation effectiveness of this technology by quantifying the mass of tire particles

generated by each vehicle and the amount collected by each device. We would also evaluate the technology's feasibility and scalability for permittees in terms of cost, level of effort for implementation, maintenance, and worker safety.

This pilot will provide locally relevant tire wear emissions rates, which feed into models that estimate 6PPDQ hotspots and help prioritize treatment. The study will also provide material for laboratory toxicity studies and directly start mitigating tire wear in the environment. We would target testing on routes where mitigation would yield the greatest benefit, such as traffic corridors with health disparities, nearby salmon habitat, and areas without stormwater treatment.

What type of information will be collected or analyzed for this proposed study?

Vehicle tire emissions

- Total tire mass loss over the pilot
- Tire wear emission rate (mg/mile)

Collected material

- Total mass collected (mg)
- Composition of the material collected (% tire and road wear particles, break wear, and organics by weight)
- Particle size distribution
- Tire and road wear particle capture rate (mg/mile)
- Additional factors affecting collection rates such as rainfall, temperature, and driving distance.

Feasibility

- Labor hours required for maintenance per vehicle per miles driven
- Required maintenance steps
- Cost estimates for scaling the technology across agency vehicle fleets

What are the anticipated measurable outcomes and key deliverables that will be produced by the proposed study and how will they be used by Permittees and the Washington State Department of Ecology?

- Tire particle collector effectiveness (in terms of total mass collected, and % of emissions mitigated)
- Tire particle emission rates for tested vehicles
- Amount of tire wear mitigated over the course of the pilot
- Report on effectiveness, tire particle characteristics, and feasibility for scaling across fleets

List the permittees or agencies you are proposing to coordinate with.

Seattle Public Utilities and City of Bellevue have agreed to partner with us on this project. They would be part of the project scoping, learning about the tire particle collector design, installation, and maintenance processes. Their input will help us identify opportunities and challenges for using these devices in fleets beyond King County. Their input will be incorporated into final reporting on this project.

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