

Focus on: 6PPD-quinone Sampling



Ecology scientists collect water samples to study toxic chemicals transported to waterways by urban runoff.

Study Design Considerations

Why sample?

- The study objective will drive the when, where, who, and how to sample.

Where to sample?

- Size of stream, accessibility (steep slopes, private vs. public property, safety, and visibility to avoid vandalism and theft), flow, mixing rates, sampling duration, and proximity to suspected point or non-point sources will help determine where you sample.
- Mapping and modeling are great tools to identify where to sample.

When to sample?

- 6PPD-quinone (6PPDQ) occurs during storm events and, depending on the watershed characteristics, may only persist in the water column for a few hours, so grab samples need to be timed just right to detect the contaminant.
- Understanding the life history of the vulnerable species of interest helps determine when to sample.

How to sample?

- Objectives, feasibility, and resources will determine the most appropriate sampling method.
- There are many sampling strategies to consider. Pros and cons are described in the following sections.
- Utilize technical guidance resources when available.
- Collaborate with local partners.
- Quality assurance and data validation level should meet the study goals.

Safety Tips

Personal protection	<ul style="list-style-type: none"> 6PPD and 6PPDQ are hazardous substances. Use gloves and safety glasses to prevent direct contact. Print and review the material safety data sheets.
Road safety	<ul style="list-style-type: none"> Carry road safety equipment and follow roadside safety procedures.
Fieldwork safety	<ul style="list-style-type: none"> Safety vests, lines, personal flotation devices (PFDs), first aid kit, etc.
Communication	<ul style="list-style-type: none"> Carry radio or cellular devices, upload a field plan, and have a shore contact and emergency contact information on person.
Buddy system	<ul style="list-style-type: none"> Follow the buddy system in case of an emergency.

Preparation and Sampling

Project Plan	<ul style="list-style-type: none"> Have an approved quality assurance project plan (QAPP) on hand and follow the proposed procedures as closely as possible. Collect quality control samples for each sampling event, including field blanks and duplicates.
Intent to Sample	<ul style="list-style-type: none"> Notify the intended lab of your intent to sample, get the necessary sampling supplies, and follow their sample management procedures, including labeling, storage, and transport. Follow EPA Draft Method 1634¹
Field training	<ul style="list-style-type: none"> Field staff should be trained in standardized operating procedures to support safe, quality data collection and avoid the spread of invasive species.
Field Equipment	<ul style="list-style-type: none"> Procure and prepare necessary field equipment, transportation, and supplies.
Site Access	<ul style="list-style-type: none"> Request access to private land and bring gear to safely access sites, such as manhole hooks, ropes, flashlights, work lights, and brush-clearing tools.
Sample Transport	<ul style="list-style-type: none"> Keep samples on ice in a cooler or container to avoid light exposure. Arrange for sample storage and transport to ensure timely arrival and extractions within the 14-day hold time.
Sample Container	<ul style="list-style-type: none"> Use an amber glass bottle to minimize loss of 6PPDQ. Use 250 mL volumes when possible to allow for whole bottle extractions. Rinse 3 times and minimize head space. High-density polyethylene (HDPE) can be used for short periods of time if needed.

¹ https://www.epa.gov/system/files/documents/2024-01/draft-method-1634-for-web-posting-1-23-24_508.pdf

Collection Method Considerations

GRAB Sampling

- Simplest discrete sample collection method.
- Requires minimal equipment and training.
- Effective for slower-moving waters with longer retention times.
- Represents a snapshot in time and needs to be timed just right to capture the storm or pollutant peaks.

ACTIVE Sampling

- Program options include a combination of time-weighted, flow-weighted, composite, and interval sampling.
- Sampling can be started manually or remotely with user-defined parameters.
- Autosamplers should be set to rinse and purge tubing.
- Increases the chance of capturing the pollutant peak.
- Requires more equipment and specialized training.
- Polytetrafluoroethylene (PTFE - Teflon) lined tubing is preferred to minimize the loss of 6PPDQ; short sections of silicone tubing are all right for the peristaltic pump.
- Minimize the amount of tubing used and keep it out of direct light.

PASSIVE Sampling

- Good for provisional toxics screening to focus more intensive sampling efforts. Great tool for source identification by providing comparative time-weighted mass loading estimates.
- There are two main types of passive samplers: 1) accumulative and 2) equilibrium based that mimic bioavailable 6PPDQ.

BIOASSAYS

- Invertebrates, fish, and periphyton are commonly used as indicators of water quality health and to assess exposure risk.

Related Information

- [6PPD & 6PPD-quinone – Interstate Regulatory Technology Council²](https://6ppd.itrcweb.org/)
- [6PPD - Washington State Department of Ecology³](https://ecology.wa.gov/6PPD)
- [Tire Contaminants – Story Map⁴](https://gis.ecology.wa.gov/portal/apps/storymaps/stories/53b11807ac124735b281872a514809b5)



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² <https://6ppd.itrcweb.org/>

³ <https://ecology.wa.gov/6PPD>

⁴ <https://gis.ecology.wa.gov/portal/apps/storymaps/stories/53b11807ac124735b281872a514809b5>