Fact Sheet

Moss Sampling Procedures Using Portland as a Study Area

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Department of Environmental Quality

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Background

The Oregon Department of Environmental Quality partnered with the U.S. Forest Service in 2013 on a moss sampling study to determine if moss could be used as an indicator of air quality.

Data from this initial moss study showed potentially elevated levels of air toxics in several Southeast Portland neighborhoods. DEQ deployed temporary air monitors that confirmed what the moss data suggested—there were elevated levels of air toxics in these areas.

The results indicated moss could be used as a screening tool to identify areas needing follow-up air monitoring. However, little is understood about how pollutant concentrations found in moss relate to concentrations in the air.

DEQ laboratory staff collecting moss.

How moss sampling differs from air monitoring

Traditional air quality monitoring can be expensive and time consuming. It requires equipment to be set up at a location, powered, and maintained, and then the raw technical data must be analyzed.

In comparison, moss is naturally present around Oregon. Moss is passively exposed to air all the time, making it an excellent candidate to employ as a screening tool to identify areas needing follow-up air monitoring.

Despite its many positive attributes, moss sampling cannot completely replace traditional air monitoring. This is because the pollutant concentrations measured in moss do not equate directly to air concentrations. Therefore, concentrations in moss cannot be used in comparison to established benchmarks or screening levels that DEQ uses to evaluate the potential risks of pollutants found in air.

The U.S. Forest Service is currently undertaking additional research to evaluate the relationship between moss concentrations and air concentrations.

Building capacity for moss sampling

The DEQ laboratory conducted a study in 2017 based on the U.S. Forest Service sampling and analysis protocols. The purposes of this initial study were to:

- Develop the sampling protocols and analysis methods to collect and process moss samples at DEQ's lab.
- Determine how concentrations of metals found in samples collected by DEQ compared to concentrations found in U.S. Forest Service samples.

DEQ's moss sampling study: 2017-2018

DEQ collected moss samples in 2017 from a total of 10 sites: eight urban sites previously sampled by the U.S. Forest Service and two rural sites not previously sampled.

What the study showed

Concentrations of metals in moss were higher in more industrialized urban areas and lower in rural areas. Data also indicated that concentrations of metals in moss can vary greatly over short distances.

DEQ also achieved the main goals of the study: to validate field sampling and analytical methods initially deployed by the Forest Service. This validation occurred by comparing DEQ data and methods with those in the Forest Service study.

The exact relationship between levels of pollutants found in moss and atmospheric concentrations of pollutants remains unknown. Additional investigations into seasonal effects,

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life history, growth rate, and uptake rate are warranted.

However, DEQ's 2017-2018 study indicated moss sampling may be a useful, cost effective tool to identify areas to focus traditional or expanded air monitoring efforts.

For more information

Read the full report, *Evaluation of Moss Sampling as a Methodology for Evaluating Air Toxics, Using Portland as a Study Area* at https://www.oregon.gov/deq/aq/air-toxics/Pages/default.aspx

Alternative formats

Documents can be provided upon request in an alternate format for individuals with disabilities or in a language other than English for people with limited English skills. To request a document in another format or language, call DEQ in Portland at 503-229-5696, or toll-free in Oregon at 1-800-452-4011, ext. 5696; or email deqinfo@deq.state.or.us.