

Monitoring Air Quality for Environmental Health

Why Passive Samplers?

- Easy to use
- Inexpensive
- Noninvasive
- Passive device; does not require power source
- Personal or environmental monitoring use

Why RTI?

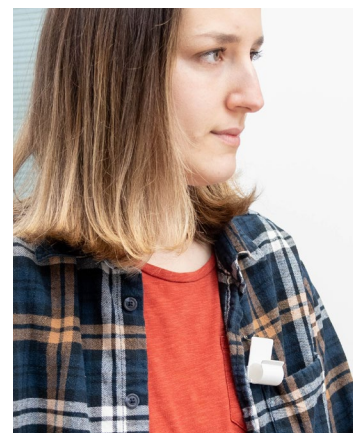
RTI International has dedicated and experienced staff who provide support by designing study plans, sampling supplies, and offering lab-quality cleaning and loading. We conduct instrumental and data analyses and offer reliable, fast service.

How Do They Work?

Passive samplers collect and analyze gaseous nitrogen oxides, nitrogen dioxide, sulfur dioxide, ozone, and ammonia. Following is a summary of how the samplers work:

- Each analyte has a pad with a different coating designed to collect the specific analyte. A passive sampler is loaded with a coated pad for the specific analyte.

- The sampler is clipped to a person's outer clothing to conduct personal monitoring or hung from a shelter to obtain a sample for environmental monitoring.
- Gas molecules diffuse into the passive device via concentration gradient and are absorbed into the pad thanks to the analyte-specific coating.
 - This collection of gas molecules occurs during an exposure time that can range from 24 hours to 2 weeks, depending on the anticipated concentration. For example, a sample obtained near the source of the analyte being analyzed will require less time to obtain an adequate sample.
- The pads are then extracted in water and measured by ion chromatography. After analysis, ion chromatography results are converted to a mass loading value. The final gas concentration is determined by dividing the mass loading by the total exposure time. Other factors that may impact these measurements include wind velocity, radiation, pressure, temperature, and relative humidity.



Impact Story

The Clean Air Act has helped to improve air quality in the United States over the last 30 years. Although some areas of the country have made significant progress in their air quality, many other metropolitan areas have not. Poor air quality needs to be addressed in these urban areas, which are home to disproportionate populations of individuals from both ethnic and racial minority groups.

Numerous short- and long-term negative health effects, such as respiratory illness and the development of asthma, are linked to air pollution exposure. Many cities are aiming to address these environmental inequities by developing sustainable solutions to create cleaner environments. The first step toward this process is using passive samplers, which provide a solution for measuring air pollution over time across an array of geographic areas.

Passive samplers are small devices that contain polypropylene vessels that hold collection pads. These pads absorb surrounding chemicals over a desired period and then are analyzed to provide information about the environment that they were deployed in. These samplers can be attached to clothes to measure personal exposure or can be fastened under shelters to monitor indoor as well as outdoor air quality. The samplers are easy to use for community-based studies and require no maintenance because they are activated as soon as the sealed packaging is removed.

RTI has 3 decades of experience in this field through providing passive sampler analysis and expertise with a variety of collaborators. We partner with Ogawa USA as well as various other federal and private entities that are interested in addressing clean air inequities. Notably, RTI works with the New York City Community Air Survey by providing and analyzing passive samplers to support New York City's clean air initiatives. Overall, we aim to provide a way for cities to analyze air pollutant trends and to develop sustainable air quality solutions through data collected via the use of passive samplers.

More Information

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Case Study: Addressing Environmental Injustices

Passive samplers are used to support health studies addressing environmental injustices. Researchers across the globe conduct personal monitoring of children and adults who live near roadways and industry, providing awareness to policy makers about injustices and work needed to control emissions and keep everyone safe.



Case Study: Exposure of Pollutants in Pregnancy

Passive samplers are used to support studies that measure women's exposure to pollutants during pregnancy to assess the impact of excessive exposure to infants.



Case Study: Efficacy of Counter-Pollutant Drugs

Passive samplers are used to evaluate the efficacy of new drugs designed to counter the effects of excessive air pollutant exposure.



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RTI International is an independent, nonprofit research institute dedicated to improving the human condition. Clients rely on us to answer questions that demand an objective and multidisciplinary approach—one that integrates expertise across the social and laboratory sciences, engineering, and international development. We believe in the promise of science, and we are inspired every day to deliver on that promise for the good of people, communities, and businesses around the world. For more information, visit www.rti.org.

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