

Preparing for Personal Air Sensors – State and Local Air Quality Agencies on the Frontlines of Citizen Science: November 2017 EM Magazine Article



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An article titled *Preparing for Personal Air Sensors: State and Local Air Quality Agencies on the Frontlines of Citizen Science* (“Article”) has been published in the November 2017 edition of EM magazine.

The co-authors of the *Article* include:

- Stuart Spencer, Deputy Director, Office of Air, Arkansas Department of Environmental Quality/Association of Air Pollution Control Agencies (“AAPCA”) 2018 President
- Jason Sloan, Policy and Membership Associate at AAPCA
- Sean Alteri, Kentucky Division for Air Quality, 2017 AAPCA President

By way of introduction, the authors cite the public’s interest in what are described as “low-cost” personal air sensors and state:

With their on-the-ground experience, proximity to the public, expert personnel and ability to interpret current air quality information, state and local air agencies are uniquely situated to help address technological and communication issues surrounding the increased use of low-cost personal air sensors. The Association of Air Pollution Control Agencies (AAPCA) has worked closely with its member agencies, as well as the U.S. environmental Protection Agency (EPA), over the last two years to better understand these sensors and develop tools to help facilitate proactive community engagement.

The perception of what constitutes a “personal sensor” can vary. What is characterized as a consensus description was incorporated in an AAPCA fact sheet. The authors note:

Low-cost and portable air sensors may have varying definitions. Personal air sensors may not meet the stringent standards established for monitors operated by state, local or federal agencies and monitoring data used to inform compliance with National Ambient Air quality Standards (NAAQS). An emerging technology, personal air sensors are sensing devices for air pollution that are designed to provide short-term information regarding an individual’s immediate environment. Quality assurance and quality control measures may not exist for personal air sensors or their data, and the result may be questionable data quality and a high variability between instruments.

“Recent Developments” are stated to underscore public interest in personal air sensors and the need for state and local air agencies to address these issues. By way of summary, they include:

- Public information provided by EPA described as an Air Sensor Toolbox for Citizen Scientists, Researchers and Developers and Air Sensor Guidebook
- National Advisory Council for Environmental Policy and Technology
- Congressional Legislation/Citizen Science Provisions of the American Innovation and Competitiveness Act
- Queries to state/local air agencies

The authors describe AAPCA initiatives that have been undertaken to improve both understanding and communication in regards to personal air sensors. These actions have included establishment of an AAPCA “Personal Air Sensor Work Group” and time spent on the issue at AAPCA meetings.

“Opportunities” related to personal air sensors are stated to include:

- Classroom/citizen science applications
- Better understanding of air quality and the Clean Air Act
- Augment regulatory networks/detect pollution hotspots
- Identify air quality trends

In terms of public education, the authors state that favorable EPA reports on improvements in air quality have not been recognized by the American public. They suggest that inquiries about personal air sensors (and increased public awareness as a result of these technologies) “offer an opening for air agencies to provide important information to their constituents about monitoring technology, the Air Quality Index, and the basis for standards under the Clean Air Act.”

Limitations associated with such sensors are also addressed. It is suggested that laboratory and field testing suggests many low-cost sensors cannot compare to monitors used for regulatory purposes by air agencies. Potential limitations cited by an AAPCA fact sheet includes:

- Possible inability to establish quality control and quality assurance measures and nonconformance to quality assurance documents established by EPA or other regulatory agencies
- Production of questionable data quality and data that might not correlate with Federal Reference Method for Federal Equivalent Method monitors used for regulatory purposes
- Display of air quality information differently than those data used by air agencies (citing as examples averaging time, units of measure, level, exposure, and method)
- Difficulty relating short-term measurements from such sensors (which may be for a second or a minute) to health effects of air pollution evaluated on the basis of an hour or day of exposure
- May not be operated in ambient conditions or by siting requirements in accordance with 40 CFR Part 58 (Appendix E)
- Diminished accuracy from humidity, temperature, transitioning from indoors to outdoors, as well as cross sensitivities to other gases
- Absence of geographical information and documentation necessary to ensure consistent and comparable data
- Need for regular calibration and subject to drift and decreased sensitivity over time
- High variability between instruments

[A copy of the article can be downloaded here.](#)