Movable Monitoring Platform Development to Augment Citizen Science

Ted Allen, Betsy Frey, Charles Sarnoski, and Keith Hoffman

Delaware Department of Natural Resources and Environmental Control (DNREC): Division of Air Quality (DAQ)

Background and Approach

Local community groups have become more involved in assessing air pollution impacts, including the use of citizen monitoring projects. Delaware DNREC Division of Air Quality (DAQ) recognized a need to respond to community concerns with additional monitoring that can represent more localized scientific data without expanding the existing fixed ambient monitoring network. Faced with limited resources to address increasing demand for monitoring data, Delaware DAQ developed a Movable Monitoring Platform (MMP). Major issues for implementation included the possible physical configurations, access to electricity, data communication, platform mobility, and security.

Design and Implementation

The resource developed by DE/DAQ consists of a repurposed 2004 Ford E-450 van formerly used by another agency.

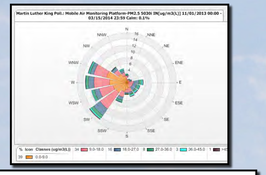
Physical modifications include:
- Installation of Federal Reference Method (FRM) and Federal Equivalent Method (FEM) continuous monitors for multiple criteria pollutants
- Wind speed/wind direction instrument
- Partisol Particulate Matter (PM) monitor to complement the continuous rack-mounted PM FEM monitor.
- Gas Chromatograph for Volatile Organic Compounds (VOCs)
- Other monitors can be switched out or added depending on the needs of the specific project

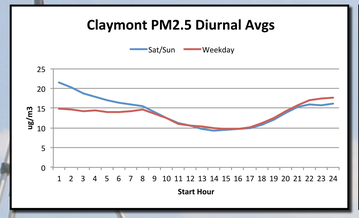
The MMP operates off a local 120VAC 50 Amp source, with an onboard 7Kw generator available for short-term maintenance & demonstration (not for monitoring). Envidas Ultimate, used elsewhere within the Delaware ambient monitoring network, was installed for real-time retrieval of 5 minute, 15 minute, and hourly average data from the continuous monitors.

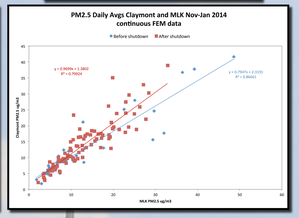
Field Study – Claymont, DE

The initial deployment of the movable platform was adjacent to a steel plant in Northern Delaware. After evaluating several possible sites, the parking lot of a retail center in the predominant downwind direction of the plant was selected. Businesses and local community groups were supportive of the project and the location. Site security was initially a concern, particularly since it was not fenced; no negative repercussions were encountered.

Data Examples







Outcome of Initial Deployment

The continuous monitors generally performed as expected; limitations were related to interior space and monitoring inlet design. There were some issues with the aethalometer though these were generally matters related to a new instrument. The cellular-based data collection system worked well and performed in real-time, as do the other monitoring stations in the network. Overall data quality was documented adequately and will be evaluated in the final report.

Recommendations

Before beginning this type of effort, a well-defined purpose for the monitoring platform including the kinds of information to be gathered, as well as the data's applicability, to an identified concern, should be developed. A clear plan covering the likely deployment paradigms should be agreed upon by both the development and operational teams and documented as such.

A good understanding of all operational aspects including siting, staffing, security, data handling, telecommunication, mobile installation specifics, and monitoring equipment is necessary for success.

Links: www.dnrec.delaware.gov/Air/Pages/Default.aspx www.dnrec.delaware.gov/Air/Pages/MAMP.aspx www.dnrec.delaware.gov/Air/Pages/Air-Quality-Monitoring-Homepage.aspx