

## Preparing For The Imminent Rise Of Citizen Science

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The rise of citizen science will pose major challenges to industry in environmental permitting, compliance, enforcement and risk management. Fueled by advances in information and monitoring technologies, adapted by a public that is concerned about its “personal environment,” and fostered by the U.S. Environmental Protection Agency, citizen science is starting to generate data that does not fit easily into the traditional environmental compliance and risk management model.



Delmar R. Ehrich

### Advances in Information and Monitoring Technology

The EPA blandly describes citizen science as “projects and programs that engage the public in scientific investigations, such as asking questions, collecting data and interpreting results.”[1] In that sense, citizen science is not new; after all, members of the public have long volunteered to assist or be subjects in university or government studies.

What is new is that advances in information and monitoring technologies increasingly put portable, small, lower-cost monitoring devices into the hands of individuals or groups interested in air or water quality in their personal environments.[2] Indeed, some are attached to smart phones.[3] Data collected by individual devices can be sent to a central database, where this “crowd-sourced” data can be aggregated and evaluated.[4]

### The EPA Fosters the Development and Use of Citizen Science

The EPA has developed “tool boxes” to provide interested citizen users with resources to collect, analyze, interpret and communicate environmental data.[5] For example, the EPA has developed the “Air Sensor Toolbox for Citizen Scientists,” which includes information about sampling methodologies, calibration of monitoring devices, and interpretation of data.[6] The EPA recently trained citizen scientists from each of the 10 EPA regions on the use of this toolbox and best practices for conducting community air monitoring.[7]

Recognizing that the quality of data from small, portable monitoring devices is not (yet) typically of the same quality as compliance data from continuous emission monitoring and other devices, the EPA also works with technology developers to meet the stringency required to provide credible data and to make these lower-cost alternatives to traditional monitoring more acceptable to scientists and engineers.[8]

The EPA provides grants to enable communities to collect their own environmental data for use in

evaluating local environmental conditions, such as high rates of asthma in industrial neighborhoods.[9]

### **Enabling Communities to Monitor Environmental Conditions**

Nongovernmental organizations and community activists have always had the legal authority to threaten or bring citizen's suits. However, doing so typically involves a large (and limiting) expenditure of resources, particularly to parse voluminous monitoring reports or gather their own data.

The EPA's next generation compliance strategy aims to put compliance information directly into the hands of the community, through advance monitoring, real-time reporting requirements and other "transparency" measures.[10] The EPA will incorporate these strategies in all enforcement actions in fiscal years 2017 through 2019.[11]

Emission sources and related control and monitoring equipment often are within facility boundaries, where citizen science devices don't reach (and likely do not yet generate data equivalent to static compliance monitors.) Recent enforcement actions[12] and regulations suggest that the EPA seeks to move compliance points to the "fence line" of facilities, where communities may be better able to collect their own data using new portable air monitoring devices.[13] Some within the EPA advocate for designing rules to support citizen monitoring.[14]

### **New Tools to Assess Risk From Local Sources of "Pollution"**

The EPA is developing several risk screening tools, including the Community-Focused Exposure and Risk Screening Tool (C-FERST), which is a geographic information system and resource access web tool designed to support community partners making decisions to reduce pollution and minimize exposures. Future versions may include "ongoing human exposure science." [15] It will be available to the EPA and its community partners (although the EPA has not announced plans to make C-FERST available to the regulated community.) [16]

One major hurdle for plaintiffs in "toxic tort" lawsuits by neighbors of industrial facilities is the legal requirement to demonstrate exposure to an injurious agent in sufficient concentration to cause personal injury or property damage. If C-FERST aggregates existing emission data and provides relevant "exposure science," those hurdles may be reduced.

### **Citizen Science Will Change Environmental Risk Management**

States and localities will likely be burdened by having to evaluate the data collected by citizen scientists to determine if the information is credible and whether some state or local action is necessary. A business suggested to be contributing to elevated risk in an area, based on crowdsourced data, will be burdened in determining whether it is credible — it will be difficult to test whether the data are accurate, unbiased and reproducible, and what, if anything they mean about risk to human health.

Citizen science data may eventually undermine the existing permit system of environmental compliance based on emission limits, measured by static emission monitoring devices. It may lead to additional regulation to prevent poorly defined "effects" beyond facility boundaries.

Nuisance and other toxic tort lawsuits may be easier to bring, based on more available data purporting to demonstrate that neighbors and others have been exposed to contaminants.

## What Can Companies Do to Prepare?

Companies should monitor developments in analytical devices and EPA tool boxes for such devices. The EPA has been very open about its efforts to foster citizen science. At a minimum, a qualified environmental engineer or other professional should monitor the EPA's activities and announcements.

It may be prudent, however, for other companies to engage in a more thorough, privileged evaluation. Such companies might include those with significant air emissions or waste water discharges, facilities that already have neighborhood complaints about emissions, or those with facilities in communities identified as overly burdened from an environmental justice standpoint. Legal counsel should direct a privileged evaluation by qualified professionals regarding how such citizen science devices might be used around company facilities, what they might show, how that data compare to compliance monitoring data, and how the company might respond to complaints based on such data.

Monitor what the EPA is doing with respect to citizen science. Has it made grants to any community groups to conduct citizen science projects that might be directed at company facilities? Is there anything in the EPA's various screening and mapping tools about a company facility?

Track what the EPA is doing with next generation compliance enforcement actions and settlements, and in particular whether the EPA utilized citizen science generated data. This is a low-cost way to anticipate what the EPA might next seek as best practices or requirements for your industry, such as transparency with affected communities, fence line monitoring, and new compliance requirements.

Based on these evaluations, companies should review, and, if necessary, revise their existing environmental management and compliance plans. Companies should also evaluate their communication plans. How do we communicate with the regulators, the public, customers, employees and other constituencies about whether conditions are safe? Do we need to do more to engage our communities about what we do, and how we manage those operations?

## Conclusion

Citizen science is developing rapidly. Companies will confront information about their facilities, the provenance and accuracy of which will likely be unclear. Preparing now is prudent. Accurate and timely communication with the public about environmental and public health conditions at company facilities will be critical.

—By Delmar R. Ehrich, Faegre Baker Daniels LLP

*Del Ehrich is a partner and leader of the environmental practice area at Faegre Baker Daniels' in Minneapolis.*

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[1] <https://www.epa.gov/sites/production/files/2014-09/documents/citizen-science-fact-sheet.pdf>

[2] <http://aircasting.org/>

[3] <http://www.smithsonianmag.com/innovation/with-wearable-devices-that-monitor-air-quality-scientists-can-crowdsource-pollution-maps-180954556/?no-ist>

[4] <http://aircasting.org/> for “Aircasting” in which data from individual AirBeam users is aggregated.

[5] <https://www.epa.gov/air-research/air-sensor-toolbox-citizen-scientists>

[6] <https://www.epa.gov/air-research/air-sensor-toolbox-citizen-scientists>

[7] <https://www.epa.gov/air-research/community-air-monitoring-training>

[8]

[https://cfpub.epa.gov/si/si\\_public\\_record\\_report.cfm?dirEntryId=277270&simpleSearch=1&searchAll=sensor+evaluation+report](https://cfpub.epa.gov/si/si_public_record_report.cfm?dirEntryId=277270&simpleSearch=1&searchAll=sensor+evaluation+report)

[9] [https://www.epa.gov/sites/production/files/2015-03/documents/citizen\\_science\\_toolbox\\_ironbound\\_community\\_fact\\_sheet.pdf](https://www.epa.gov/sites/production/files/2015-03/documents/citizen_science_toolbox_ironbound_community_fact_sheet.pdf)

[10] <https://www.epa.gov/compliance/next-generation-compliance>

[11]

<https://yosemite.epa.gov/opa/admpress.nsf/0/25662047ebab45a085257f5d0071b4a0?OpenDocument>

[12] See BP Whiting Consent Decree, which required company to install and operate a fence line monitoring system for benzene and to report results to a publicly-accessible website.

<https://www.epa.gov/enforcement/bp-whiting-settlement-flaring>

[13] See EPA’s Petroleum Refinery Sector Risk and Technology Review and New Source Performance Standard Rule, which, among other things, requires continuous fence line monitoring of benzene concentrations. 80 Fed. Reg. 75,1777 (Dec. 1, 2015)

[14] Hindin and Silberman, Designing More Effective Rules and Permits, *The George Washington Journal of Energy and Environmental Law*, Spring 2016, volume 7 No. 2, at 113

[15] [http://www.cumulativeimpacts.org/documents/C-FERST\\_Qs&As\\_1-5-2011.pdf](http://www.cumulativeimpacts.org/documents/C-FERST_Qs&As_1-5-2011.pdf)

[16] <https://www.epa.gov/healthresearch/community-focused-exposure-and-risk-screening-tool-c-ferst>