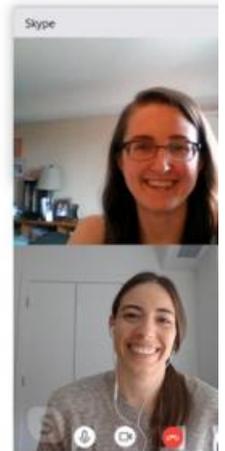


Air Pollution & Health Effects

Prepared for *Skype a Scientist*



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A Local Community Needed a Scientist. A Dynamic Fellow Duo Answered the Call.

Monday, July 20, 2020

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A Fresh AAAS STPF Candidate: Dr. Erin McDuffie (@atmosph_erin).

Erin: Rewind to late April, Finalist Interview Week for the [AAAS Science and Technology Policy Fellowship](#) (STPF). It was Monday afternoon and my first virtual interview had just ended with staff from the Office of Environment at the Department of Defense. Going into the week, I wasn't sure what to expect. One, because this was the first year that all finalist interviews were conducted remotely and two, because I was anxious to see how my background and interests in air quality matched with this year's positions. I was particularly surprised when I received an interview request from the Department of Defense and was certainly relieved that this first interview had gone well. At least as well as a 45-minute conference call with six strangers could have gone. First-year

fellow, Andrea Hindman was one of those six strangers. Little did I know then, just how soon again our paths would cross.

A First-year Fellow's Network Casts a Wide Net: Dr. Andrea Hindman (@andrea_hindman).

Andrea: I felt helpless in the throes of a pandemic. I had close friends from graduate school volunteering in coronavirus testing labs, and my husband and I were struggling to adjust to life working from home with our new co-worker, my 2.5-year-old son. I was reaching for anything to allow me to do my part in the global response. It was at this point that I read about the experience of a colleague doing [Skype a Scientist](#) in the [Spring newsletter](#) for my professional society's Women in Toxicology special interest group. Skype a Scientist was founded in 2017 by then graduate student, Sarah McAnulty (@SarahMackAttack), to match scientists with classrooms everywhere. Great! Signing up was easy and I could ease the pressures on teachers scrambling to develop remote content for students. My first assignment was fun and expected—I got matched with a 7th grade class and answered questions on a range of topics relating to environmental health science.

My second assignment, however, was unexpected—a local community in Ashtabula, Ohio was reaching out to better understand the health and environmental impacts of a new facility expected to generate air pollution in their city. They even shared the facility permit with me, provided by the Ohio Environmental Protection Agency (EPA). I felt totally comfortable covering lifespan health effects and exposure science. However, the specificity of their questions about measuring air pollution and aspects of study design felt a bit out of my league. Do I decline the invite? Do I offer the expertise I have and leave them mostly empty-handed for the air quality and measurement piece? I want to make clear that scientists don't have all the answers, but we usually can figure out how or where to go, to find them. I thought of Erin, whom I had the pleasure of interviewing a week earlier, right away!

The Dynamic Scientists Join Forces.

Erin: Fast forward two weeks. I had survived (and hopefully thrived!) an intense week of Zoom calls and a nerve-racking fellowship placement process, both of which were somehow simultaneously exhausting and invigorating. My inbox finally started to quiet down, so I was intrigued to see a new message pop-up from Andrea. She had remembered my interview and was wondering whether I would be willing to help her with a presentation for the Skype a Scientist program.

I had heard of Skype a Scientist before and based on Andrea's email, it was quickly clear that we both share a passion for science communication (not surprising for AAAS policy fellows!). I was initially expecting Andrea to have been matched with a student group and was surprised to learn that she had actually matched with an adult nonprofit group concerned with the quality of their local air. I knew that Andrea's Ph.D. was in molecular biology, with a focus on connecting environmental exposures to disease risk. I have since learned that she also has postdoctoral research experience with the nonprofit [Silent Spring Institute](#), focused on human biomonitoring, toxicology, and community-based research in partnership with the [Social Science Environmental Health Research Institute](#) at Northeastern University. I, on the other hand, have a Ph.D. in atmospheric chemistry from the University of Colorado, Boulder and have spent the last seven years as a graduate student and postdoctoral research fellow studying sources of air pollution using measurements from airplanes and computer models. I definitely haven't had many opportunities to dig into the details of technical facility permits, but I decided to jump on this opportunity for a new experience that would put my Ph.D. skills to work, strengthen my connection with a current fellow, and help a community in need.

A Community Needed Scientists.

Ashtabula County is home to over 100,000 residents and lies roughly 60 miles northeast of Cleveland along the shores of Lake Erie. While Ashtabula may be known for its nineteen covered bridges (including both the longest and shortest in the U.S.), the county also has a long history of environmental pollution. Ashtabula is home to the Fields Brook site, which was placed on the [National Priorities List \(NPL\)](#) of hazardous waste sites (i.e., Superfund sites) in 1983. [Up to nineteen individual facilities have operated at this site since 1940](#) and have been documented to have released hazardous carcinogens into the Fields Brook, including polychlorinated biphenyls (PCBs), polycyclic aromatic hydrocarbons (PAHs), and heavy metals. These historical releases have led to the [broader contamination](#) of the Ashtabula River, the Harbor in the city of Ashtabula, and the surrounding area. Various remediation and restoration projects have been ongoing since the site was placed on the NPL in 1983, [with work continuing today](#).

Ashtabula County also has a higher mortality rate for both breast and lung cancers compared to the Ohio average, according to the [Ohio Cancer Incidence Surveillance System's 2020 Annual Cancer Report](#). Some residents suspect that this higher cancer mortality rate is tied to Ashtabula's legacy of environmental pollution. Ashtabula County also neighbors a region to the west, which [does not currently meet National Ambient Air Quality Standards \(NAAQS\) for ozone](#), a known hazard to human health and the environment. Ashtabula County itself does not currently violate any air pollution standards, but only has one official air quality monitor in the entire county.

Based on the county's history, it's not surprising that members of the [Ashtabula County Water Watch](#) were concerned when they recently learned about the proposed development of a new large production facility, slated for Ashtabula Harbor. The Ashtabula County Water Watch is an all-volunteer group of community residents, working together since 2012 to address issues related to water quality, ecosystem health, and the well-being of rural and urban communities. In line with this commitment, Water Watch members have been actively engaging the Ohio EPA throughout the permitting process for this new facility.

In May, the Ohio EPA held a virtual public hearing to go over the facility's draft permit application. The facility is proposing to annually produce over 500,000 tons of pig iron, which is an intermediate in the iron industry, produced by smelting iron ore and used to produce steel. According to the permit, the operations at the new facility are allowed to release up to 391,357 tons of greenhouse gases (CO₂ equivalent) each year. For comparison, the sum of all U.S. activities released a total of [6,667 million metric tons of greenhouse gases \(CO₂ equivalent\) in 2018](#). This new facility is also allowed to annually release over 500 tons of other chemical compounds into the air, which include known air pollutants that also have the potential to form ozone and fine particulate matter (PM) through secondary chemical reactions. Due to these large emission levels, the company leading the facility development is required to follow federal EPA procedures for the [New Source Review Permitting program](#), which includes an air quality modeling analysis to demonstrate that these new emissions will not produce local air pollution levels higher than current air quality standards. Due to the technical nature of these documents, the Water Watch members decided to tap the Skype a Scientist program for help understanding this permit, the air quality analysis, and the potential health risks for their community.

Empowering a Community with Scientific Knowledge.

Andrea & Erin: Drawing on our complimentary technical backgrounds and communication experiences, we tag-teamed a 1-hour Skype presentation to Water Watch members in early June. After the presentation, we provided the group with our comprehensive slide deck, including a general overview of air pollution, its sources, and its impacts on the environment and human health, including the challenges linking air pollution to specific health impacts and diseases. We also provided resources such as online visualization tools that monitor regional air quality (such as [AirNow](#)), and

references to help identify tools and strategies to be proactive about monitoring the health of their community. Erin closed the presentation with an overview of the new facility permit application, the required air quality modeling analysis, and a discussion of the results that will eventually inform the Ohio EPA's final decision on the permit approval. Shortly after our presentation, we received questions from the group about resources we had provided and felt satisfied that our curated lists had been a useful and worthwhile effort.

It turns out that we were not the first scientists to speak with Water Watch members and while the official public hearing for the permit passed in May, members hope to use their knowledge from ours and others' presentations to further formulate informed questions for the Ohio EPA. They also hope to investigate ways to collect their own air quality measurements, including buying new, low-cost air sensors to monitor local PM levels. If deployed, these may be the first publicly accessible air quality monitors in the city of Ashtabula and the first monitors for PM in the entire county.

Final Thoughts from the Fellow Duo and on Seizing STPF Opportunities During Uncertain Times.

Andrea: I'm currently confined to my 15th floor apartment near Washington longing for lost in-person meetings and AAAS STPF networking opportunities. Though my Fellowship position supporting the Department of Defense has felt like my form of activism during this tumultuous time, I wanted to do more and connect more. I am grateful for experts like Erin who say "yes." Joining scientific forces with Erin made the Skype a Scientist experience extremely rewarding, both for the community that needed a scientist and for me through a uniquely rich learning opportunity. I practiced my science communication and connected my passion and expertise more specifically to Erin's work, all while connecting with an equally passionate community organization. Seeing our science through the eyes and needs of this community gave our research experience a sense of place. This was an important reminder that fellows have the greatest impact when we ground public health research and science policy at the community-level.

Erin: I'm arriving in Washington during a time of great uncertainty and social distancing. It's easy to start worrying about whether my AAAS STPF experience will live up to all I've heard from alumni fellows (including Andrea!). Besides exercising my science communication skills, this unique opportunity to meet Andrea and collaborate with her to empower a community in need has shown me that no matter how many workdays, happy hours, or informational interviews may be virtual, the AAAS STPF program and rich fellow community will continue to provide current fellows with transformative opportunities.

We want to thank the [Ashtabula County Water Watch](#) group for inviting us into their community, and specifically thank Justin Thompson for reaching out through Skype a Scientist and proofreading this post. Thank you to Dr. Sarah McNulty (@SarahMackAttack) for recognizing the utility of virtual platforms to make science accessible broadly and starting these important and rewarding conversations between scientists and the public, through [Skype a Scientist](#).

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