Spring 2020 Newsletter

2B Technologies — 2B Buzz

We Are Open, and Accepting/Shipping New Orders

As our first article below illustrates, 2B Technologies is playing a role in the fight against COVID-19. Our instruments are also used in other areas important to public health, such as food safety and water treatment. As a result, we are designated as an essential business and we remain open. We have adjusted our procedures to protect the health and safety of our employees and the community at large, which remains our top priority. We wish everyone the best in these challenging times.

Case Study

On One of the Front Lines of the Virus Wars

2B Tech-Made Ozone Monitor is Integral to Ozone Disinfection System

Ozone has long been known to be effective in fighting viruses and bacteria. Reaching every nook and cranny, gas-phase ozone at high concentrations forms the basis for one of the techniques used to disinfect hospital rooms, surgical areas, other critical-care spaces, and in the food industry. Measuring the ozone levels both during and after fumigation is a critical aspect of the process. The ozone levels during fumigation are important to ensure the effectiveness of the disinfection; measuring the ozone levels after fumigation protects human health by determining when it is safe to re-enter the room.

A commercial instrument made by the company STERISAFE in Denmark produces high ozone to disinfect rooms such as in hospitals. An ozone monitor made by 2B Tech measures ozone during and after the process.

2B Tech's Model 108-series ozone monitor is at the heart of a commercial instrument made by STERISAFE, a company in Copenhagen that has successfully undergone the rigorous certification process for their patented ozone-disinfection units. The STERISAFE PRO is a robotic unit that both produces the ozone used during the disinfection process, and measures the room ozone concentrations throughout the process.

The company sold several units primarily for hospital use in 2019, their first year of certification. As one would expect, the company anticipates many more orders in 2020 as the battle against bacteria, viruses, and COVID-19 rages on.

Application: Ozone Disinfection

Model 108-L Ozone Monitor

Air Pollution News

An Unintended Experiment in Air Quality

COVID-19 Clears the Air Worldwide

It seems the current quarantine goes beyond people. Air pollution is also under wraps around the globe as the novel coronavirus puts the kabash on life-as-usual.

Clear skies in Los Angeles and Beijing. The Himalayas again visible in the distance in northern India. Lower pollution levels across Europe visible in the satellite data.

The Himalayas can be seen from parts of India where they haven't been visible for decades.

This is the new normal. But, it's a temporary reprieve. And of course it doesn't even remotely register as a silver lining to the global suffering and loss of life now occurring.

No doubt studies of this unintentional air quality experiment will eventually make their way into the scientific literature. Right now, though, it's data-gathering time. And we're all a part of the experiment.

Employee Spotlight

2B Tech Founder John Birks Wins Haagen-Smit Award

Career Contributions to Atmospheric Science Recognized by Award

We are proud to announce that John Birks is a recipient of the prestigious Haagen-Smit Clean Air Award, in recognition of his outstanding contributions to atmospheric science during his career. Congratulations, John!

John's many accomplishments began in the academic world, first at the University of California Berkeley where his Ph.D. research included studies on the effects of nuclear weapons testing on the stratospheric ozone layer. He expanded on that work as a professor at the University of Illinois and the University of Colorado, studying the kinetics of many reactions important in the then-emerging issue of stratospheric ozone depletion by chlorofluorocarbons.

In the 1980s, he and Paul Crutzen revisited the issue of nuclear warfare's effects on the atmosphere and they discovered that as much as 99% of sunlight could be blocked by smoke from the fires caused by a nuclear war, cooling the planet and leading to a "nuclear winter." Global leaders such as Ronald Reagan and Mikhail Gorbachev were aware of the discovery, which also became household knowledge around the world.

At the University of Colorado, John later shifted his research toward the development of analytical techniques for atmospheric studies, including a focus on making vertical profile measurements in the atmosphere using kites, balloons, and his personal aircraft. He and his research group carried out measurements around the world to characterize the atmospheric chemistry related to air quality and climate issues. This work required lightweight instruments that could be carried aloft...and set the stage for what would come next in John's career!

Building on his "first lifetime" of scientific achievements in academia, John founded 2B Tech in 1998 and began a second life of making breakthroughs in the development and commercialization of instruments for atmospheric measurements. John's keen scientific insights are the basis for the many innovations of 2B Tech's 20-product lineup for measuring ozone, nitrogen oxides, black carbon, and mercury vapor. It's also noteworthy that when he left academia, John did not lose his passion for education. At 2B Tech, he founded the nonprofit GO3 Project to bring atmospheric science into the classrooms of students in middle school and high school, work that continues today in the current AQTreks project.

The California Air Resources Board has bestowed the Haagen-Smit Clean Air Awards annually since 2001 to recognize significant achievements related to air quality and climate change. The award is named after Dr. Arie Haagen-Smit, who pioneered research on the causes of smog and is often referred to as the "father" of air pollution control. The award ceremony honoring John and the other 2019 winners, originally planned for April, will occur on a future date at CARB headquarters in Sacramento.

Award Press Release

Peer-Reviewed Publication

Model 714 NO_2/NO/O_3 Calibration Source Described in *Atmospheric Measurement Techniques* Paper

2B Tech's versatile calibrator, the Model 714 NO_2/NO/O_3 Calibration Source, is the topic of 2B Tech's latest peer-reviewed publication. The article appeared in March 2020 in the journal *Atmospheric Measurement Techniques*.

About two years ago, a light bulb went off in the head of 2B Tech's lead engineer, Craig Williford, and he realized he could combine the best of both worlds from 2B Tech's line of calibrators to make one "super-calibration source" for three gases: NO_2, NO, and O_3. The basic principles of the Model 408 (our NO calibrator, also described in the new paper) and Model 306 (our ozone calibrator, described in a previous paper) are used in the Model 714, and together they also enable the calibration of NO_2 via the stoichiometric reaction of NO and O_3.

The paper presents performance data and shows that the Model 714 is suitable as a transfer standard for both criteria pollutants, NO_2 and O_3. Like its Model 408 predecessor, it photolyzes N_2O supplied by small "Whippit"-style cartridges to make NO, thus completely avoiding the need for compressed gas cylinders. This makes the Model 714 especially handy in field settings.

The Model 714 can be used for calibrations of NO, NO_2, and O_3 instruments for concentrations up to 1000, 500, and 1000 ppb, respectively. Check out the paper or visit our website to learn more about the instrument.

Portable calibrator for NO based on the photolysis of N2O and a combined NO2/NO/O3 source for field calibrations of air pollution monitors, J.W. Birks, A.A. Turnipseed, P.C. Andersen, C.J. Williford, S. Strunk, B. Carpenter, and C.A. Ennis, *Atmospheric Measurement Techniques* **13**, 1001-1018, 2020.

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