Winter 2018

2B Technologies
An InDevR Company

2B Buzz

2017 Pricing Extended--Act Quickly Though!

For a limited time, 2B Technologies is offering an extension on its 2017 pricing. This applies to any of the instruments, parts, and accessories that we sell.

Place your order by 2 February 2018 to take advantage of this offer!

Request a Quote

More Info About Our Products

Quick Primer: Ozone Transfer Standards

All roads lead to Rome...and to the Standard Reference Photometer

Environmental agencies throughout the world rely on a gas-phase, direct UV-absorbance technique for ozone calibrations, using the well known value for the absorption cross section of O_3 at 253.7 nm. This is an absolute measurement method... but how is an individual instrument's calibration, itself, determined? For regulatory purposes, the key to demonstrating accuracy of ozone measurements is their traceability to a fundamental reference standard. That traceability is achieved through a pyramid of "standard reference photometers" (SRPs) and "transfer standards."

High atop the pyramid is the world's ozone reference standard, the International Bureau of Weights and Measures (BIPM) Standard Reference Photometer #27 (BIPM SRP#27). This photometer is located at BIPM in Sèvres, France. If a country is a member of the "Convention of Meter," it has one laboratory designated to provide traceability to that country. Each member country has an "ozone national standard" instrument, which undergoes scheduled bilateral comparison testing directly with SRP#27. From there, countries construct a system to essentially "transmit" this

calibration to the network of instruments involved in their national ozone monitoring program.

Figure 1 shows the setup of the standards system of the United States. The U.S. national standard is "SRP#0," maintained by the National Institute for Standards and Technology (NIST) and the Environmental Protection Agency (EPA). It is directly compared to a fleet of "Level 1 Standards" at the national site and at regional locations. The calibrations of regulatory ozone monitors in the field are traceable to these Level 1 SRPs via three levels of "transfer standards." Transfer standards are defined as "a transportable device or apparatus which, together with associated operation procedures, is capable of accurately reproducing pollutant concentration standards or produce accurate assays of pollutant concentrations which are quantitatively related to a higher level and more authoritative standard" (EPA, 2013). Thus a transfer standard can be either an ozone source or an ozone analyzer.

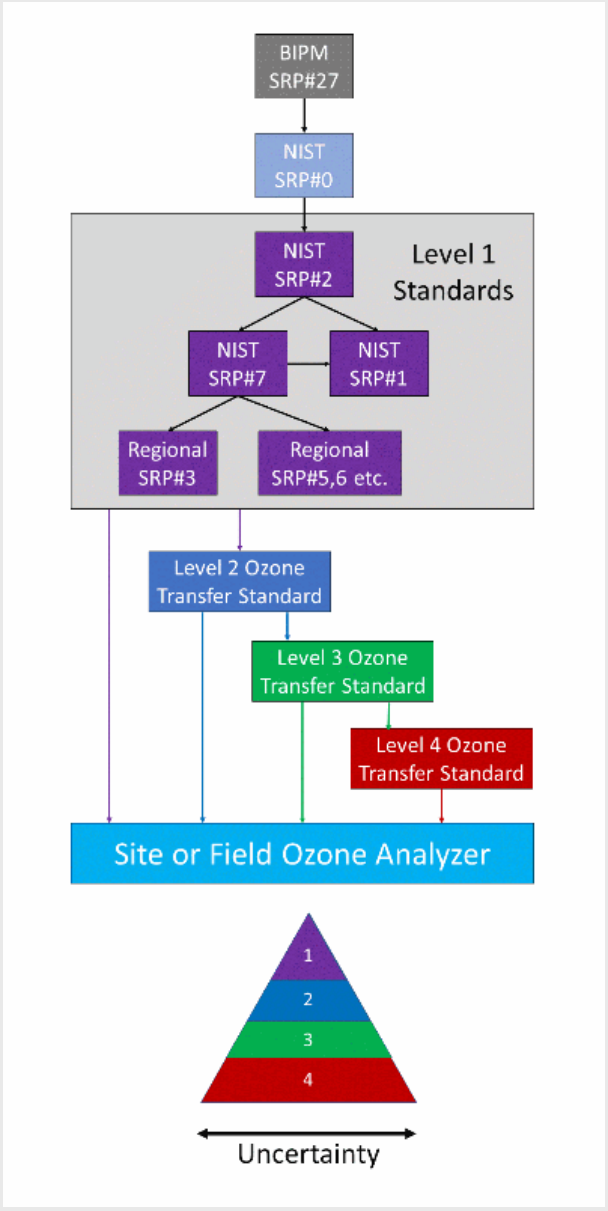


Figure 1.
US EPA ozone transfer standards traceability. (Adapted from EPA, 2013.)

The EPA accepts Level 2, Level 3, and Level 4 ozone transfer standards for calibration of a monitoring or field ozone analyzer, as shown in Figure 1. The uncertainty increases with each level of transfer standard. Typically, a Level 2 "uncompromised standard" is maintained in the laboratory where

conditions of use may be carefully controlled. This transfer standard is used to calibrate Level 3 transfer standards that encounter frequent use and potentially rough treatment in the field. The Level 3 transfer standards may be returned on a frequent basis for verification by the Level 2 standard. Level 4 standards, calibrated against Level 3 standards, also are allowed. Often, level 3 and 4 standards are more portable and designed to be more rugged and/or less sensitive to environmental conditions than higher level transfer standards. They may be used for calibrating instruments deployed in remote locations, for example.

An EPA Level 2 transfer standard must include both an ozone generation device and an analyzer. A Level 3 transfer standard can be a combination of an ozone generator and analyzer or only an analyzer. A Level 4 transfer standard can be an ozone analyzer or only an ozone generation device. Levels 2-4 Transfer Standards must undergo a "6x6" verification in which six calibration curves, each consisting of six approximately equally spaced ozone concentrations in a range including 0 and 90% (±5%) of the upper range of the reference standard, is obtained on six different days. The relative standard deviations of the six slopes of the calibration plots must not exceed 3.7%, and the standard deviation of the 6 intercepts cannot exceed 1.5 ppb.

The 2B Technologies Model 306 is a highly portable ozone calibration source that can serve as an EPA Level 4 transfer standard.

EPA (Environmental Protection Agency), "Transfer Standards for Calibration of Air Monitoring Analyzers for Ozone," Technical Assistance Document EPA-454/B-13-004, October 2013.

Model 306 Ozone Calibration Source

Particulate Pollution and the Highly Sensitive Arctic

Dirtier clouds are warmer clouds--especially in the Arctic

As an indicator of climate change, the Arctic is acknowledged as the proverbial canary in the coal mine-- exhibiting signs of warming faster than the rest of the globe, by perhaps a factor of two. Finding the reasons for this "Arctic amplification," as it's called, is an area of ongoing research. The answers undoubtedly lie in the complex interactions of the atmosphere, meteorology, climate, clouds, sea ice, and the land surface in this fragile region of the globe.

Clouds above the US Department of Energy's Atmospheric Radiation Measurement (ARM) site in the Arctic near Barrow, Alaska. Photo Credit: DOE.

A new study by researchers in France, the U.S., and the U.K. zeroes in on one such interaction, between particulate pollution and clouds.

Clouds can have a warming or a cooling effect on climate. When they bounce sunlight back to space, they cool. But in the Arctic, where snowy surfaces and sea ice already reflect much of the incident solar radiation, clouds tend to have an insulating effect by absorbing radiation and re-radiating it back to warm the Arctic surface. Particles play into this by increasing the number of cloud droplets and enhancing the warming effect of the clouds.

The new study, published in November 2017 in *Geophysical Research Letters*, used atmospheric models to track air pollution plumes, and combined that with satellite images to investigate the plumes' interaction with clouds. They found that in the Arctic, radiative properties of the clouds are two to eight times more sensitive to the pollution than clouds at other latitudes. Though the reasons for this are unclear, the resulting enhanced warming of the Arctic clouds could be at least one piece of the puzzle of Arctic amplification.

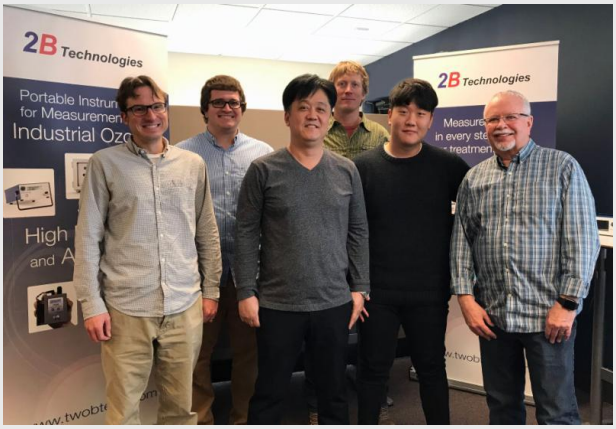
Understanding the processes is especially important because a warmer Arctic, with its diminishing sea ice, is projected to open up new shipping routes previously unavailable. Though the pollution now reaching the Arctic mostly comes from afar, this new scenario would add particulate emissions from ships directly into the region.

"High Sensitivity of Arctic Liquid Clouds to Long-Range Anthropogenic Aerosol Transport," Q. Cookman, T.J. Garrett, D.P. Finch, and J. Riedi, *Geophysical Research Letters*, 44, doi: 10.1002/2017GL075795, 2017.

Link to GRL Paper

South Korean Distributors Visit 2B Tech

Mr. Byeong-Hak Kim and Mr. Tae-Yun Kim



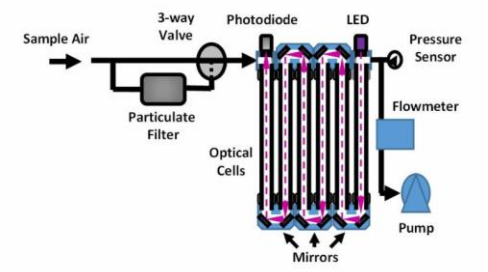
Korean distributors Byeong-Hak Kim and Tae-Yun Kim (center, front row) meet with 2B Tech's Morgan Allers, Hayden Aubermann, Craig Williford, and John Birks.

2B Tech welcomed our South Korean distributors for ambient air monitors, Mr. Byeong-Hak Kim and Mr. Tae-Yun Kim of Total Engineering Co., Ltd., for a site visit January 15-17. They toured the facilities and had many discussions with 2B's sales and technical staff about the Model 405 nm NO_2/NO/NO_x Monitor, which they are introducing for use in South Korea's monitoring programs.

2B Tech has more than 20 distributors worldwide. Click the link below to find the distributor near you.

2B Tech Distributors

2B Tech Awarded Phase I SBIR Grant from the National Science Foundation for Development of Black Carbon Photometer



Schematic of the Black Carbon Photometer under development by 2B Technologies.

2B Tech has been awarded a Phase I grant for "Black Carbon Photometer: Direct Measurements of Black and Brown Carbon Aerosols without Filter Collection." The grant was awarded from NSF's Small Business Innovation Research (SBIR) Program, under the subtopic for Environmental Sensing, Environmental Pollution Control and Mitigation.

Studies of black and brown carbon aerosols are critical to understanding the health effects of air pollution, and key to reducing uncertainties in climate models. Rather than using filters to accumulate

a sample of particulates (the approach of the most common current technique, aethalometry), the Black Carbon Photometer uses the simple and direct technique of long path photometry to quantify total extinction from particulates directly in the aerosol (gas + particles) phase. The proposal is to develop a relatively low cost (<$10,000), rugged, portable, highly accurate instrument to address scientific and market gaps of currently available commercial instrumentation.

Employee Spotlight: Peter Andersen

2B Tech's Director of Product Development

It can be said without exaggeration that Peter Andersen is involved from A to Z for every instrument 2B Tech makes. As Director of Product Development, he plays a leading role in evaluating new ideas, and rolls up his sleeves for the design, testing, and manufacturing of our products. His extensive experience in trace gas analysis and spectroscopic instrumentation, along with a keen eye for detail and practicality, infuse every aspect of his work at 2B Tech.

Originally from Los Angeles, Peter came to Colorado after college looking for adventure. He enjoys hiking, biking, kayaking, and camping throughout the West with his wife and their two children. Peter received his Ph.D. in chemistry from the University of Colorado. He has been a member of the team at 2B Technologies since 2004.

See Us at the National Air Quality Conference in Austin!

We'll be at the National Air Quality Conference, being held January 24-26 in Austin, Texas. If you're headed that way, please stop by Booth 21 in the exhibit hall. Hayden Aubermann (Technical Sales Representative), Shannon Rodriguez (VP of Finance), and Jessa Ellenburg (Director of Educational Outreach) will be on hand to demonstrate several of our instruments and answer your questions.

Also, please plan to attend the talk being given by Jessa. She'll speak on "AQ Treks: Students Learning About Air Pollution Through Measurement and Data Sharing" during the 10 am breakout session on Communicating Air Quality on Thursday, January 25. AQTreks is our program that offers low-cost rentals of our Personal Air Monitors to classrooms, where students design "treks" to gather data, upload and share it on the web, and analyze the results.

We hope to see you in Austin!