2B Technologies
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2B Buzz

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Case Study: US Forest Service Regional Ozone Monitoring

The US Forest Service's Rocky Mountain Research Station began deploying 2B Technologies Model 202 and 205 Ozone Monitors in 2006 amid growing concern over air quality on Colorado's western slope. The research effort focused on areas affected by the oil and gas development boom of the early 2000s and is headed by scientists Robert C. Musselman and John L. Korfmacher in Fort Collins. The project has grown from two stations near Glenwood Springs, Colorado to twenty-one sites stretching from northwest Nebraska to eastern Nevada.

US Forest Service Remote Monitoring Station on the Eastern Slope of the Ruby Mountains, Northeastern Nevada

Although other state and federal agencies monitor ozone in urban and suburban settings, little data existed at the time for locations in remote, wilderness-like areas like those managed by the Forest Service. Korfmacher and Musselman developed three different solar-powered, stand-alone installations for the monitors which could be deployed anywhere forest management staff wanted to collect data. The program culminated in 2014 with publication of their findings in a scientific journal, *Atmospheric Environment*, and an additional publication for the technical aspects of the installations.

The Forest Service ozone data collection program continues in 2015, with some sites running year-round in insulated enclosures. The data they collect are used extensively by air-quality staff of the Forest Service and other state and federal agencies.

Past Newsletters

John Korfmacher with the Remote Monitoring Station in Fort McMurray, Alberta, near the Athabasca Oil Sands.

Korfmacher has constructed a total of 40 installations, for his lab's own use and also for other Forest Service researchers. Additional installations from his published plans have been built by non-profits, the Colorado Department of Public Health and Environment, and a Canadian environmental-science organization. The machines have been deployed across North America including Puerto Rico, Alberta, New Jersey and California.

Introducing Ahmad Nabiyar, 2B Tech's New Global Sales Manager

2B Technologies is pleased to announce the addition of Ahmad Nabiyar to our team. Ahmad will serve as our new Global Sales Manager and as such will be responsible for all sales-related activities, including developing and executing effective sales strategies, direct sales, developing new markets, and management of our distribution channels.

Ahmad comes to us from GE Analytical Instruments where he served as Global Sales Representative for their NO_x product line. Ahmad earned his BS degree in Molecular, Cellular and Developmental Biology at CU, Boulder and has extensive knowledge of both biomedical and environmental applications of analytical instrumentation. Ahmad is rapidly coming up to speed on all of our products and their applications in the fields of ambient air monitoring, industrial ozone, and environmental education.

Morgan Allers continues to serve as the "Face of 2B" in his role as our Customer Relationship Manager, focusing on internal sales and customer support. You can reach both Morgan and Ahmad at sales@twobtech.com or give either a call at +1(303)273-0559 to discuss your ozone and NO_xmeasurement needs.

Featured Product: Model UV-106-W Aqueous Ozone Monitor

The Model UV-106-W Aqueous Ozone Monitor™ uses our patent-pending MicroSparge™ technology to measure dissolved ozone in water with high precision and accuracy. Unlike most dissolved ozone sensors, the instrument does not make use of a membrane that will foul over time. Instead, dissolved ozone is measured by nearly complete sparging of ~2 mL of water with ozone-scrubbed ambient air and integrating the gas-phase concentration of ozone stripped from solution. A small correction, based on the temporal profile of ozone removed from solution, is made to account for any ozone remaining in solution. Because ozone is measured in the gas phase, interferences from particles and dissolved inorganic and organic compounds are removed, making the instrument applicable to both ultra pure water and "dirty" water, such as drinking water, which can contain a wide variety of dissolved inorganic and organic impurities and suspended particles.

Model UV-106-W Aqueous Ozone Monitor for Accurate Measurement of Dissolved Ozone

Features:

- Interference-free measurement of dissolved ozone in ultra pure or "dirty water"
- NEMA waterproof housing
- New measurement every 10 seconds
- Internal data logger logs 16,368 lines of data
- Precision and accuracy of 0.05 ppm or 1% of reading
- Both serial and user-scaleable analog outputs (0-2.5 V and 4-20 mA)
- Selectable data averaging times of 10 seconds, 1 minute, 5 minutes, and 1 hour (custom averaging times available)
- LED alarms

For more detailed information on the Model UV-106-W Aqueous Ozone Monitor, see Model UV-106-W.

Air Pollution News: Common Allergens Strengthened by Ground-Level Ozone & Nitrogen Dioxide

The 249th National Meeting and Expo of the American Chemical Societytook place last month in Denver, CO and hosted a number of creative, groundbreaking lectures ranging from natural solutions to low-grade prostate cancer to transforming packing peanuts into microsheets

and nanoparticles for use in rechargeable batteries. One of the lectures, presented by researchers of the Max Planck Institute in Germany, showed evidence that ground-level ozone and nitrogen dioxide have the capability to change the chemical structure of some of the most familiar and potent allergens. Effectually, the potencies of these allergens are strengthened.

The researchers employed tests and models to exhibit how a "potent allergen protein called Bet v 1 (found in the pollen of the major white birch) reacts to various concentrations of ozone and NO_2." The model displayed that, if tyrosine (an amino acid that helps form Bet v 1) is oxidized by ozone, then these Bet v 1 proteins can be linked together by sequences of chemical reactions. Furthermore, as these Bet v 1 proteins are linked together, immune systems may have a tendency to become more irritated due to the proteins being longer in structure. The proteins are also more receptive to bonding with nitrogen dioxide.

White Birch in the Springtime
Photo Source: Dr. Grubman @ Doctor Allergy

What does this mean for us? Researchers note that, as allergens are altered by air pollutants such as ground-level ozone and nitrogen dioxide in correlation with a globally-changing climate (humidity increases, temperatures rising, and a more lengthy growing season), a greater number of people may experience allergies to pollen.

Check out the full article about this presentation here. Want to measure ozone or nitrogen dioxide concentrations in your area? Check out our full list of products here.

Monitoring Tip: UV-Absorbing Interferences in Ozone Monitors

Ozone measurements by absorbance of the 253.7-nm emission line of a low pressure mercury lamp is a highly accurate method of measuring ozone in a wide range of applications, including measurements in ambient air. The method has the advantage of being absolute in that it is based on the Beer-Lambert Law, requiring only infrequent calibration. Very few compounds found in ambient air have significant absorbance at 254 nm, and those that do tend to have very low concentrations, making UV absorbance highly selective for ozone. However, in the most polluted ambient air, as may occur in a large urban area in summer, positive interferences of up to a few ppb are known to

result from the presence of other UV absorbing compounds, especially those containing one or more aromatic rings. Also, interferences can be quite large indoors due to a wide range of volatile species arising from perfumes, floor wax, mercury spills (e.g., broken thermometers), out gassing of polymers, etc.

In a recent Tech Note, we describe how to estimate the maximum possible interference from any UV-absorbing species using absorption cross sections obtained from the Max Planck Institute Spectral Atlas. We also provide a table with selectivity factors for some of the most common interfering compounds.

For applications where UV-absorbing interferences may be a problem, we recommend use of our interference-free Model 211 Aqueous Ozone Monitor.