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2B Buzz

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Personal Ozone Monitor (POM) Approved as Federal Equivalent Method

Upon publication in the Federal Register on August 26, 2015, the Personal Ozone Monitor became the smallest Federal Equivalent Method (FEM) ever approved for an air pollutant. The POM has dimensions of 4 x 3 x 1.5 inches and weighs only 0.75 lb (340 g). It has a built in GPS so that ozone measurements may be logged continuously along with geographic location. By folding the optical path in the shape of a "U", it was possible to achieve approximately the same path length in the POM as in the Models 202, 205 and 106-L and thus have similar precision and accuracy (~2 ppb). For more details see: POM

- ✓ Based on UV absorbance
- ✓ Precision and accuracy of 2 ppb
- ✓ Personal exposure monitoring for studies of health effects of air pollutants
- ✓ Health and safety monitoring at industrial sites using ozone
- ✓ Vertical profiling using balloons, kites, RPVs and light aircraft where space and weight are highly limited

MENTION THIS AD TO GET A 20% DISCOUNT ON A POM

Offer ends October 31

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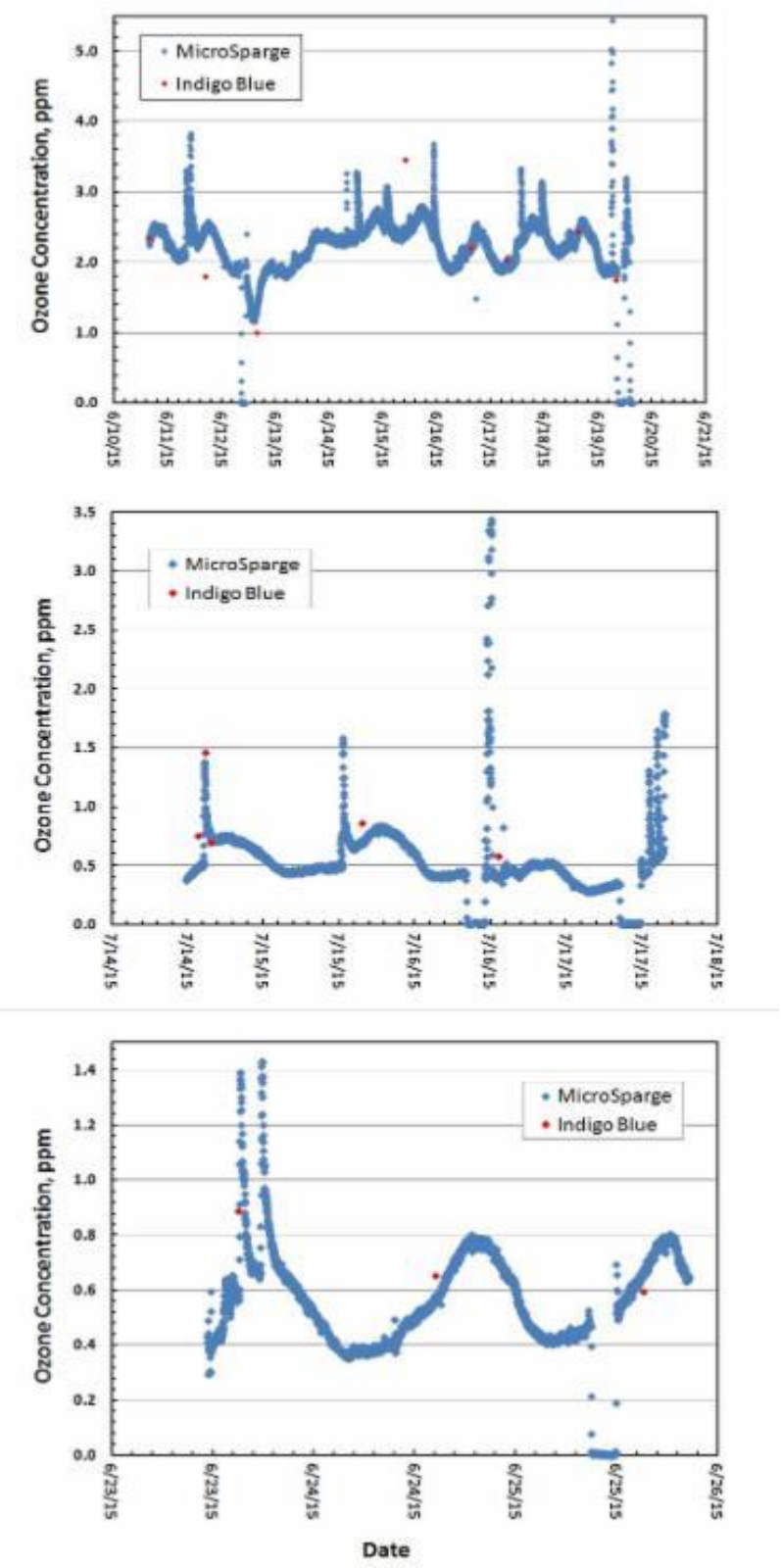
Featured Application: Measurements of Residual Ozone in a Wastewater Reuse Project Using the New Model UV-106-W Aqueous Ozone Monitor

The Model UV-106-W Aqueous Ozone Monitor, utilizing our new MicroSparge™ technology, was evaluated by continuously monitoring the dissolved ozone concentration in a potable research demonstration project, specifically a project in which water of wastewater origin is treated to a point where it can ultimately be reused as drinking water. The project was performed at the City of San Diego's Advanced Water Purification Facility (AWPF), a 1 MGD demonstration plant at the North City Water Reclamation Plant. The AWPF treats tertiary wastewater with ozone, biologically activated carbon filters, microfiltration/ultrafiltration, reverse osmosis, and UV with advanced oxidation in that order. The Model 106-H was used to measure ozone residual within a pipeline ozone contactor between the ozone injection and biologically activated carbon filters. Online ozone residual measurements are necessary for calculating disinfection credits for regulatory and public health reasons. The design flow of the ozone system was 1.6 MGD. During the demonstration project, the applied ozone dose was 10.8 mg/L, the average UVT was 68.7% in ozone influent and 83.8% in ozone effluent, the average turbidity was 0.23 NTU, and the average TOC level was 7.22 mg/L.

Measurements were made during three multi-day periods for a total of 20 days, as shown in the three graphs below. Grab samples were occasionally obtained and analyzed by the indigo method using a Hach colorimeter. Overall good agreement was found between the MicroSparge™ measurements and the indigo measurements. There were no instrument failures and no need for maintenance during this test period. The continuous ozone measurements show the high degree of variability of ozone during the treatment process despite application of a nearly constant ozone dose rate. The sharp positive excursions in ozone were found to be due to the chlorine in the feed water, thereby reducing the ozone demand and allowing higher ozone concentrations. The high variability in dissolved ozone concentration as function of time, despite constant applied ozone dose, demonstrates the possibility of reducing cost in ozone treatment by using a feedback from the dissolved ozone monitor to control the ozone generator. Note that occasionally the treatment process was shut down to allow back flushing of the activated carbon filters. As seen in the graphs, during those times, the ozone measurements decreased to zero, as expected, and with a very fast response time.

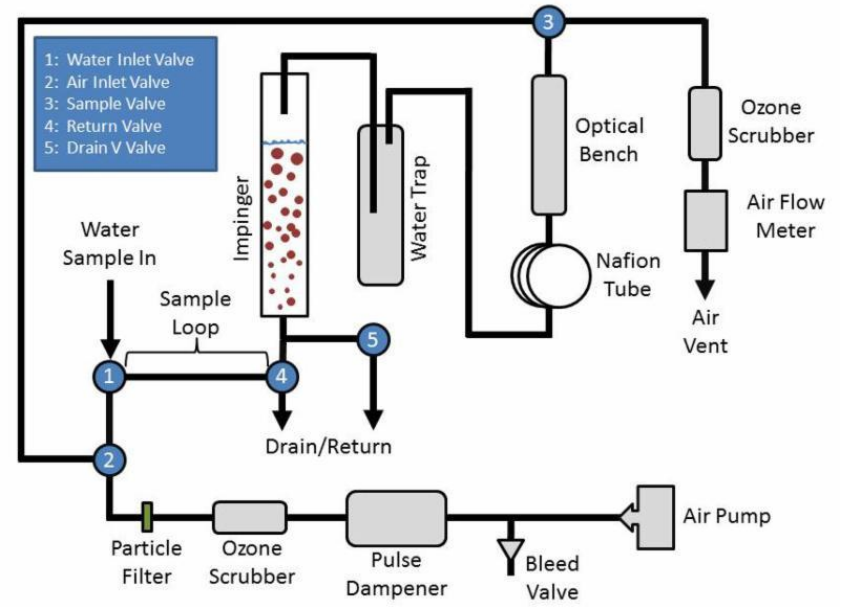


Dissolved ozone concentration as measured by the Model UV-106-W Aqueous Ozone Monitor (blue) in ozone-treated wastewater. Note the variability of ozone concentration and the overall good agreement with grab samples analyzed by the indigo blue method.

We thank Trussell Technologies, Inc. and Kerwin Rakness for

generation and use of data obtained using the MicroSparge™ and indigo blue measurements. The project entitled "WaterReuse Research Project 14-12 Demonstrating Redundancy and Monitoring to Achieve Reliable Potable Reuse" is financed under the Safe Drinking Water, Water Quality and Supply, Flood Control, River and Coastal Protection Bond Act of 2006, administered by the State of California, Department of Water Resources, with administrative support from the San Diego County Water Authority, and financial, technical, and administrative support from the WaterReuse Research Foundation.

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 and integrating the gas-phase concentration of the ozone stripped from 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. Below is a schematic diagram of the UV-106-W.



A description of the new Aqueous Ozone Monitor is provided here: [Model UV-106-W](#).

Monitoring Tip: Cold Weather Upgrades for Model 202 and 205 Ozone Monitors

If you plan to use your Models 202 and 205 2B Tech ozone monitors at temperatures below about 10 °C, we recommend that you obtain a cold weather upgrade to prevent loss of data

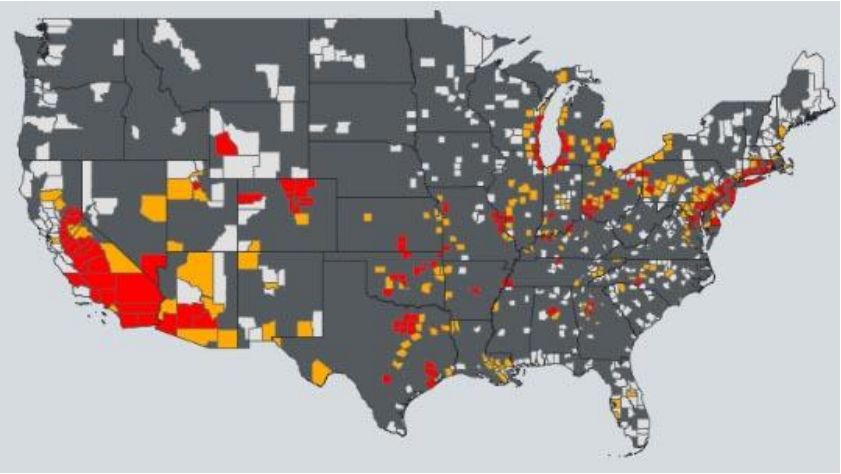
due to extinction of the UV lamp or failure of the air pump. The cold weather upgrade includes a lamp heater and air pump capable of operating at low temperatures. Although the lamp will not normally extinguish during even very low temperature operation, it may not reignite if there is even a brief power failure. Also, the low temperature of the lamp may result in low lamp intensity and consequent loss of precision. These potential problems are solved by addition of a ~1-watt heater to the lamp block.

At low temperatures the polymer diaphragms of the miniature air pumps used in our ozone monitors become stiff, causing increased current draw, over heating, and a shorter lifetime for the pump motor. 2B Tech can provide you with either rotary vane pumps, which have no diaphragms (but relatively short lifetimes of ~2,000 hr) or diaphragm pumps that operate better at low temperatures.

Finally, consider enclosing your ozone monitor in 2 in (5 cm) or more of closed cell styrofoam on all sides. With that amount of insulation, the heat dissipated by the lamp, pump and electronics (4-5 watts) is enough to keep your instrument sufficiently warm.

New EPA Ozone Rule

The EPA has released its long awaited new rule on ozone. The 75 ppb standard established in 2008 will be reduced to 70 ppb. This new National Ambient Air Quality Standard (NAAQS) applies to the fourth-highest daily maximum 8-hr concentration, averaged over 3 years. As shown in red in the map below, compliance with the 75 ppb standard has not yet been achieved, so state and local agencies will be faced with the challenge of compliance with this even stricter standard. Shown in orange are additional counties expected to now be out of compliance.



Map showing counties out of compliance with the previous 75 ppb standard (red) and additional counties expected to be out of compliance with the new 70 ppb standard (yellow). For this map and others showing counties that would be out of compliance for 65 ppm and 60 ppb standards, see http://businessroundtable.org/ozone-map.

Once achieved, the EPA estimates there will be 230,000 fewer asthma attacks each year nationally -- excluding California, which is considered separately -- in addition to 28,000 fewer missed worked days and up to 360 prevented premature deaths. It is estimated that the health benefits will save up to $5.9 billion per year at a cost of an estimated $1.4 billion to achieve the standard.

The new ozone rule can be downloaded from the EPA websitehere.

Featured Journal Article: "Enhanced Light Absorption by Mixed Source Black and Brown Carbon Particles in UK Winter"

S. Liu, A.C. Aiken, K. Gorkowski, M.K. Dubey, C.D. Cappa, L.R. Williams, S.C. Herndon, P. Massoli, E.C. Fortner, P.S. Chhabra, W.A. Brooks, T.B. Onasch, J.T. Jayne, D.R. Worsnop, S. China, N. Sharma, C. Mazzoleni, L. Xu, N.L. Ng, D. Liu, J.D. Allan, J.D. Lee, Z.L. Fleming, C. Mohr, P. Zotter, S. Szidat and A.S.H. Prévôt

Nature Communications **6**:8435, doi: 10.1038/ncomms9435 (2015). Link to Open Source Site

This recent study discusses the differences between absorption of light by black carbon (BC) versus brown carbon (BrC). The study was conducted in the UK during the winter to explore the varying effects brown carbon has on climate, as brown carbon is not been explored nearly as thoroughly as black carbon. Black carbon is generally produced by vehicular emissions and factories within denser areas like cities, whereas brown carbon is produced by wood-burning fires and other forms of solid wood combustion

Brown carbon tends to absorb only at short wavelengths, while the more common-known black carbon absorbs radiation at various wavelengths across the solar spectrum. This effectually contributes to differences in absorptive properties between the two. Most climate models to date account for black carbon, but do not take brown carbon into consideration nor the differences between their absorptive properties and regional variability.

This study sought to reduce some uncertainty about the contributions of black carbon and brown carbon to climate warming due to the changeability of their absorptive properties in relation to regional location and emission sources. Additionally, the study sought to explore the variability of BC and BrC absorptions in relation to "emission estimates, atmospheric transport simulations, and removal rates" in the atmosphere. The study found that brown carbon should be treated as its own type of particle pollution and should be accounted for in regional pollution differences.