



Impact of AIRPHX Cold Atmospheric Plasma On Carbon Dioxide Concentrations

Statement of Purpose

On April 7, 2024, Scientific Air Solutions, Turlock, California (“SAS”), conducted an evaluation (“Evaluation”) of the impact of AIRPHX technology on the level of carbon dioxide (“CO₂”) in a test chamber over time. SAS is an independent BSL-2 laboratory. AIRPHX is a technology company offering proprietary cold atmospheric plasma technology to promote indoor air quality (“IAQ”). The Evaluation took place at the SAS facility in California. The purpose of the Evaluation was to determine if the treatment provided by AIRPHX technology would break the double covalent bonds in the CO₂ molecules in the test chamber – essentially reducing the level of CO₂ in ambient air and providing a tool for supporting improved IAQ in occupied spaces.

Description of Evaluation

The Evaluation was conducted in a test chamber into which a continuous flow of ambient air with CO₂ was introduced. The level of CO₂ was measured with five Honeywell BW Solo single gas sensors located in the four corners and the middle of the test chamber at a height of (4) four feet off the floor. Prior to activating the AIRPHX unit, the CO₂ levels in the test chamber were allowed to stabilize with CO₂ at an average level of approximately 300 parts per million (“ppm”). Once CO₂ levels were stabilized, the AIRPHX unit was activated and allowed to treat the air being introduced into the test chamber. CO₂ levels in the test chamber were recorded every 15 minutes. After 120-minutes of treatment, the AIRPHX device was de-activated and CO₂ levels continued to be measured at 15-minute intervals absent treatment from the AIRPHX unit. Measurements were ceased at 195-minutes into the Evaluation. Specific features of the Evaluation include:

- Test Chamber. The test chamber has dimensions of 10 feet x 13 feet x 9 feet for a total volume of 1,170 cubic feet (see Exhibit I picture of test chamber). A controlled amount of ambient air was introduced into the test chamber and a comparable amount of test chamber air was recycled through the ductwork on a continuous basis. The test chamber was maintained with slightly positive air pressure with CO₂ introduced at 35 psi.
- AIRPHX Unit. The AIRPHX unit is an in-duct unit model IDU 250K that is installed in the duct after the air handler through which air in the test chamber is recycled back into the chamber. When powered on, the AIRPHX unit activates when airflow is detected in the duct. Once activated, the AIRPHX unit produces a continuous cold atmospheric plasma field through which the ambient air passed prior to being introduced into the test chamber.



- Introduction of CO₂. The Evaluation used commercially available CO₂ provided by Airgas - Medical Grade Carbon Dioxide, 50 Pound High Pressure Steel Cylinder. The ambient air with CO₂ was introduced into the test chamber at a continuous rate of 65 cubic feet per minute.
- Measurement Devices. The Evaluation used five (5) Honeywell CO₂ sensors (model BW Solo single gas detector) placed in the four corners and center of the test chamber at a height of 48 inches . The sensors measure the CO₂ levels in ppm on a continuous basis.

All of the components utilized in the Evaluation are available commercially without the requirement of special licensing or authorization.

Test Results

After allowing the level of CO₂ in the test chamber to stabilize at an average of approximately 300 ppm, the AIRPHX device was activated. CO₂ levels were subsequently measured at 15-minute intervals. Once the AIRPHX device was activated, the level of CO₂ exhibited continuous reductions (see Exhibit II) with levels less than 10 ppm – the lower limit of detection for the sensors - at the 75-minute measurement interval¹. The CO₂ levels were measured at less than 10-ppm for the 75-, 90-, 105-, and 120-minute measurement intervals. At the 120-minute measurement interval, the AIRPHX device was turned off. After that occurred, the level of CO₂ in the test chamber continued to be measured at 15-minute intervals. Without AIRPHX treatment, the CO₂ levels returned to a stabilized level of approximately 300-ppm and remained at that level through the termination of the Evaluation at the 195-minute interval.

The Evaluation confirms treatment by AIRPHX cold atmospheric plasma reduces CO₂ levels in ambient air. The reductions can be attributed to the impact of CO₂ molecules passing through the plasma field, at which time O=C=O the double covalent bonds in the CO₂ are broken and the CO₂ is converted to CO₂ → CO + O and CO → C+O. The method of gas, in particular CO₂, dissociation used and described here focused on bombarding the gas with electric discharges. In this process CO₂ acts as a dielectric. The activation energy for CO₂ is 5.51 eV. The energy released during controlled electric discharges breaks the interatomic bonds between the oxygen and carbon atoms.

This characteristic of AIRPHX technology has many applications in the area of IAQ including: (i) reducing “stuffiness” in an occupied space to improve the environment for occupants, (ii) reducing the need for outside air exchanges that should result in significant energy savings; and (iii) providing a strategy for reducing an organization’s carbon footprint.

¹ AIRPHX advised SAS that these results are consistent with mass spectrometry testing conducted in a BSL-4 laboratory by a technician with a bachelor’s degree in chemistry with experienced performing proteomics or metabolomics sample preparation, operating and/or maintaining LC-MS/MS systems (supported by AIRPHX’s chief technology officer). In the mass spectrometry testing, an 82.5% reduction of CO₂ molecules was observed upon a single pass of CO₂ through an AIRPHX plasma field.



Exhibit I Test Chamber

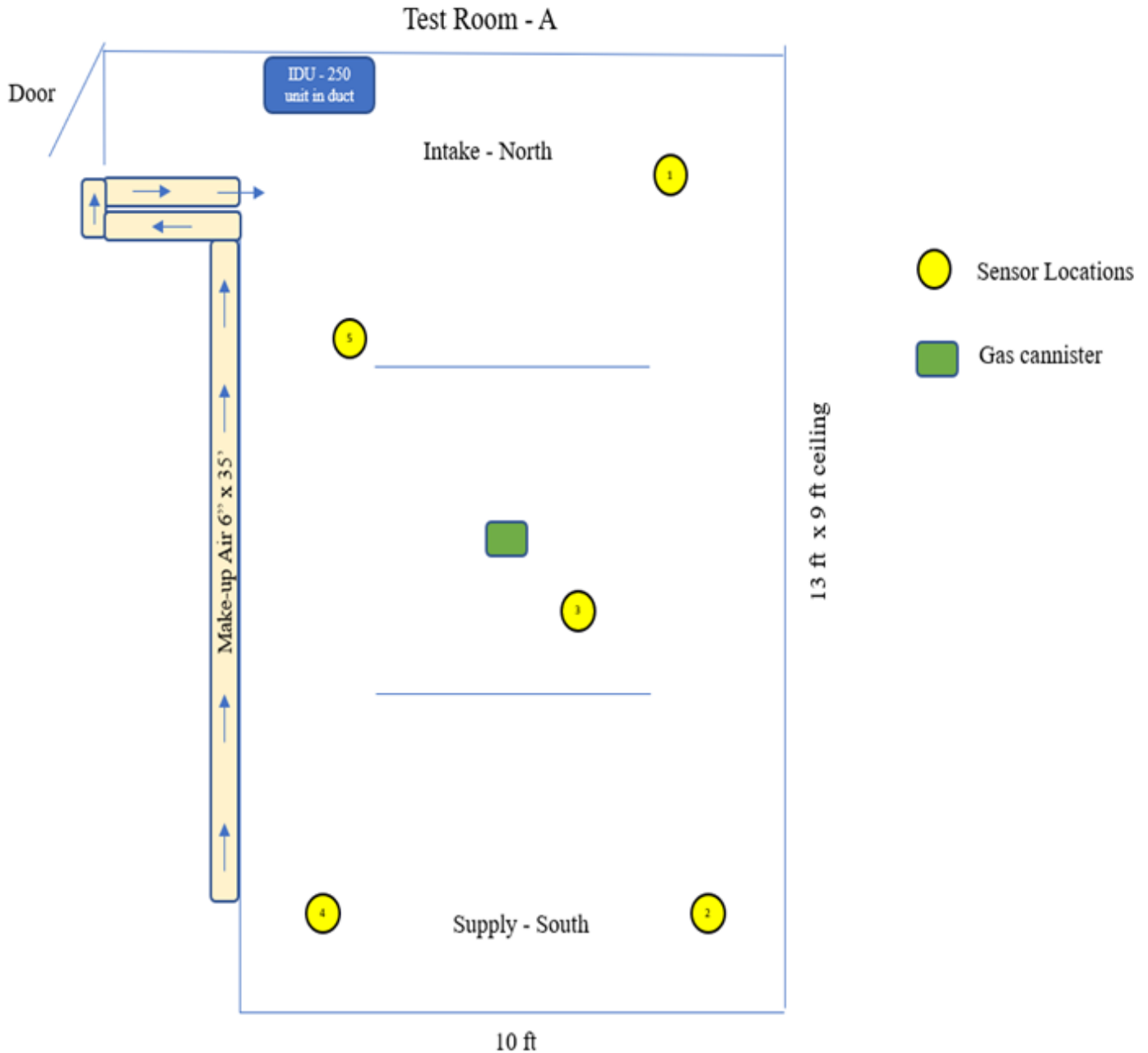
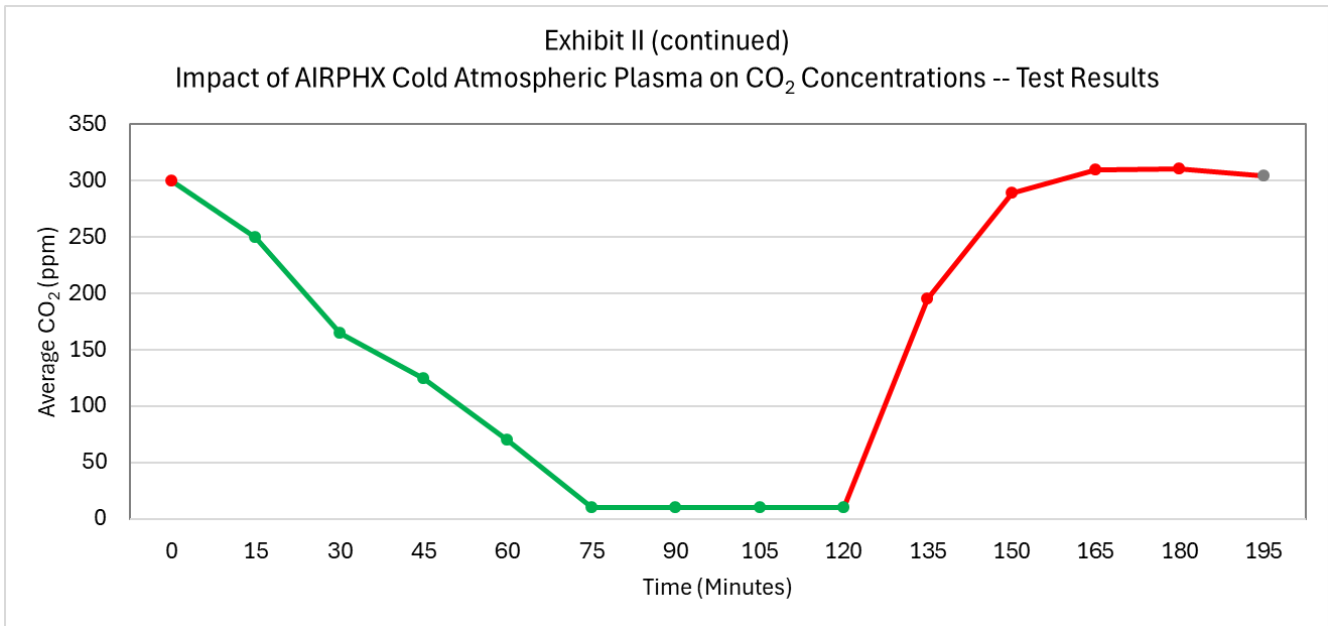




Exhibit II
 Impact of AIRPHX Cold Atmospheric Plasma
 on CO₂ Concentrations - Test Results

Time Minutes	Status of AIRPHX Unit (1)	CO ₂ (ppm)	
		Average	Range
0	Off	300	
15	Active	250	150-300
30	Active	165	125-200
45	Active	125	95-150
60	Active	70	50-100
75	Active	<10	
90	Active	<10	
105	Active	<10	
120	Active	<10	
135	Off	195	182-210
150	Off	289	190-388
165	Off	310	193-425
180	Off	311	198-433
195	Off	304	184-423(2)
(1) IDU 250K unit active status.			
(2) Back at beginning levels of CO ₂ .			



- AIRPHX unit active
- AIRPHX unit off
- Back at beginning levels of CO₂