CASE STUDY

PURGE VIRUS

STAY SAFE and HEALTHY

Navajo Nation

Window Rock, AZ

CASE STUDY – Contents

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Company Highlights

- Purge Virus provides disinfection solutions for every type of facility.
- Alignment of the most appropriate technology to each facility
- Premier customer support and installation, upon request, via our national strategic partnerships.
- Performance and Testing Reports
- Proven technology: Over 50,000 Ultraviolet (UV-C) disinfection devices installed via our manufacturing partner since the 1960s and 150,000 installations via our Bipolar Ionization (BPI) provider since 2008.

For this Project Purge Virus used Bipolar Ionization (BPI) Disinfection Technology:

Given the size and configuration of the HVAC Air Handling Units (AHUs), BPI provided the most appropriate form of disinfection. Since 2008, one of our US production partners for bipolar ionization has over 150,000 installations worldwide: Over 1,000 K-12 Schools, and many healthcare applications including hospitals ranging from Duke Medical in North Carolina to the Cleveland Clinic in Ohio. The next set of pages focus on BPI.

Project Highlights

Window Rock Navajo Tribal Park and Veterans Memorial – Arizona

Known as *Ni' Alnii' gi* (center of the world) to the Navajo for centuries, Window Rock was established as the capital of the Navajo Nation in 1936. Located just across the New Mexico border, the town of Window Rock is home to the Navajo Nation Council.

- Account: Navajo Nation
- Location: Window Rock, Arizona, USA
- Scope of initial disinfection work:

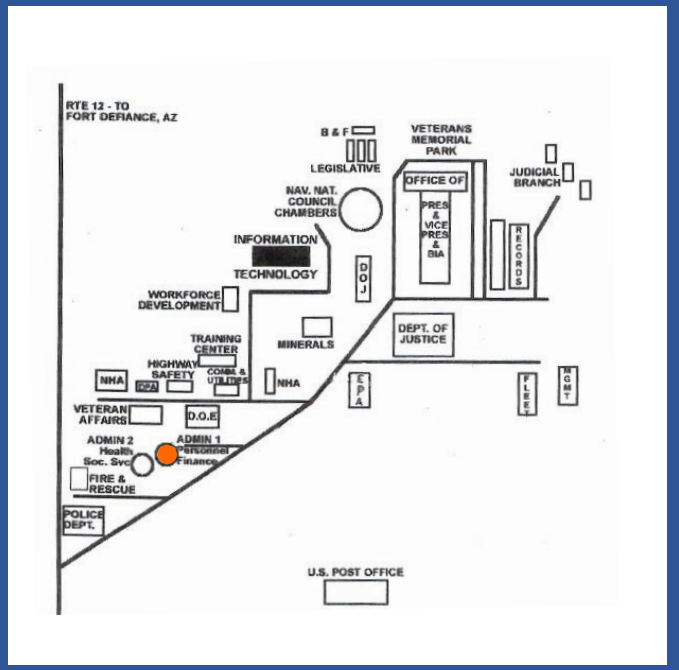
Buildings (6 of multiple)	Sq Ft
Admin 1:	22,800
Admin 2:	22,800
Presidents:	18,000
EPA:	6,000
Museum:	54,520
Education:	38,131

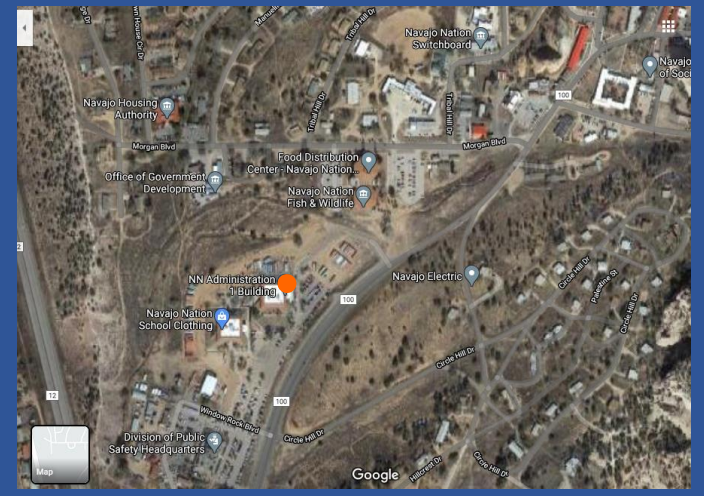
See the updates at the end of this Case Study
(Purge Virus provided disinfection for a total of 10 buildings as well as portable devices.)

- This Case Study focuses on the Administration Building #1

Project Photographs

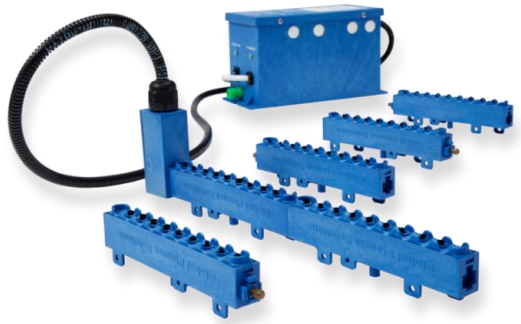
Administrative Building #1





One (1) of four (4) large rooftop Air Handling Units (AHUs)

Project Photographs



Disinfection Solution: Modular needlepoint Bipolar Ionization prepared in rows prior to entering the large rooftop Ari Handling Units (AHUs) for installation

Strategic Partners and Contact Information

PURGE VIRUS
STAY SAFE and HEALTHY

- Disinfection - Indoor Air Quality (IAQ):
- https://purgevirus.com/
- Contact: Charlie Szoradi – charlie.szoradi@purgevirus.com M: 610-551-5224

Agile Technologies Group
Rapid Testing Tracing Treatment Technology

- Project point / COVID-19 Rapid Testing partner:
- https://www.4agiletech.com/
- Contact: Rod Martin - rodmartin@4agiletech.com M: 312-869-0200

PVBJ

- HVAC strategic installation partner:
- https://pvbjinc.com/
- Contact: Paul Benis - paul.benis@pvbjinc.com M: 610-633-8371

Local Support: **NAVAJO ELECTRIC**:
http://navajoelectric.com/

Disinfection Data

Administrative Building #1:

- Facility size: 22,800 sq ft
- HVAC: 4 rooftop AHUs: 24 Tons (DX Cooling Capacity) with 10,000 CFM each
  (Note: This is in line with the U.S. average of 400 CFM / ton, which would yield 9,600 CFM)
- Equipment: Two (2) Carrier 48MA030 Multizone Units - Voltage: 460 / 3/ 60
- AHU Installation: 2016
- Disinfection Installation: January 2021

Disinfection at the AHU Blowers:

- Each bipolar ionization disinfection module is 6" in length and rated for 250 CFM per inch.
- Each module is engineered for up to 1,500 CFM.
- 11 modules x 1,500 CFM = 16,500 CFM
- Length of each row: 6" x 11 modules = 66" (5'-6")
- Installation: (2) sets of rows running across the coil covers up to 33,000 CFM
  (Note: by design this is well over the 10,000 CFM of each ACH to provide maximum disinfection)

Ion Production:

- Each 6" module has 9 carbon fiber emitters and generates 840,000,000 ions/cubic centimeter (i/cc).
- With 11 sections of 6" (66"), each row generates 9.24 billion i/cc.
- Since each AHU has two rows, the total ion generation is 18.48 billion.
- With (4) four same size AHUs the total ion production (i/cc) for this facility is just under 74 billion.
- The massive number of ions produced at the AHUs are to account for the travel distance and loss as the ions move through the ducts to each room in the building. (Note: With 22,800 sq ft of conditioned interior area, this is well more ion generation than needed to meet the target interior 1,000 i/cc to inactivate COVID-19)

Support Info:

- Bipolar Ionization – How it works
- Testing Results
- Measurement and Verification

BIPOLAR IONIZATION

FIVE KEY ADVANTAGES to Bipolar Ionization (BPI)

REDUCE PARTICLES | REDUCE PATHOGENS | NEUTRALIZE ODORS | SAVE ENERGY | SAVE TIME

HOW IT WORKS:

CLEAN THE AIR NATURALLY

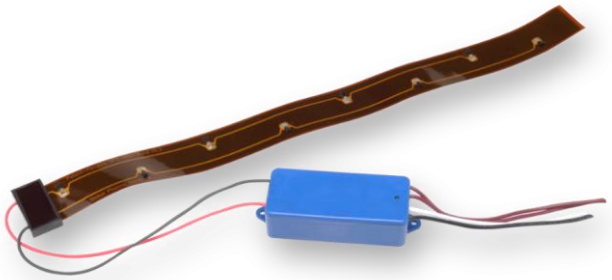
Ions are present naturally in the air and are found in the highest concentrations where the ocean meets the shore and high elevation in the mountains.

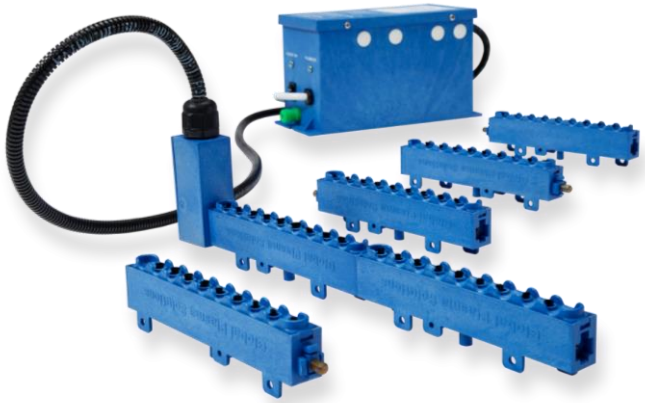
The ionization plasma process artificially creates the ions found in these desirable locations and supply them into the building, enhancing the indoor air quality. Process has been around since the late 1800's.

Units of Measure = ions/cc (cubic centimeter)
Waterfalls/High Elevation = 5,000 i/cc
City = 200 i/cc
Inside Buildings = <100 i/cc

BPI – Sample Devices

carbon fiber
ion emitters





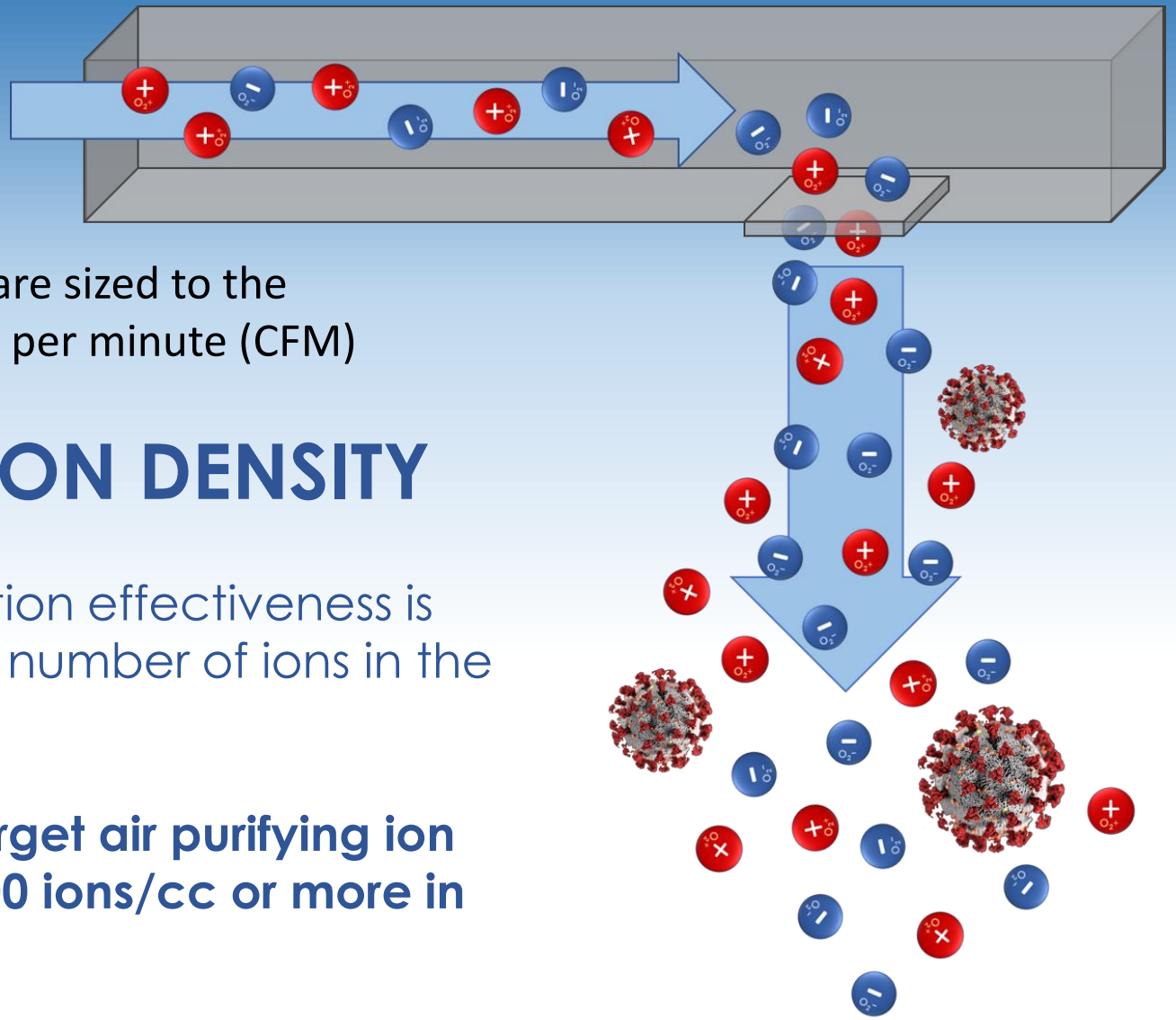
The special carbon fiber ion emitters are soldered into the circuit traces for the ribbon devices (ideal for ductless HVAC) and the emitters are mounted on the other devices for ducted HVAC

Designed for
3,200 CFM or 8 tons.
(e.g. PTACs) This ribbon system comes in 18" and 36" lengths
Ion Production:
> 35 Million +/- Ions/cc /ft.

Designed for
4,800 CFM or 12 tons
ideal for mid sizer HVAC systems.
Ion Production:
> 400 Million +/– Ions/cc

Designed for large HVAC e.g.
8,000 CFM / 20 tons or larger
(any length up to 240 inches in 6-inch increments: 50–250 CFM per inch of bar.)
Ion Production:
> 840 Million +/- Ions/cc per 6 in.

HVAC BLOWER
(enhancement)



Ionizer devices are sized to the
HVAC cubic feet per minute (CFM)

TARGET ION DENSITY

Bipolar Ionization effectiveness is based on the number of ions in the space.

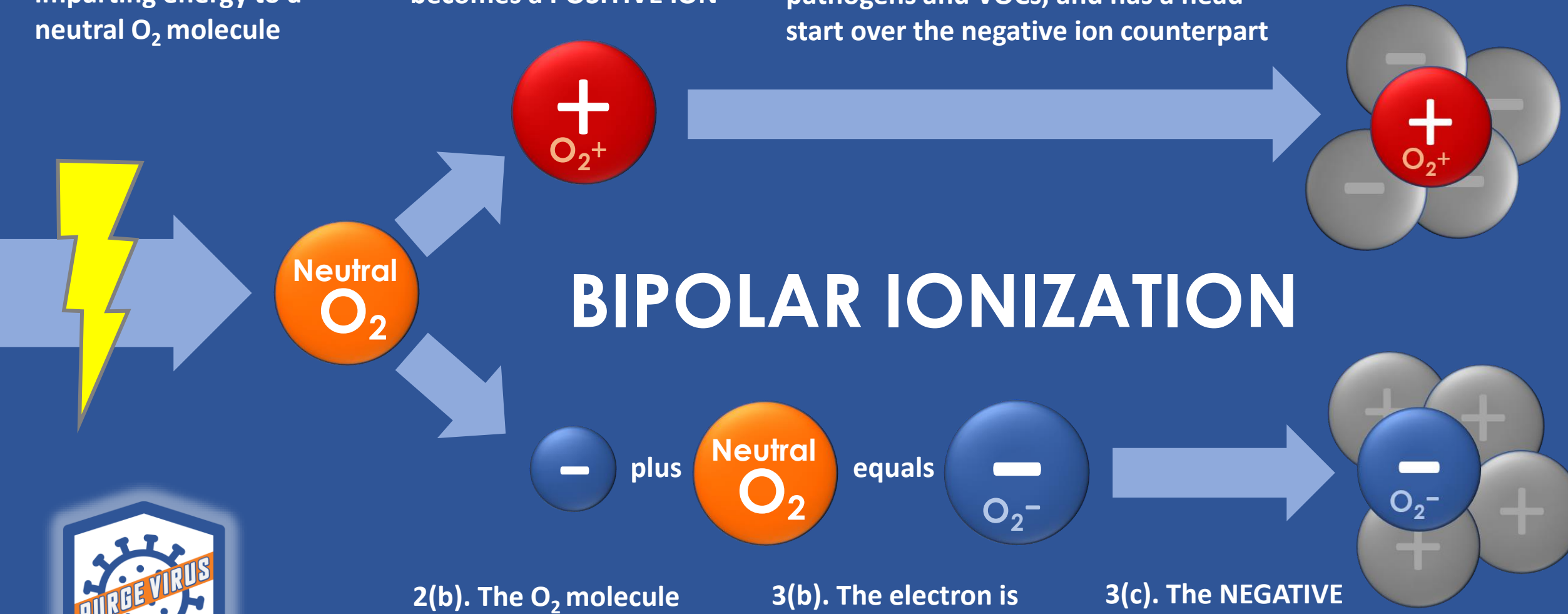
For viruses: target air purifying ion density is 1,000 ions/cc or more in the space.

BIPOLAR IONIZATION

1. Ionization starts by imparting energy to a neutral O_2 molecule

2(a). The O_2 molecule becomes a POSITIVE ION

3(a). The POSITIVE ION "seeks" pathogens and VOCs, and has a head start over the negative ion counterpart

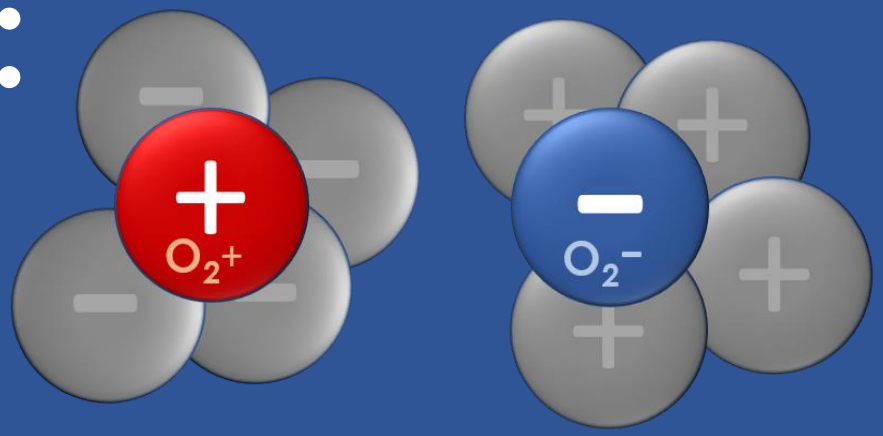


2(b). The O_2 molecule emits an electron

3(b). The electron is captured by another O_2 molecule creating a NEGATIVE ION

3(c). The NEGATIVE ION "seeks" pathogens and VOCs

CLUSTERS:



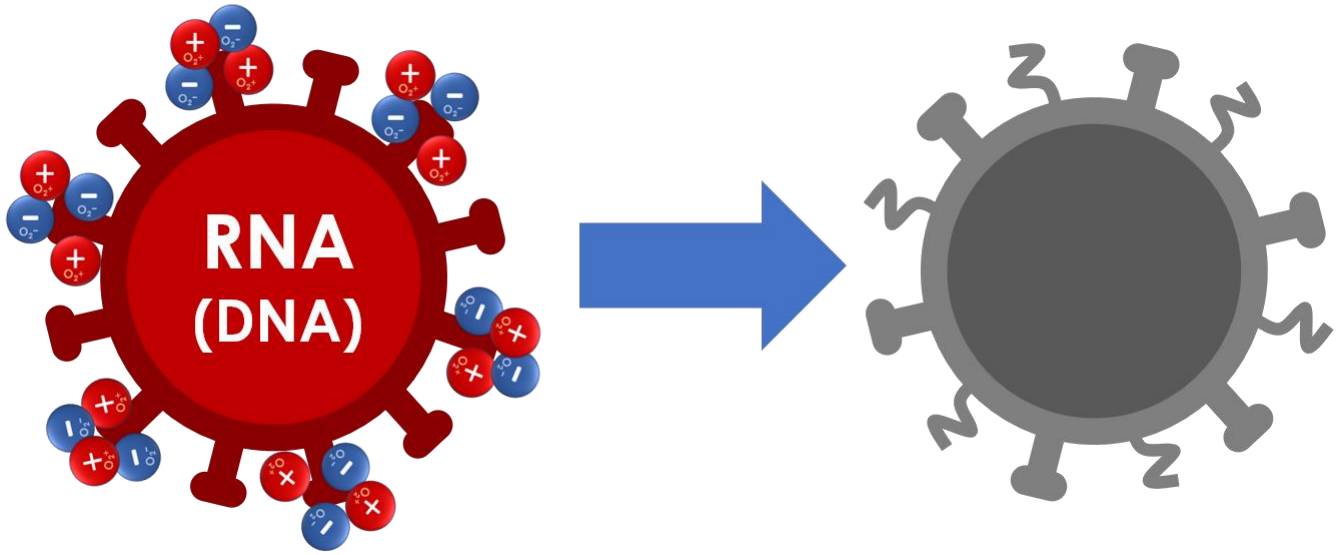
4. The charged ions combine with oppositely-charged airborne elements forming clusters, which are more easily trapped in filters

BPI / VIRUS SCIENCE: BPI inactivates airborne viruses. The bipolar ions surround the hemagglutinin (surface proteins that form on organisms and trigger infections) and change into highly reactive hydroxyl radicals.

The ions **destroy the virus surface structure**, in the case of coronavirus the spikes, on a molecular level. As a result, the virus cannot cause infection, even if it enters the body.

envelope spikes (viruses differ in structure)

ions destroy the molecules of the surface proteins of the virus



THE RESULTS:

Cleaner indoor air and surfaces without harmful ozone production.

A) As the clusters divide to reproduce, bacteria and VIRUS cells are robbed of life-sustaining hydrogen and are destroyed.

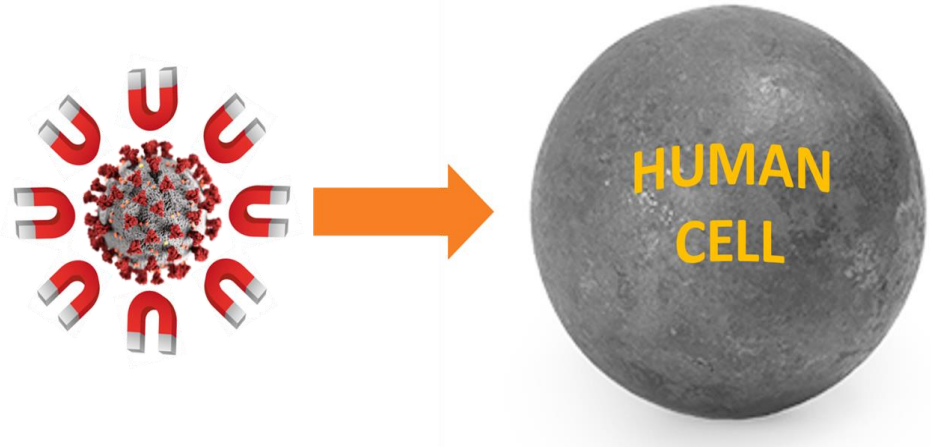
B) Odorous gases and aerosols are neutralized on contact with oxygen ions.

C) Oxygen ions create a chemical reaction with VOCs breaking down their molecular structure.

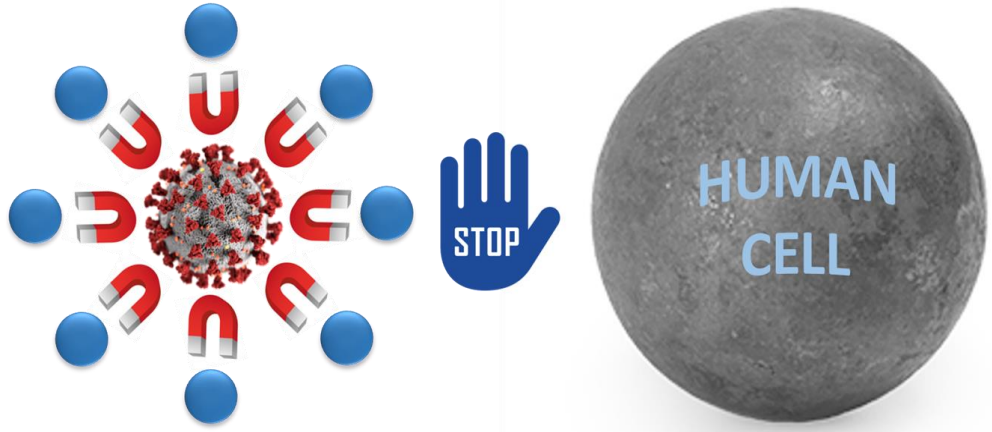
TESTING:

TESTING COUNTS: **99.4%** reduction rate on a SARS-CoV-2 (COVID-19) surface strain within 30 minutes, the first instance in which an air purification company has effectively neutralized SARS-CoV-2 in this manner.

The laboratory study was designed to mimic ionization conditions like that of a commercial aircraft's fuselage. Based on viral titrations, it was determined that at 10 minutes, 84.2% of the virus was inactivated. At 15 minutes, 92.6% of the virus was inactivated, and at 30 minutes, 99.4% of the virus was inactivated.



Without Bipolar Ionization = CONTAMINATION
(attraction to cells)



With Bipolar Ionization = PROTECTION
(rejection from cells)

Measurement and Verification

Our field teams have ion meters to measure and verify the performance of the installed bipolar ionization devices.

ION METER:

The Air Ion Counter Model AIC2 is a handheld meter designed to measure ion density– the number of ions per cubic centimeter (ions/cc) in air. It measures this number separately for positive and negative ions (+ and – ions are usually present simultaneously).

This instrument is a true ion density meter, based on a Gerdien Tube Condenser design, and it contains a fan which draws air through the meter at a calibrated rate. The unit comes as a dual-range model; AIC2-R1 has selectable maximum ranges of both 2 million and 200 million ions/cc. For comparison, a typical outdoor environment has 100 to 1000 ions/cc

Case Study Updates – 04.21.2021

Purge Virus is pleased to partner with AGILE Technologies Group LLC (www.4agiletech.com) on multiple projects including the collaborate work for Navajo Nation. In 2020, AGILE started providing rapid COVID-19 testing for the Navajo Nation, and AGILE brought in Purge Virus to initially provide portable disinfection devices. The scope of the services expanded dramatically to include added services by AGILE as well as comprehensive disinfection by Purge Virus in the heating, ventilation, and air conditioning (HVAC) systems across ten buildings at Window Rock.

To date the COVID-19 mitigation for Navajo Nation has included:

1. Rapid antigen and antibody testing
2. Air purification through portable and in-duct disinfection
3. Highest protective quality N95 masks
4. Bipolar ionization necklaces for personal protection
5. Wrist-worn devices for screening blood oxygen level, body temperature, heart rate that give an alert with any downturn in these health indicators

The extensive COVID-19 disinfection has included 10 buildings on the Navajo campus:

- Administrative Building #1
- Administrative Building #2
- Presidents Building
- Natural Resources Building
- Budget Finance Building
- Legislative Building #1
- Legal Building #2
- Legal Building #3
- Legal Building #4
- Fort Defiance

(See the next page for more information on the technology used in the buildings)

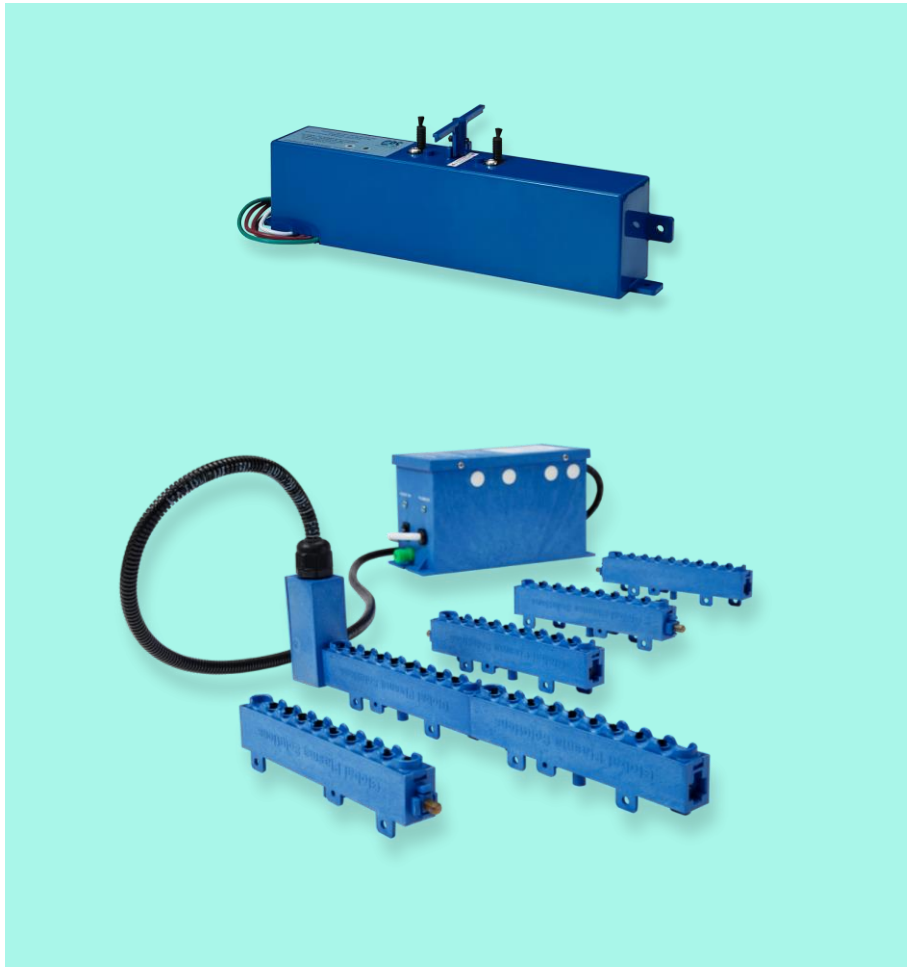
Case Study Updates – 04.21.2021

HVAC Bipolar Ionization Disinfection for Navajo Nation:

Prior to the technology production and on-site installation, Purge Virus conducted a comprehensive site visit to review the existing HVAC equipment. The key for successful disinfection is to align the right technology to each facility.

Per the Center for Disease Control and Prevention (CDC) Guidelines, Purge Virus used multiple bipolar ionization devices in the air handling units (AHUs) that meet the Underwriter Laboratories (UL 867 and UL 2998) with zero ozone production. The advanced system is some of the only technology in the world that meets the dual criteria. Ionization inactivates the proteins that form the "spikes" on the COVID-19 acellular microorganisms. The result is indoor air quality (IAQ) that is cleaner than outdoor air and protects humans from infection by COVID-19

99.4% COVID-19 inactivation: Third party testing:
www.purgevirus.com/disinfection-testing



Case Study Updates – 04.21.2021

Highlights on the initial portable devices for Navajo Nation:

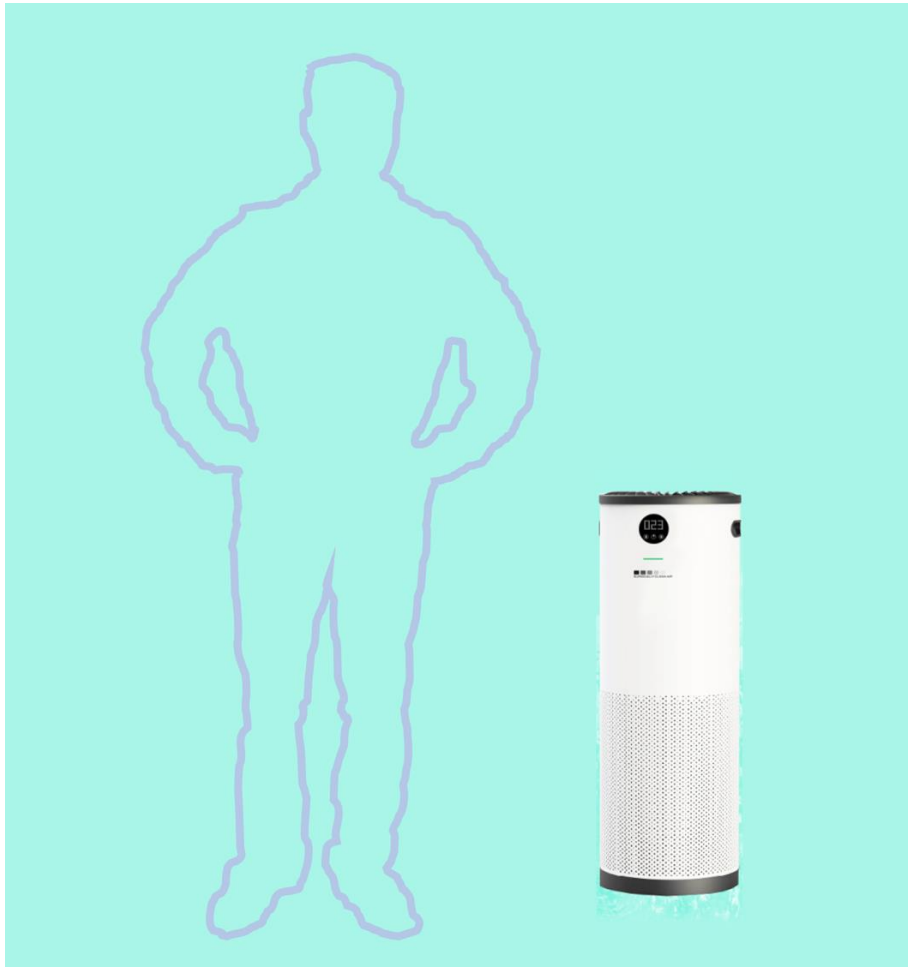
Portable Disinfection Cylinders:
The devices have a 12-inch diameter, and they are 33.5 inches tall. They include four speeds with variable cubic feet per minute (CFM) and cover up to 1,600 ft².

The advanced disinfection includes:

- Ultrafine Particulate HEPA-Rx Filter
- Activated Carbon Filter
- Germicidal Ultraviolet (UV-C) Bulbs
- Hydroxyl Radical Reactivity Chamber
- Revitalizing Negative Ion Chamber

Each device also includes auto functionality as well as air quality sensors.

For more details see the cylinder device toward the bottom of this page: www.purgevirus.com/portable-devices



Case Study Updates – 04.21.2021

Purge Virus: Media Coverage - high-profile site-visit, and disinfection results in 7 Straight Days without a COVID-19 death

First lady **Jill Biden**'s office announced on April 17, 2021 that she will visit the U.S. Southwest in the coming week, with stops planned in New Mexico's most populous city and the **Navajo Nation**'s capitol in **Arizona**. The announcement said Biden will travel to Albuquerque on Wednesday and **visit Window Rock**, Arizona, on Thursday and Friday.

The Navajo Nation has garnered new attention in the last few months as Deb Haaland was appointed interior secretary, the **first Native American to serve as a cabinet secretary**. Nez also believes this trip from the first lady will lead to a future one with President **Joe Biden**.

FOX10

https://www.fox10phoenix.com/news/first-lady-jill-biden-to-visit-albuquerque-navajo-nation-capitol

First lady Jill Biden to visit Navajo Nation capitol

"We are honored and excited to welcome @FLOTUS to the Navajo Nation!" Navajo Nation President Jonathan Nez tweeted. "The Biden-Harris Administration has been a key partner in our response to COVID-19 which includes the #AmericanRescuePlan. We are looking forward to hosting her and her team." For most of the **pandemic**, the **Navajo Nation has been the hardest hit per capita place in America**. Nez says they plan to take her to a vaccination clinic on Friday and stress that they've now gone **seven straight days without a COVID-19 death**.

“Clean your AIR!”

PURGE VIRUS

STAY SAFE and HEALTHY