Bipolar Ionization
Case Study Highlights

To review the CASE STUDY for a major project. Please click here for Navajo Nation: http://purgevirus.com/wp-content/Purge-Virus-Disinfection-CASE-STUDY-Navajo-Nation-2021.02.13-updated-2021.04.21v2.pdf

Purge Virus is pleased to share these case studies on accounts that have utilized needlepoint bipolar ionization from our manufacturing partner. This content is organized by property type, and we included "(+ Energy Savings)" for the case studies that specifically reference the energy savings. Each of the needlepoint bipolar ionization case study highlights includes the Challenge, Solution, and Results.

Dependent Care
- Planned Pethood Plus

Education
- Greer High School (+ Energy Savings)
- University of Maryland
- Valencia College (+ Energy Savings)
- The Learning Experience (+ Energy Savings)

Entertainment
- Amalie Arena (+ Energy Savings)

Health Care
- Boston Children's Hospital (+ Energy Savings)
- Clean Room Applications

Office
- WeWork Office (+ Energy Savings)

Transportation
- Calgary International Airport
- Edmonton International Airport

Needlepoint Bipolar Ionization CASE STUDIES

Dependent Care - Planned Pethood Plus

Challenge: The recovery area of the animal hospital is an enclosed room with no air return. The room was consistently warm and the air was stagnate, thus creating an overpowering smell of urine. Additionally, there was always the potential threat of bacteria growth on the stainless steel tables of the operating room.

Solution for this Bipolar Ionization Case Study: The staff, including the acclaimed Dr. Jeff Young of Dr. Jeff Rocky Mountain Vet, decided to install the needlepoint bipolar ionization technology on their existing air handling equipment to tackle the odor problem, reduce the level of pet dander, and address the bacteria growth in the operating room.

Bipolar Ionization Case Study Results: Within 2 days of installing the needlepoint bipolar ionization equipment, the urine odor had subsided, resolving a 25-year-old problem. The staff commented that there was a noticeable reduction in airborne particles, including animal dander.

Education - Greer High School (+ Energy Savings)

Challenge: Greer High School was utilizing an outdated HVAC system that was bringing in excessive amounts of outside air, resulting in (1) wasted energy, (2) high humidity, and (3) mold growth.

Solution for this Bipolar Ionization Case Study: By utilizing the ASHRAE Indoor Air Quality Procedure, the school was able to incorporate the needlepoint bipolar ionization technology to reduce the amount of outside air needed to condition the building. The installed ionization systems reduce the intake of outside air while improving the indoor air quality.

Bipolar Ionization Case Study Results: The school realized an annual energy savings of approximately $10,000 by using the electronic air cleaners that allowed for a reduction in the per person outside air intake from 17 CFM to 5 CFM. The use of needlepoint bipolar ionization technology resulted in a lower capital expenditure while reducing the overall energy expense, thus providing the least costly ownership solution. Mold growth was abated by reducing the humidity level of the indoor air, creating a safer and cleaner space for the students and teachers.

Education - University of Maryland

Challenge: The University of Maryland, Baltimore buildings needed an applied solution to reduce exhaust fumes and particles from helicopters using a nearby landing pad. The ultraviolet light (UV) system installed in the HVAC system was unable to control the Volatile Organic Compounds (VOCs) and particulate from the helicopters, nor the odors generated within the buildings.

Solution for this Bipolar Ionization Case Study: University of Maryland - Baltimore tried several solutions and products and proved that the needlepoint bipolar ionization technology was the best. Their existing UV system was ineffective and tube-type corona discharge products tested on-site produced ozone, aldehydes, and fine particles. The needlepoint bipolar ionization technology, which is UL 2998-listed for no ozone, helps control fine particles while tackling odors.

Bipolar Ionization Case Study Results: The needlepoint bipolar ionization technology drastically reduced the exhaust fume odors within 24 hours and reduced the particles in the space by up to 85%. The new equipment not only addressed the odors from the helicopter exhaust, but also tackled the animal odors coming from the animals in the vivarium and test labs nearby.

Education - Valencia College (+ Energy Savings)

Challenge: The Valencia College, Lake Nona Campus, was constructed in 2012 and included state-of-the-art academic spaces, teaching labs, student services, bookstore, library, cafe, a Dean's suite, and administrative offices. The 88,821 sq. ft. campus was a $21.7 million project. The school wanted to proactively implement needlepoint bipolar ionization for energy savings, but also wanted to proactively get ahead of any future issues around odors, particles or pathogens.

Solution for this Bipolar Ionization Case Study: The needlepoint bipolar ionization technology was installed in all the air handling units on campus. The equipment is perfect for such a large facility because it kills mold, bacteria, and airborne pathogens while maintaining clean cooling coils.

Bipolar Ionization Case Study Results: The Valencia College, Lake Nona Campus was awarded 3 Green Globe certifications by Green Building Initiative. The needlepoint bipolar ionization technology reduced the outside air needed for ventilation by 9,300 CFM and saved $180,000 in chiller cost. The equipment was compatible with their current air handling unit, which avoided costly renovation expenses. Testing revealed that there was no Fungi or Bacteria detected on the cooling coil fins. This initiative generates $180,000 SAVINGS in annual energy costs.

Education - The Learning Experience (+ Energy Savings)

Challenge: The Learning Experience®, a national child care center franchise, realized that a large portion of their monthly operating budget was allocated to the heating and cooling of their facilities. Annual HVAC maintenance for the larger air handling equipment was also unpredictable and often an unforeseen additional expense.

Solution for this Bipolar Ionization Case Study: The self-cleaning needlepoint bipolar ionization technology was installed to reduce the amount of outside air needed to treat the indoor space. The technology also kills airborne pathogens and reduces the level of odor causing Volatile

Organic Compounds (VOCs). Each installation incorporates 5 or 6 units to improve the indoor air quality of the building.

Bipolar Ionization Case Study Results: The Learning Experience® realized a 10 ton reduction, or about 1,500 CFM, of outside air intake with the installation of the needlepoint bipolar ionization technology. This helped avoid costly HVAC equipment upgrades while reducing operating and maintenance costs. The needlepoint bipolar ionization technology also provides the added benefit of pathogen destruction, minimizing the amount of airborne pathogens and ultimate cross-contamination of germs between the children and staff. The needlepoint bipolar ionization technology is the specified solution for all of The Learning Experience® facilities across the country.

Entertainment - Amalie Arena (+ Energy Savings)

Challenge: The Amalie Arena, formerly known as the Tampa Bay Times Forum, underwent renovations in 2015. The original design of the HVAC system required approximately 202,000 CFM of outside air, according to the ASHRAE Ventilation Rate Procedure, to dilute the contaminants in the air and produce acceptable indoor air quality. The renovation of 2015 meant upgrades that would cost millions of dollars.

Solution for this Bipolar Ionization Case Study: Utilizing the ASHRAE Indoor Air Quality Procedure, the needlepoint bipolar ionization technology was installed to control airborne contaminants while reducing the amount of outside air needed. This solution provided excellent indoor air quality all while providing capital and operating cost reductions.

Bipolar Ionization Case Study Results: By installing the needlepoint bipolar ionization technology to purify the indoor air, the outside air intake was reduced to 108,000 CFM for a total savings of 94,000 CFM, or about 700 tons of cooling capacity. The reduction in cooling capacity resulted in a savings of more than $1 million in capital equipment. Furthermore, the facility is realizing an annual cost savings of approximately $115,000 in energy.

Health Care - Boston Children's Hospital (+ Energy Savings)

Challenge: Boston Children’s Hospital needed to upgrade their HVAC system to deal with noxious diesel fumes and street odors emanating from a nearby construction zone. The hospital staff and patients had been complaining about the odors that the existing UV light system was unable to control. The facilities management team was also looking for a solution to keep the entire depth of the coils clean and free of biofilm. Their UV systems only treated a few inches of the coil depth.

Solution for this Bipolar Ionization Case Study: The hospital chose to install the needlepoint bipolar ionization technology to (1) control the noxious diesel fumes, (2) tackle the odors

coming from the construction site, and (3) address the microorganisms that produced the biofilm on the coils.

Bipolar Ionization Case Study Results: The diesel fumes and other unpleasant odors were drastically reduced and coils cleaned within 48 hours, saving as much as 30% in power consumption. The hospital's alternative to resolving the odor issues with the needlepoint bipolar ionization technology would have been expensive renovations. The renovation would have added more demand to the system, creating high pressure drops. This would have resulted in a higher energy bill without 100% certainty of solving the problem.

Health Care - Clean Room Applications

Challenge: A new chemical introduced into the manufacturing process was creating odor issues for the employees working in clean rooms and adjoining spaces that shared the same air handling system. The noxious odor needed to be contained or eliminated to improve the indoor air quality and working conditions for the employees.

Solution for this Bipolar Ionization Case Study: The needlepoint bipolar ionization technology was installed in the air handling system that treats the clean room's air.

Bipolar Ionization Case Study Results: The odors were neutralized within 24 hours of the equipment installations. Additionally, the annual clean room certification process revealed that the total particle count was reduced by 89.7%. This new low particle count was the lowest the manufacturer had experienced in 10 years.

Office - WeWork Office (+ Energy Savings)

Challenge: WeWork converts existing spaces into modern, beautiful, shared office spaces. With increasing occupancy and expansion. WeWork wanted to ensure excellent indoor air quality.

Solution for this Bipolar Ionization Case Study: WeWork selected the needlepoint bipolar ionization technology to provide the best indoor air quality while minimizing costs by reducing the amount of outside air needed to ventilate the space. When new HVAC equipment is implemented, the ionization permits smaller HVAC solutions. In other cases, the ionization allows the owner to use the existing HVAC equipment. The self-cleaning needlepoint bipolar ionization equipment is perfect, because it is mountable on any indoor or outdoor duct.

Bipolar Ionization Case Study Results: WeWork realized greater than 50% savings in the HVAC renovation costs by installing smaller air-handling equipment while shortening their building upfit timeline. By using the needlepoint bipolar ionization technology, WeWork also reduced the amount of energy required to condition their spaces, realizing savings in operating expenses while creating "a world where people work to make a life."

Transportation - Calgary International Airport

Challenge: In 2017, as in prior years, the air traffic control tower at the Calgary International Airport (CIA) was having major indoor air quality issues due to smoke from the wildfires in British Columbia.

Solution for this Bipolar Ionization Case Study: In 2018, NAV CANADA installed the needlepoint bipolar ionization technology in the HVAC units for the air traffic control tower prior to the wildfire season. The intent was to test the ability of the technology to not only reduce particles entering the facility, but also to neutralize odors associated with the smoke.

Bipolar Ionization Case Study Results: • The needlepoint bipolar ionization technology helped reduce the amount of particulate entering the building by 87% at 0.3 microns within the first 48 hours of operations while still using their existing MERV 13 filters. The ionization caused the fine smoke particulate to agglomerate, making the existing filters more effective in catching the particles. Particle reduction results using existing filters with the ionization system: 1. 87.2% reduction for particle size 0.3 micrometer (0.3 micron) 2. 95.4% reduction for particle size of 0.5 micrometer (0.5 micron) 3. 95.8% reduction for particle size of 1 micrometer (1 micron).

Transportation - Edmonton International Airport

Challenge: The NAV CANADA Area Control Center at the Edmonton International Airport (EIA) was having major Indoor Air Quality issues and subsequent complaints due to the odors from airplane jet exhaust, decomposing de-icing fluid, a nearby horse racetrack, as well as the odors from a nearby cannabis processing facility. Other NAV CANADA locations, including Montreal, were also experiencing odor issues due to diesel fumes from back-up generators in the new powerhouse.

Solution for this Bipolar Ionization Case Study: In 2018, NAV CANADA installed the needlepoint bipolar ionization technology in the HVAC units for the Area Control Center at EIA as well as the Air Operation Center for the Montréal–Pierre Elliott Trudeau International Airport.

Bipolar Ionization Case Study Results: The needlepoint bipolar ionization technology effectively neutralized the odors entering the building within 24 hours of installing the system. This included both the odors associated with the jet fumes as well as odors from all of the other sources.