Alamo Area Council of Governments
Indoor Air Quality – Current Topics

Argus Environmental Consultants

Introductions

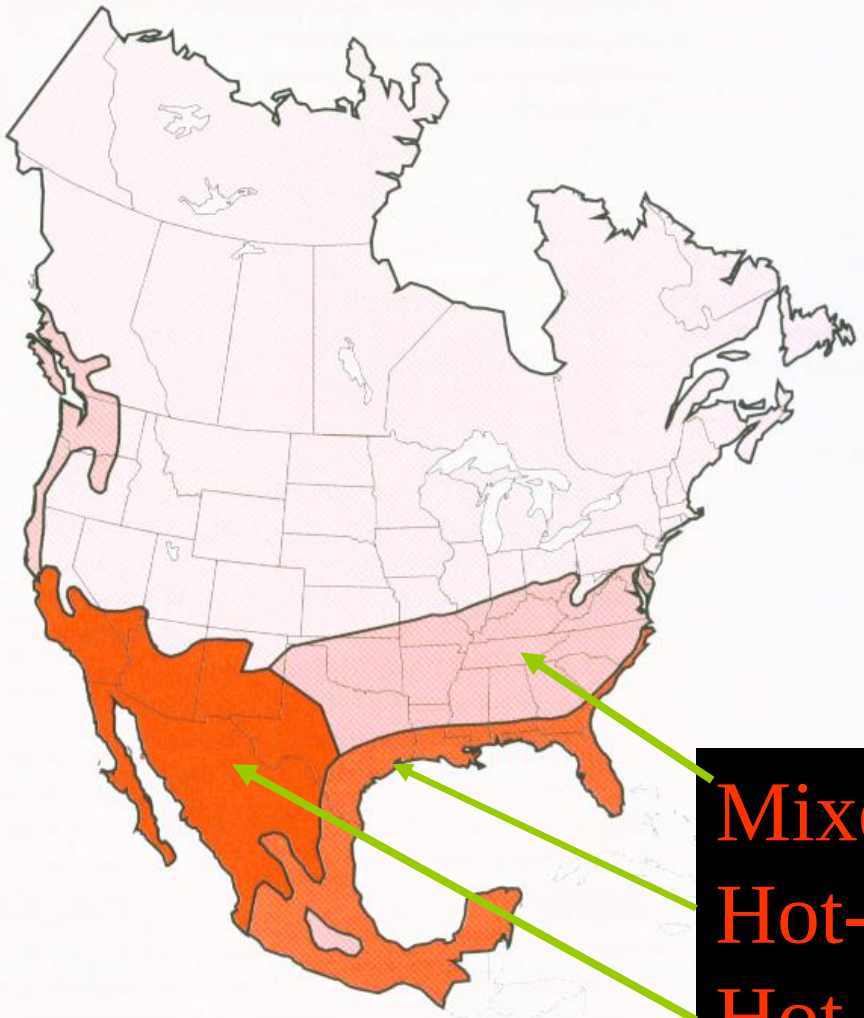
- Argus Environmental Consultants is a Texas certified small and historically underutilized business
- Texan owned and operated for 34 years
- State licensed
- Nationally certified

Industrial/Construction

- Regulated by the Occupational Safety and Health Administration
- Total dust
- Respirable dust
- Silica
- Metals – relatively new CrVI standard
- Water losses
  - 72 hours

Health Care

- Regulated by OSHA and the Joint Commission for Hospital Accreditation
- Infection control
  - Bacteria
  - Mold
- Anesthetic gases
- Formaldehyde
- Hydrogen peroxide
- Cleaning & sanitizing chemicals
- Legionella
  - Chilled water systems
  - Hot water



Mixed-Humid
Hot-Humid
Hot-Dry/Mixed-Humid

Figure A
Climate Zones

- Based on Herbertson's Thermal Regions, a modified Koppen classification, the ASHRAE definition of hot-humid climates and average annual precipitation from the U.S. Department of Agriculture

Commercial Property

- Asbestos
  - Regulated by the EPA and TX Department of State Health Services
- Mold
  - Regulated by the TX Department of Licensing & Regulation
- Environmental tobacco smoke
- Odors
  - Rubberized carpeting
  - HVAC performance
  - Housekeeping

Schools

- Mold
- Carbon dioxide (CO2)
- Respirable dust
  - Custodial activities
- Cleaning & sanitizing chemicals
- Volatile organic compounds
  - Air fresheners

Single Family Residential

- Mold
  - New EPA Energy Star requirements
- Natural gas (methane)
- Respirable dust
- Ozone
- Volatile organic compounds
- Relative humidity
- Dew point temperature

Multi Family Residential

- Mold
  - New EPA Energy Star requirements
- Respirable dust
- Ozone
- Volatile organic compounds
- Relative humidity
- Dew point temperature
- Environmental tobacco smoke

COVID-19 Lessons Learned

- Increase ventilation
- Filtration
- HVAC maintenance

Thanks for your attention.

Any questions?

Good luck out there and have a great day!

Harvest IS…

Integrating Revolutionary Products & Proven Technology to provide Building Owners with Unique Solutions to Everyday Problems.

Sustainable. Clean, Green and Eco-Friendly Solutions.

You will always HARVEST what you plant. Galatians 6:7

From Pixie Dust

To Innovation

"Sounds like Pixie Dust to me."

Protecting our Assets

Everyday Problems

Indoor Air Quality

Mold, Mildew, Bacteria,Viruses
and
The Alarming Truth

Harvest
Innovative Solutions

Industries with High Risk

Education

Airports

Facilities with:

Large Scale Areas Large Groups of People Older Buildings

Military

Healthcare

Harvest
Innovative Solutions

We Breathe the Air We Share

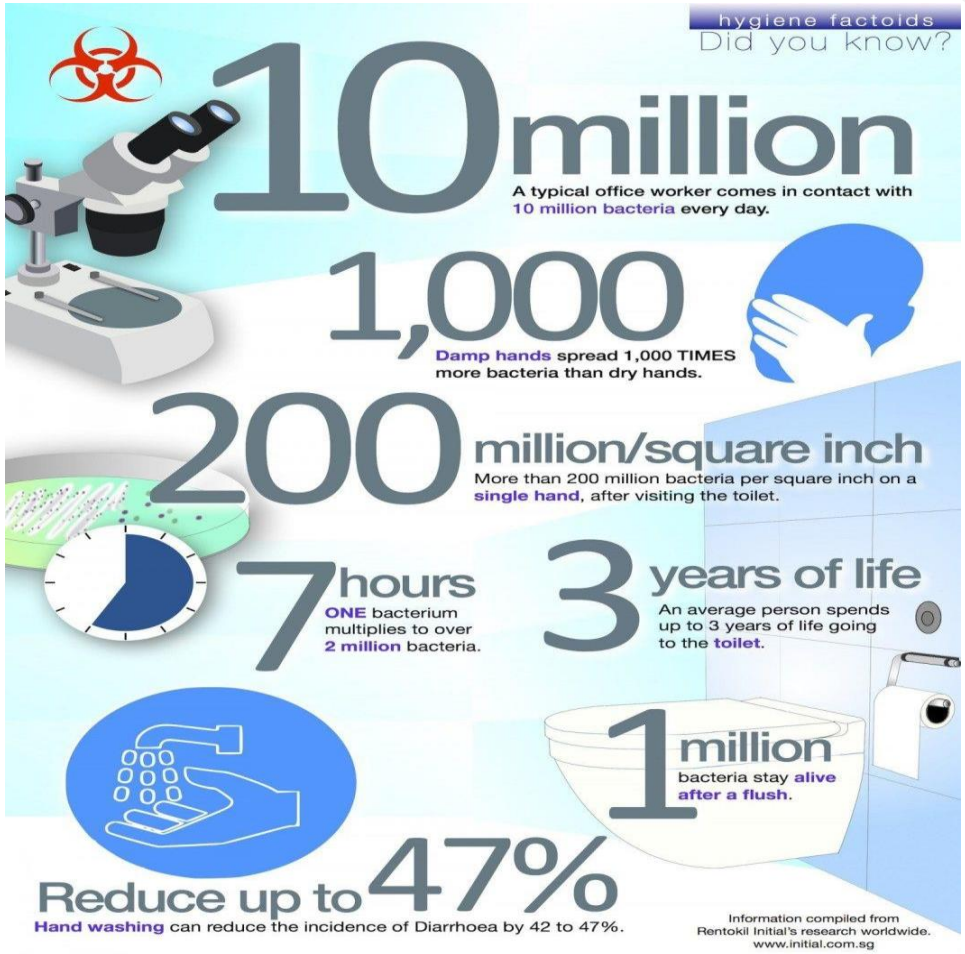
A sneeze travels at 100 mph and can travel over 20 feet.

CNN

A deadly virus is spreading from state to state and has infected 26 million Americans so far. It's the flu

The 2019-2020 flu season, which began September 29, is projected to be one of the worst in a decade, according to the National Institute of Allergy and Infectio Diseases. At least 250,000 people have been hospitalized with complications from the flu, and that number is predicted to climb as flu activity swirls.

In the 2019-2020 season so far, at least 26 million people in the US have gotten the flu and at least 14,000 people have died from it, including at least 92 children. Rico, the CDC reported this week.


hygiene factoids
Did you know?
10 million
A typical office worker comes in contact with 10 million bacteria every day.
1,000
Damp hands spread 1,000 TIMES more bacteria than dry hands.
200 million/square inch
More than 200 million bacteria per square inch on a single hand, after visiting the toilet.
7 hours
ONE bacterium multiplies to over 2 million bacteria.
3 years of life
An average person spends up to 3 years of life going to the toilet.
1 million
bacteria stay alive after a flush.
Reduce up to 47%
Hand washing can reduce the incidence of Diarrhoea by 42 to 47%.
Information compiled from Rentokil Initial's research worldwide.
www.initial.com.sg

Sick Buildings - Commercial

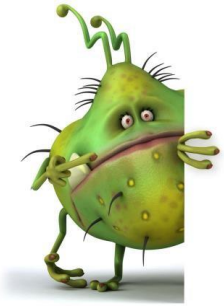
"U.S. companies could save as much as $58 billion annually by preventing sick building illnesses, and an additional $200 billion in worker performance improvements by creating offices with better indoor air."
- Lawrence Berkeley National Laboratory in Berkeley, CA

- Indoor Air pollution ranks as 1 of the top 5 environmental risks to public health since 1990
- Around the world a death occurs every 20 seconds due to Sick building Syndrome
- 20% of all illnesses are either caused by, or aggravated by polluted indoor air
- 2 out of 3 IAQ issues involves inefficient AC and duct systems

Sick Building Syndrome

Also know as **Tight Building Syndrome** or **Building Related Illness**

- **Is a worldwide phenomenon**
  - **Often flows from poor heating, ventilation and AC**
    - **Found in poorly maintained, aging buildings with environmental conditions that create *poor air quality***
      - **Nearly 5 Million students go to substandard schools**
        - **One in eight schools is inadequate for learning**
          - **60,000 schools or 46% have substandard environmental conditions that**



Micro Organisms - Greatest Source of Concern

- Can live well past 48 hours
- Multiply from 1 to 1,000,000,000 (1 billion) in 18 hours
- Temperature & Humidity used for comfort
  - Ideal conditions for growth

Survival Times & Minimum Infective Doses

MICROBE	SURVIVAL TIMES NON-POROUS SURFACE	SURVIVAL TIMES POROUS SURFACE	INFECTIVE DOSE
Influenza A virus	24-48h	8-12 h	100 to 1 000 viral particles
Respiratory syncytial virus (RSV)	6 h	30-45 min	160 to 640 viral particles
Ebola virus	11 days	*	1 to 10 viral particles
Parainfluenza virus	10h	up to 4 h	Unknown; however, evidence exists that the infectious dose is small (≥ 1.5 viral units)
Norovirus	56 days	more than 40 days	10 viral particles
Yersinia pestis	3 days	up to 5 days**	100 to 500 organisms
Bacillus anthracis (spores)	***	more than 10 years**	8,000 to 50,000 spores
Salmonella	4 days	1-4 h	at least 100,000 organisms
Campylobacteria	4 h	1-4 h	less than 500 organisms
Staphylococcus aureus (MRSA)	days to weeks, at least 4 days	less than non-porous surfaces	at least 100,000 organisms

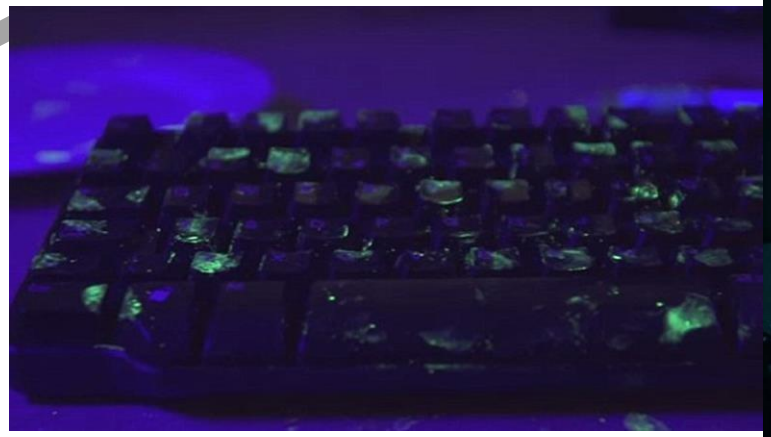
* Ebola virus in body fluids (such as blood) can survive up to several days at room temperature (CDC 2015)

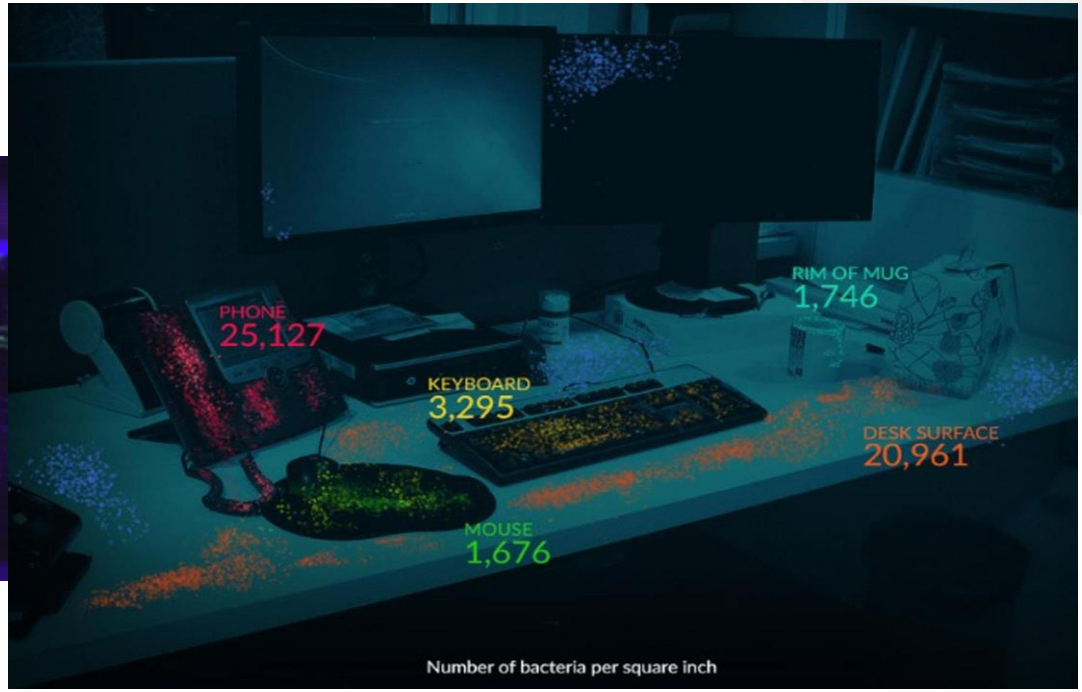
** On surface of paper

A Teacher gave her students this "hands on" learning to show them the importance of proper handwashing.

Seeing is believing.

Computer Keyboards can carry more than 200 times as many bacteria as a toilet seat.

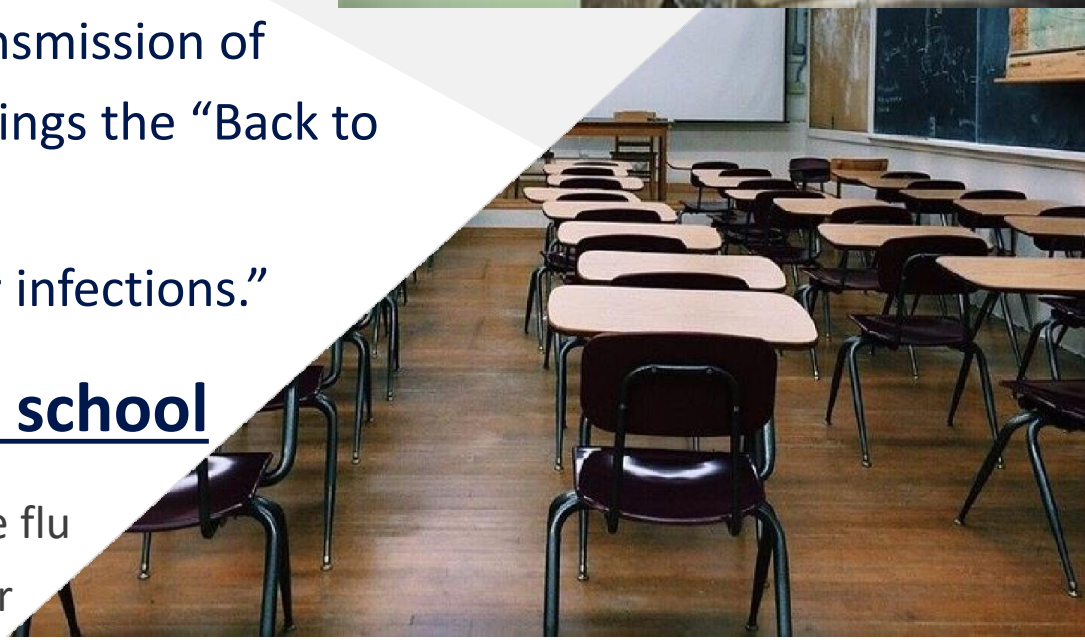




Schools - “Germ Candy Store”

“Schools inherently foster the transmission of infections.” Return to school brings the “Back to School Plague”

“Schools are breeding grounds for infections.”



189 million lost days from school

- 5% - 20% of the populations gets the flu
- Students Average 4.5 SICK DAYS/year

Harvest Innovative Solutions

Asthma's Impact on Schools

Asthma is the leading cause of absenteeism.

One in 10 kids has asthma.

Children with asthma have a 4x greater chance of getting the flu; and 44% of children hospitalized for the flu have asthma.

Improving Indoor Air Quality (IAQ) in Schools

- decreases respiratory-related illness infection rates
- positively impacts student attendance
- reduces rates of COVID-19*
- reduces the spread of other respiratory illnesses (common cold, flu, etc.)
- reduces the severity of asthma symptoms.

Research findings are clear that indoor air quality improvements improve respiratory health-related outcomes and improved student outcomes.

*Not stated in TEA report but with CIMR studies have shown it to be highly effective

Harvard University instructor David Ropeik writes in *The Washington Post*:

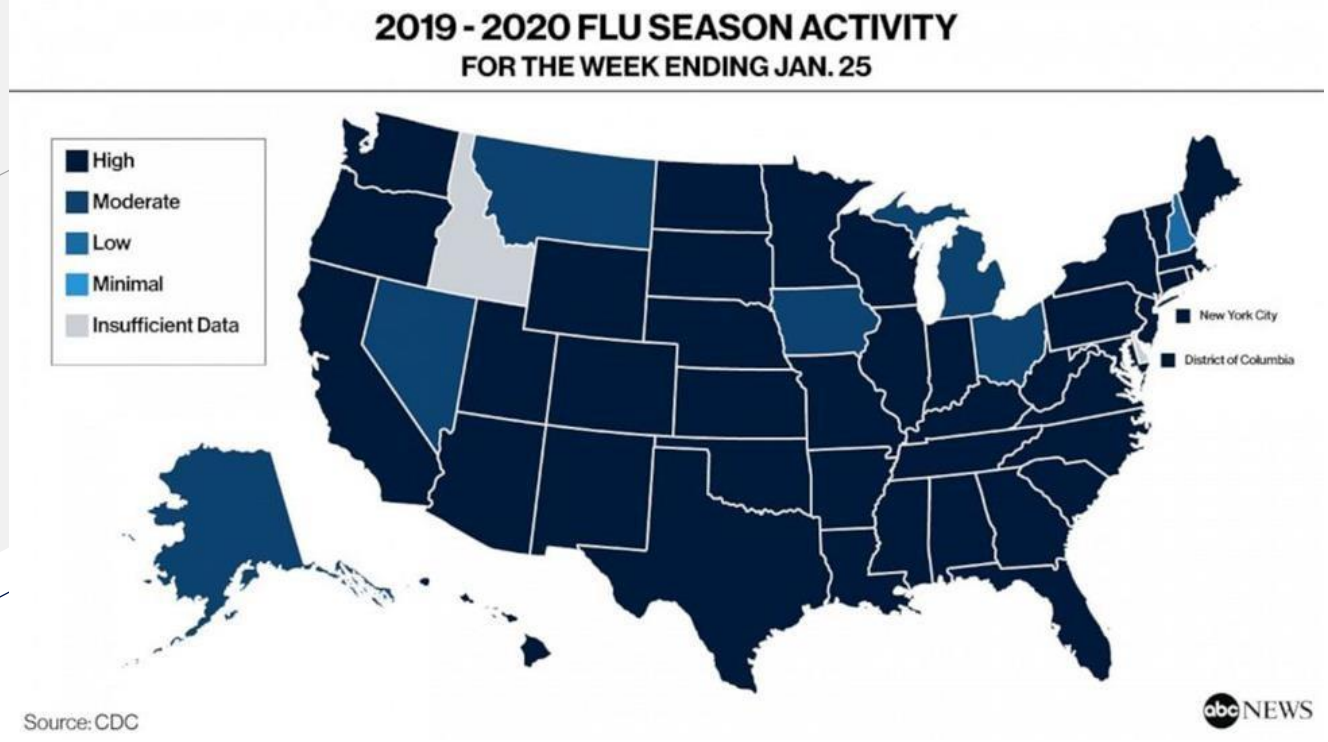
"The chance of a child being shot and killed in a public school is extraordinarily low. Not zero — no risk is. But it's far lower than many people assume… And it's far lower than almost any other mortality risk a kid faces, ***including potentially deadly disease…***

Dollars Spent on Air Quality

Dollars Spent on Security

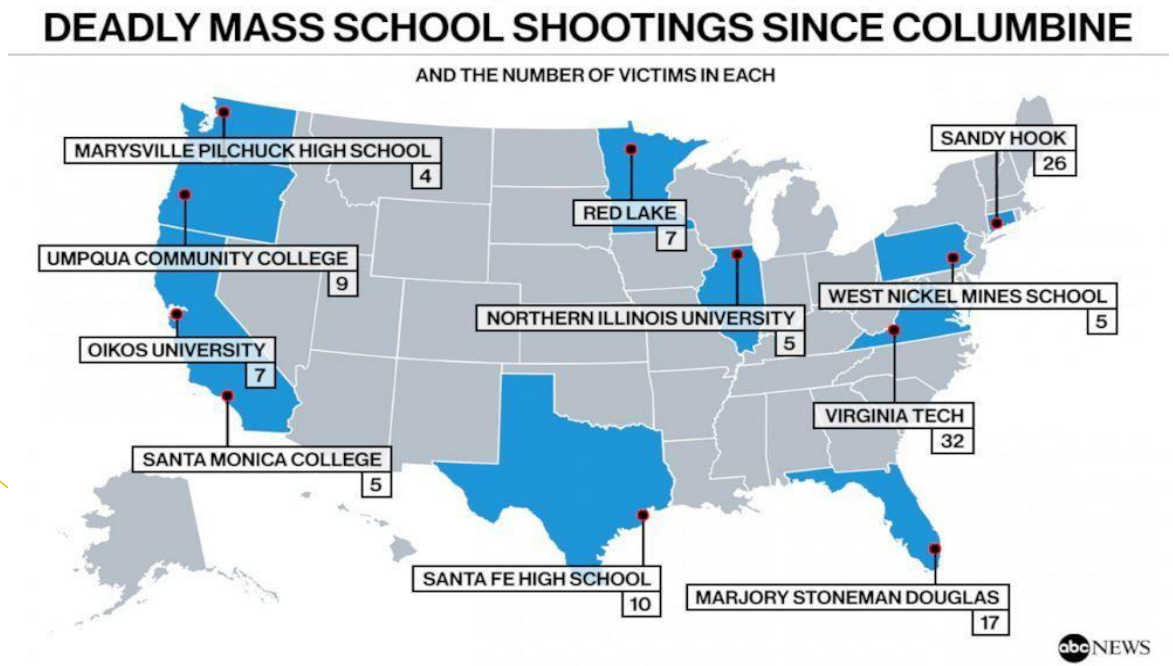
$3 Billion

INFLUENZA: The Silent Killer



Deaths in Children

2010-11 flu season: 123
2011-12 flu season: 37
2012-13 flu season: 171
2013-14 flu season: 111
2014-15 flu season: 148
2015-16 flu season: 85
2016-17 flu season: 110
2018 flu season: 179
9/19-2/20: at least 92 so far



Deaths in Children 2010-2020

The FLU has claimed 5x the number of children's lives than School Shootings.

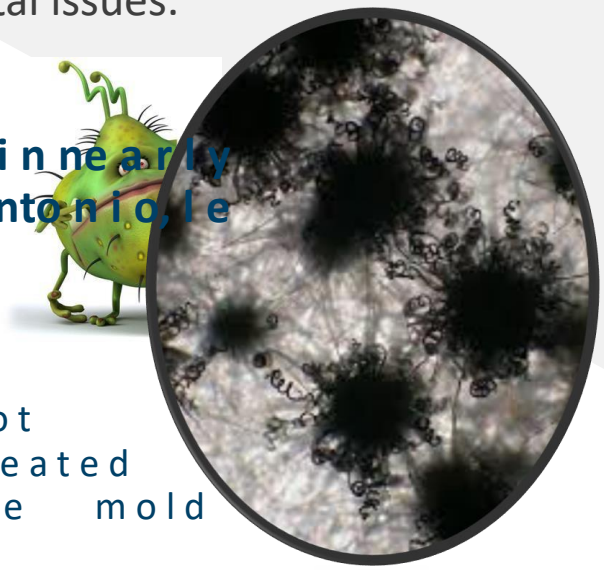
And almost 2x as many as all injuries and deaths combined.

Years	Deaths from Flu	Injuries from Shootings	Deaths from the Shootings
2010-2014	**442**	117	86
2015-2020	**590**	256	107
	1032	**373**	**183**

Military Bases Top Safety & Environmental Issue: MOLD

The Army said inspectors had visited 49 bases and found that residents at 48 of them reported concerns over safety and environmental issues.

The top concern was mold.



A top Air Force commander says mold has been found in nearly 1,200 dorm rooms at a military complex in San Antonio, leading to hundreds of military personnel being housed in hotels.

The combination of the water damage and humid hot weather in Biloxi, Mississippi,created a perfect nestingground for the mold to grow and spread.

Solutions in San Antonio - Ineffective and Fall Short*

Dr. Suzanne Gazda is a neurologist with 30 years of experience in San Antonio. (SBG photo)

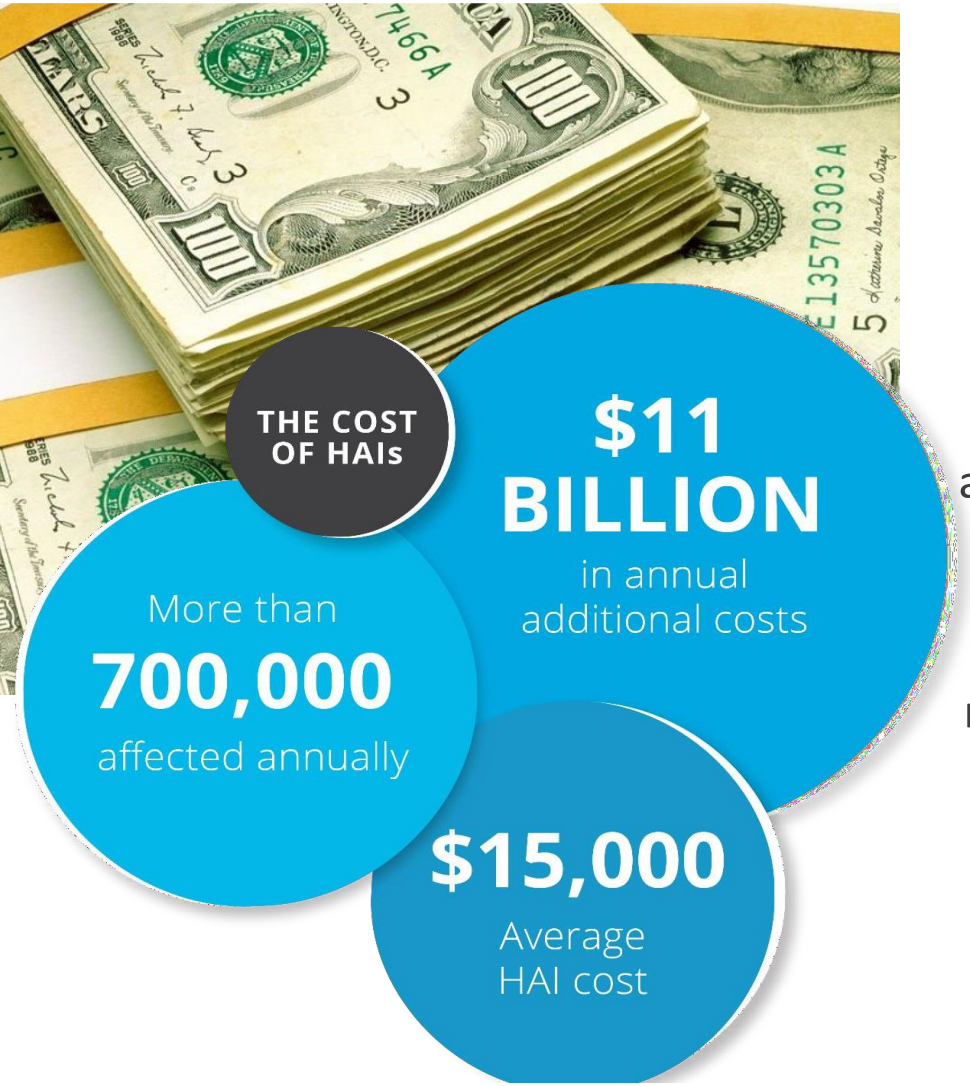
*According to Dr. Suzanne Gazda, a local neurologist, who says the mold problem is an epidemic and questions how the military is removing the fungus.

"Mold is a silent epidemic of the 21st century," Gazda says. "You cannot destroy mold with bleach. You just can't," she says.

"You can't just replace carpet. You can't just replace floorboards. You can't just paint over it. Otherwise we continue to threaten the health of anyone living in that environment."

The Joint Base San Antonio is "treating rooms with a regimen that includes a bleaching process as well as utilizing dehumidifiers, removing and replacing carpet with vinyl planks, and installing ceiling fans at the dorms. It is the largest effort of its kind in the nation.

https://news4sanantonio.com/news/local/mold-problem-on-local-military-bases-has-implications-across-san-antonio



Before COVID-19:

Total direct, indirect
and noTotal direct, indirect
and nonmedical social costs are estimated at about

$96 billion to **$147 billion annually**,

including loss of work, legal costs
and other patient factors.

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$96 billion to **$147 billion annually**,

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and other patient factors.

Facts about Hospital Acquired Infections (HAI)

- HAI's are the 5th leading cause of death in US acute-care hospitals.
- Patients admitted to a hospital have a 5% chance of contracting a HAI.
- The hospital length of stay increases by 17.6 days when patients get a HAI.
- Patients with HAI's are 5x more likely to be readmitted after discharge twice as likely to die.
- Surgical patients who develop HAI's are 60% more likely to require admission to a hospital's intensive care unit

Common Types of HAI's

- 32% = Urinary Tract Infections
- 22% = are surgical site infections
- 15% = pneumonia (lung infections)
- 14% = bloodstream infections

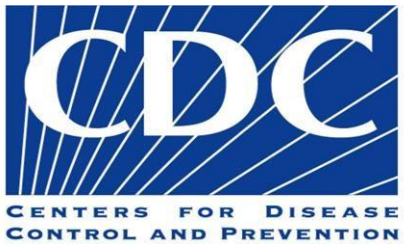
Portable Medical Equipment: A Significant Source of Transmission

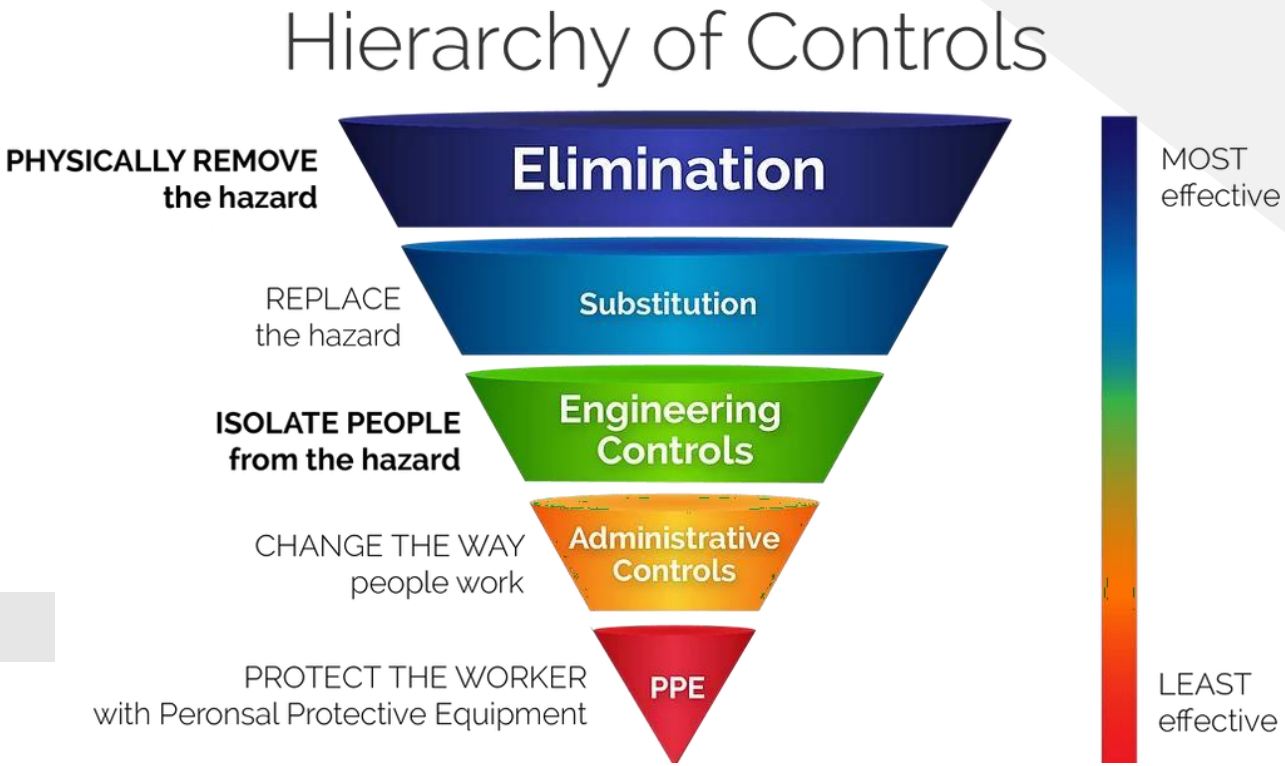
When asked what he thought of the study's results, Jinadatha notes, "Sometimes you are aware of the problem but sometimes you are not aware of the magnitude of the problem.

20 to 40 colonies on every sample

After **manual decontamination**, 25% (23/91) of the tested objects in the ED were found to be culture positive with clinically significant microorganisms(CSO). Fifteen percent (ED) of non-critical equipment tested had multiple organisms.

Eliminating Germs vs Masking Germs





Reference: U. of Nebraska and CDC NIOSHA Taskforce Report Briefing 11, April, 2020

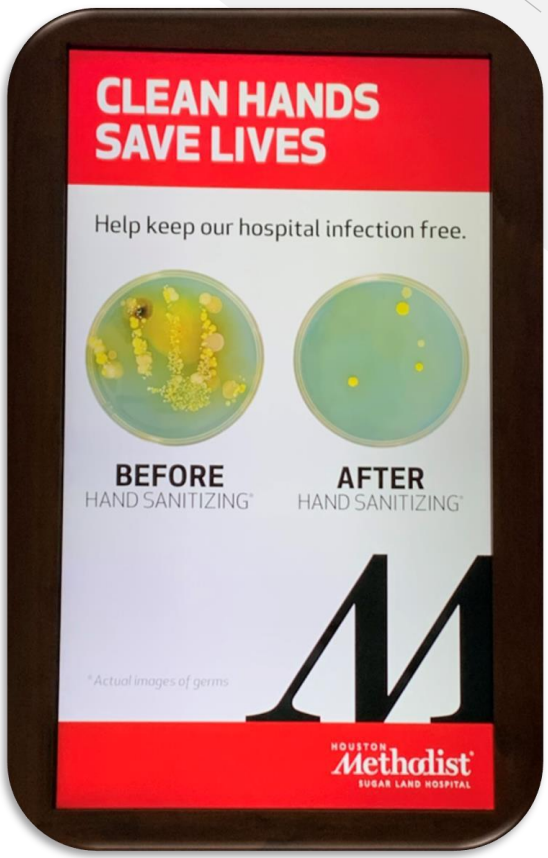
Putting Infection Control in Human Hands?

The #1 Protocol and The TRUTH about how effective it really is

It starts with the hands.

Methodist Hospital is taking steps in *building awareness* with digital billboards

- utilizing attention getting headlines
- utilizing freestanding hand sanitizing stations
- utilizing images with UV light to prove effectiveness of hand hygiene



The Truth about Handwashing

92% of Americans say it is important to wash their hands after going to the bathroom

- Only 66% actually DO
  - Of those that do, 70% only use water, which is ineffective

On any given day, 73 million Americans did not wash and 99 Million only used soap

172.2 million Americans have inadequately washed after going to the bathroom

Custodial Efforts Fall Short

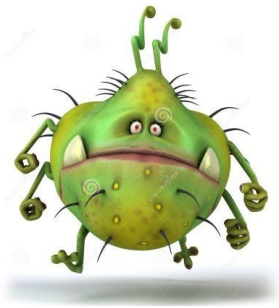
Studies show.... more than **50%** of health care surfaces are not properly disinfected.

Pathogens left behind increase the risk of infection by **39% – 353%** for the next patient who enters the room.

On average, only **25%** of targeted surfaces in 71 operating rooms had been properly cleaned.

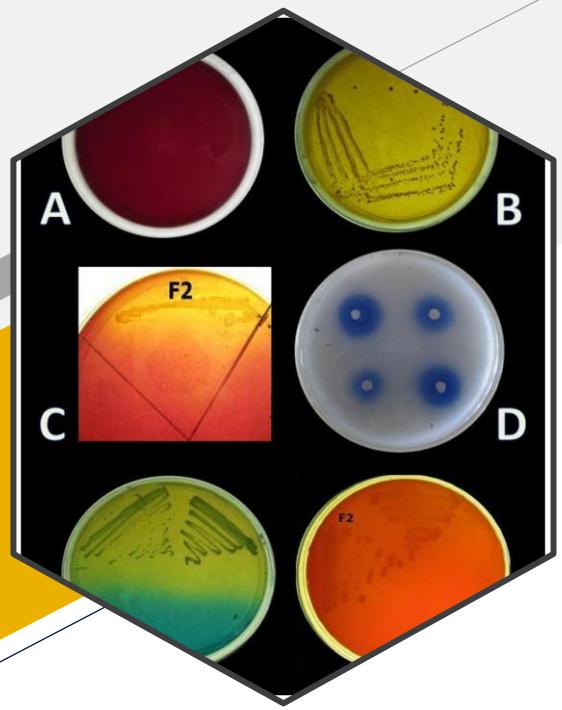
Human Factors

Fort Bend
Conroe



Disinfectants

How effective are they and are they being used properly?



Technology DOES What Humans Don't or Can't

Infection **Prevention** needs **more** than Human Intervention

Controlling COVID: A Multi-Layered Approach

”We can out innovate COVID.“ - Air University/Auburn University

- Remove the hazard
- Replace the hazard
- Engineering
- Isolate from the hazard
- Change the way we work
- Use protective equipment

Innovative Technology

- "We can fight this war with new and innovative strategies and technologies to help heal our country."

- "**Unlike vaccine and treatment strategies**, clean air technology has the potential to mitigate risk and impact the current crisis as well as **serve as a known line of defense for future airborne threats."**

Passive Technologies

Filtering

Ionization …

Micro-wave field

Electronic Air "Cleaners"

UV Lights … issue with distance from UV bulb and exposure time

Portable Filtration units …small rooms, inefficient, ineffective, & costly to operate

Filters & plates become constant source of pollution, high maintenance & cost,

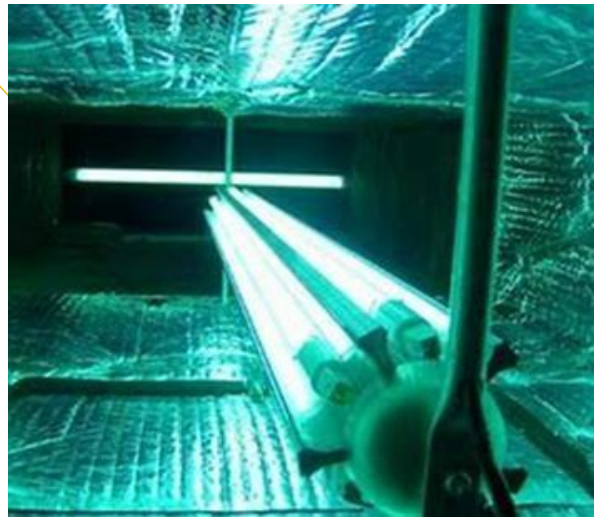
limited effect on VOCs, odors, bacteria, viruses, mold & mildew

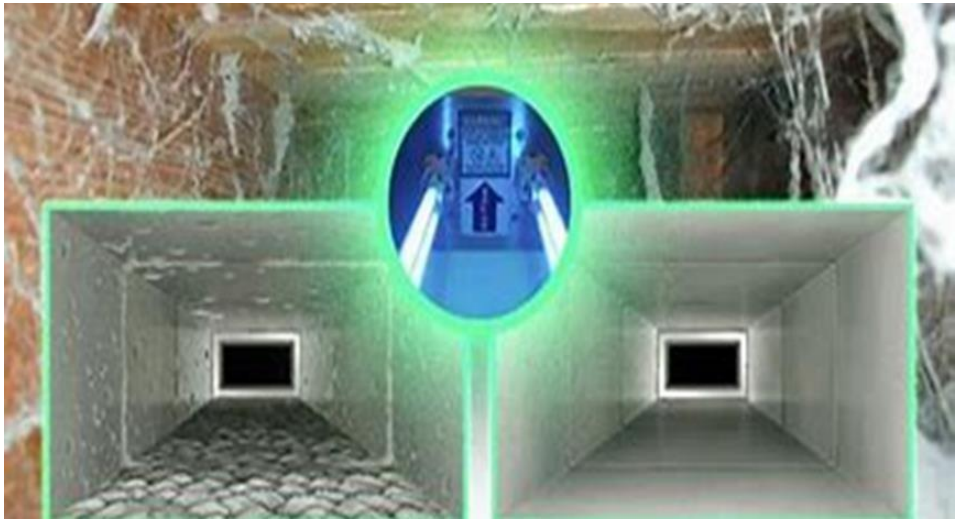
An Empty Room

Air exchanges/hour (ACH) and time requiredfor airborne-contaminantremoval

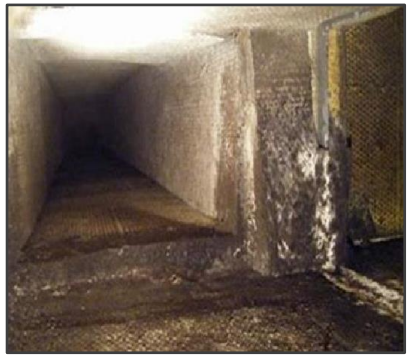
The number of air changes per hour and time and efficiency.		
ACH § ¶	Time (mins.) required for removal 99% efficiency	Time (mins.) required for removal 99.9% efficiency
2	138	207
4	69	104
+ 6	46	69
8	35	52
+ 10	28	41
+ 12	23	35
+ 15	18	28
20	14	21
50	6	8

UV installed in Ductwork

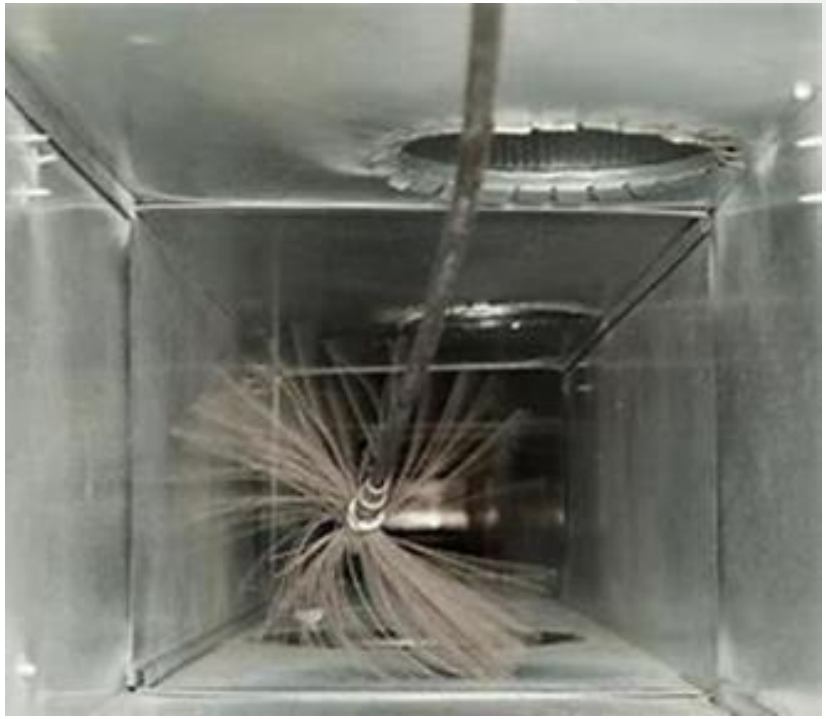




Mold accumulates in Ductwork



Cleaning Air Ducts



UVC Technology

Temporary Solution to a Continuous Problem

Room must be unoccupied during decontamination. UVC is only good on surface contaminants.

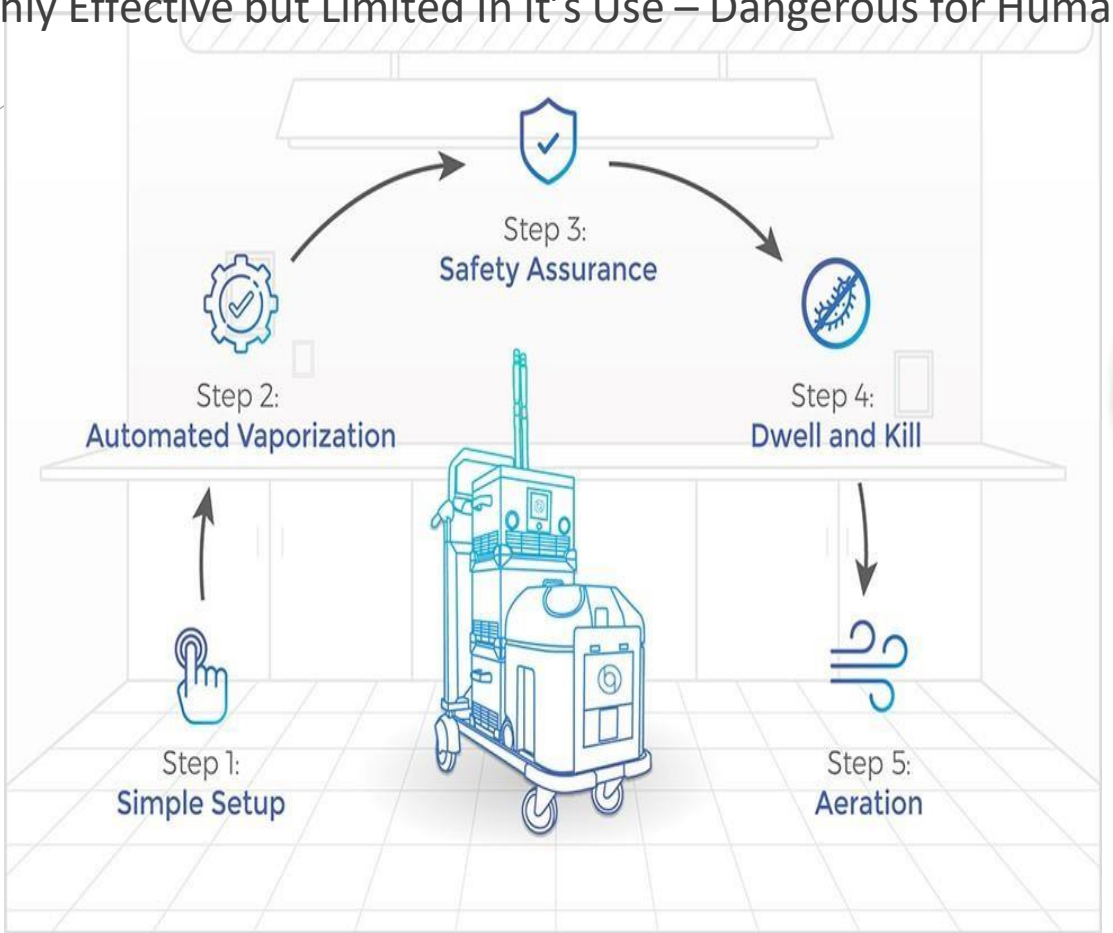
Average total cycle time = 15 - 25 minutes. Bathrooms typically require four to seven minutes.

For every inch light travels from a UV system its power exponentially weakens.

Another method of disinfection.

Hydrogen Peroxide Vapor System

Highly Effective but Limited In It's Use – Dangerous for Human Exposure

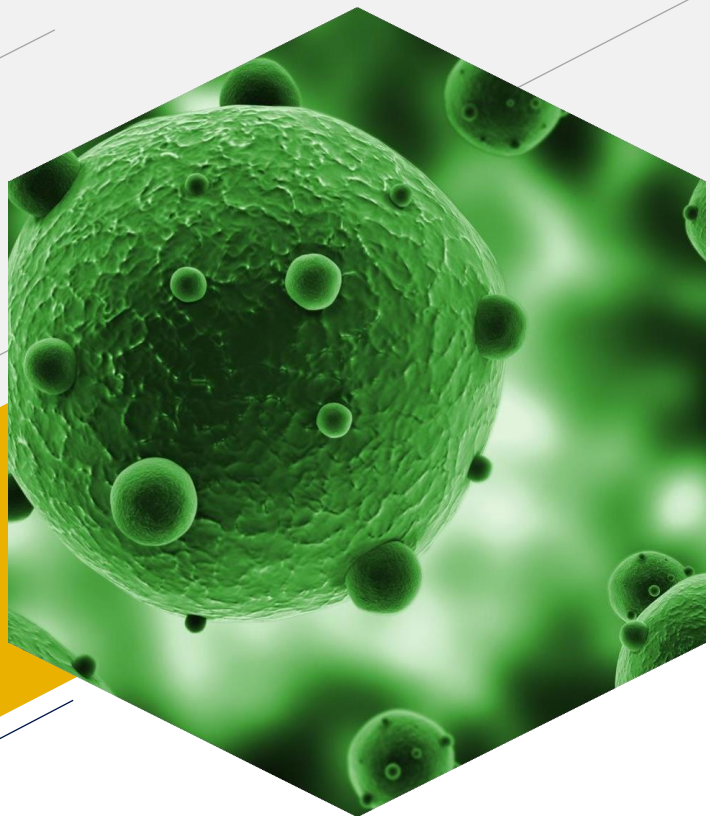


Setting A New Standard

"I have been in the education business 35 years and never used a sprinkler. I worry about mold, mildew, viruses and bacteria every day."

David Faltys Carroll ISD

It's time to start



Needs lead to…
Opportunities for Disruption.

Disruptive Innovation:

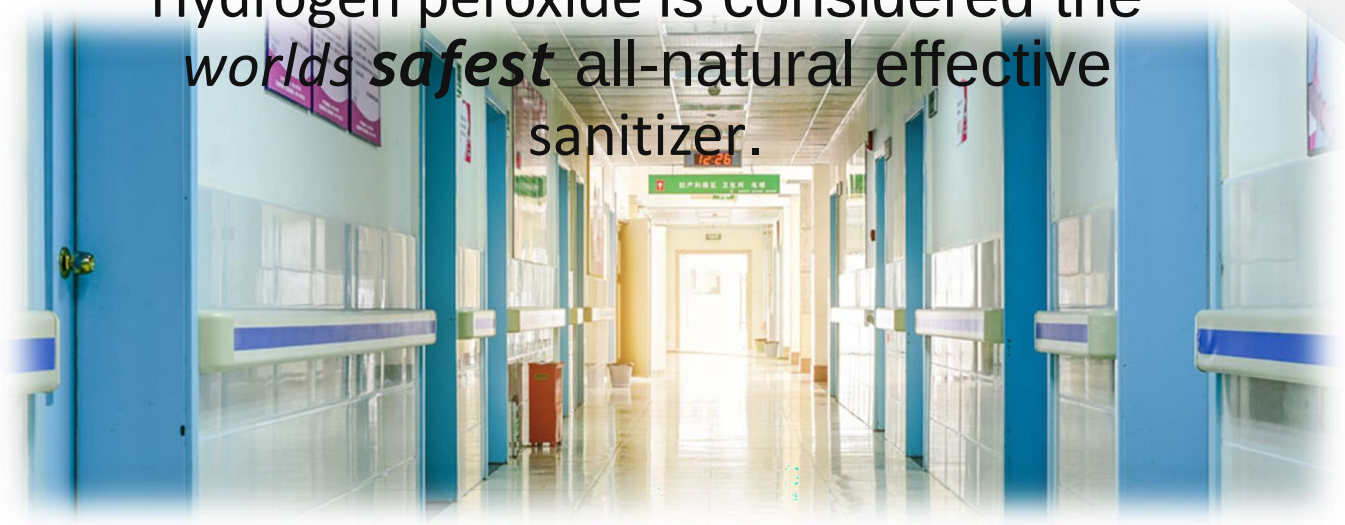
Kills germs, viruses, bacteria, mold and fungi.

Continuous Infection Control
Continuous Automated Prevention
Comprehensive, Proven Technology

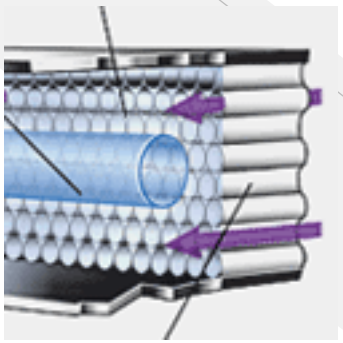
Kills Germs, Viruses, Bacteria, Mold, Mildew & Fungi

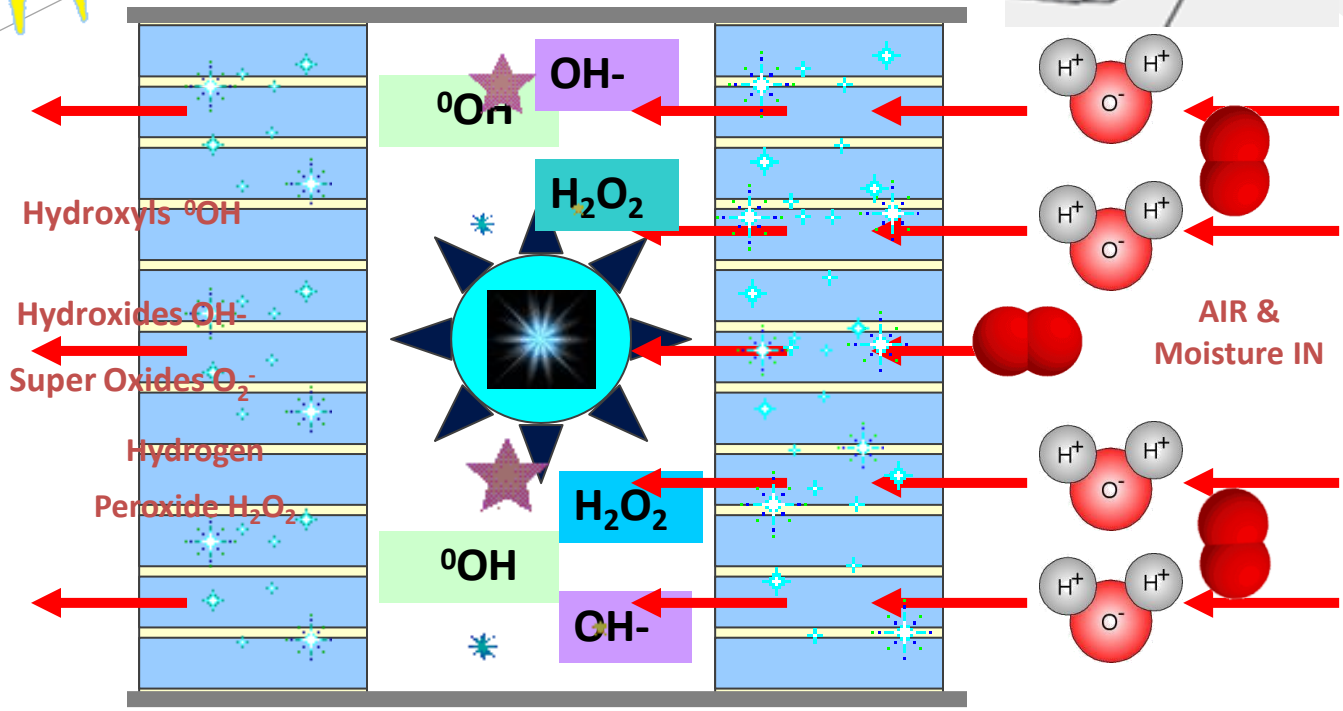
24/7/365

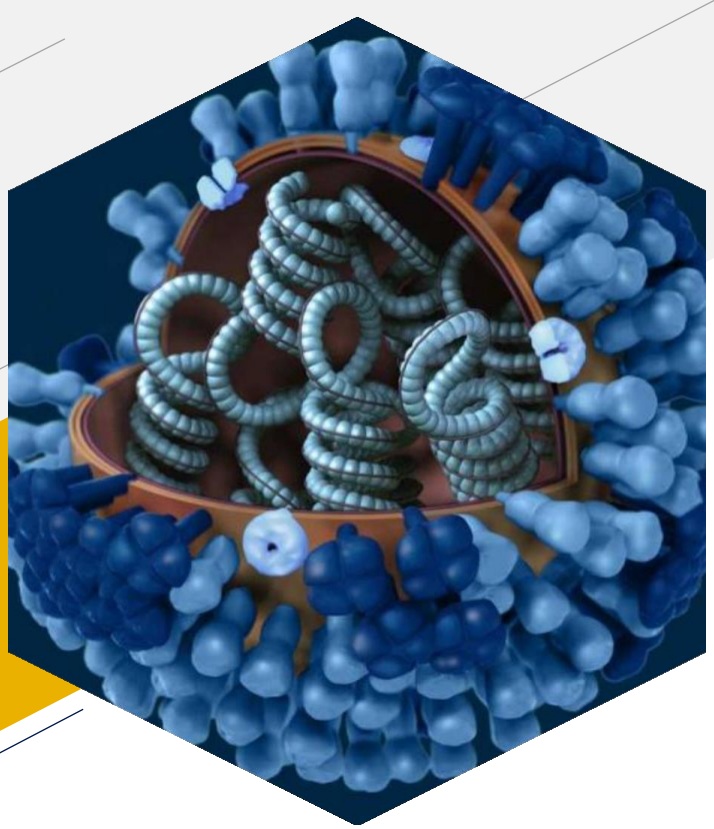
Hydrogen peroxide is considered the *worlds* ***safest*** all-natural effective sanitizer.



The Process in Action: Seek & Destroy







Safety, Clinical Trials, Research & Testing

Available

CAVALRY

AIR CARE

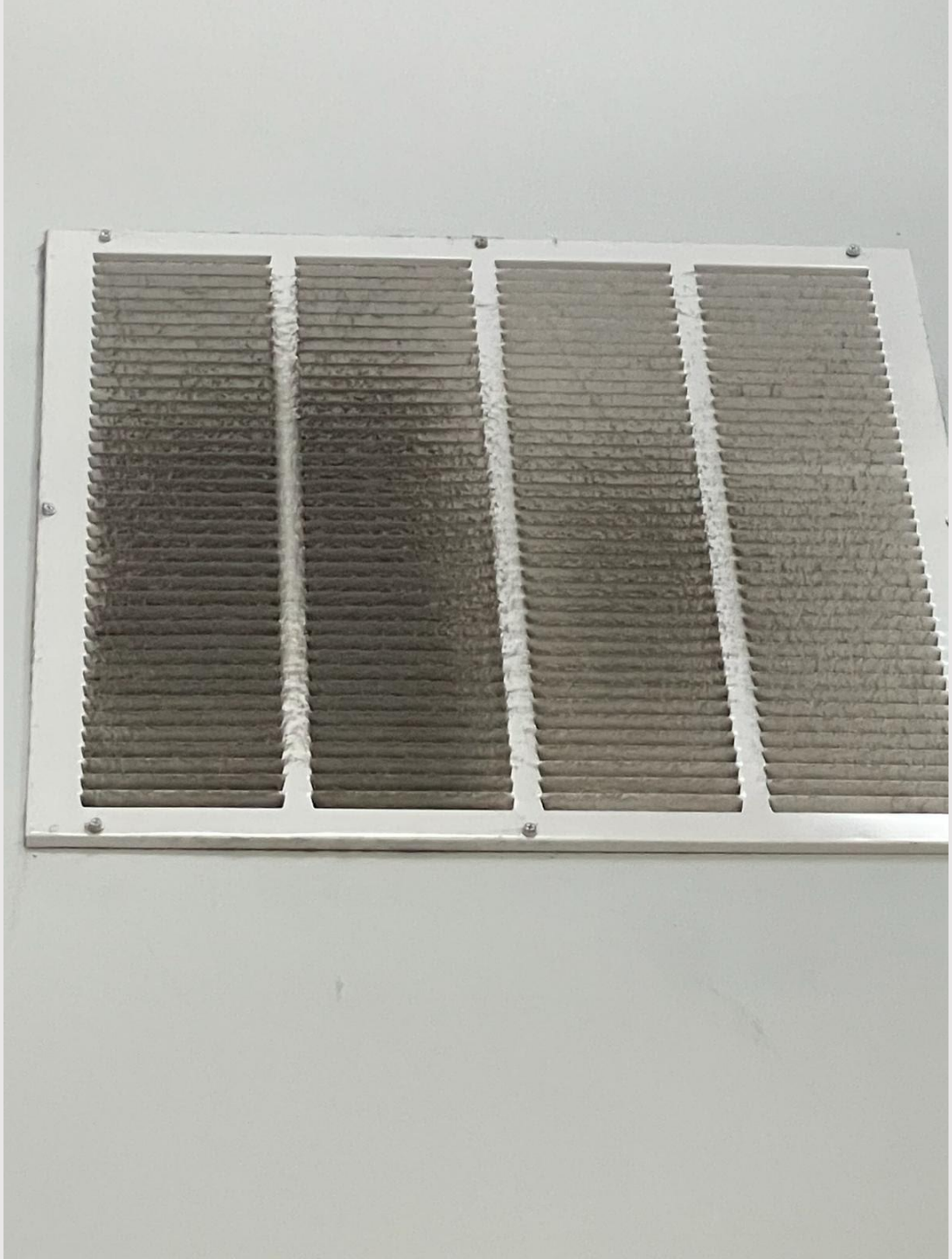
Why Clean the HVAC System and Air Ducts?

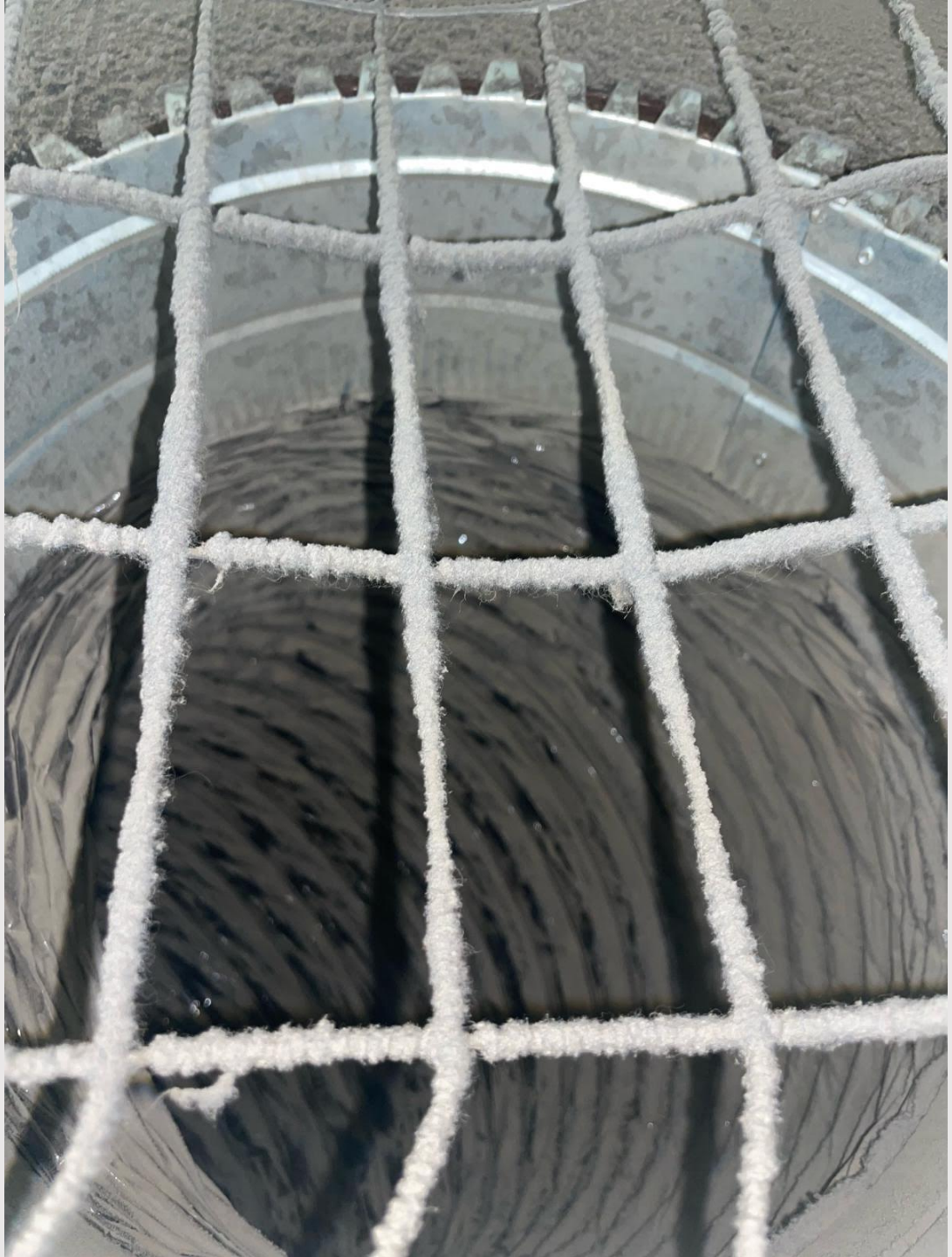
Answer: Because they get dirty!

Think of the HVAC system as the lungs of the home or building.

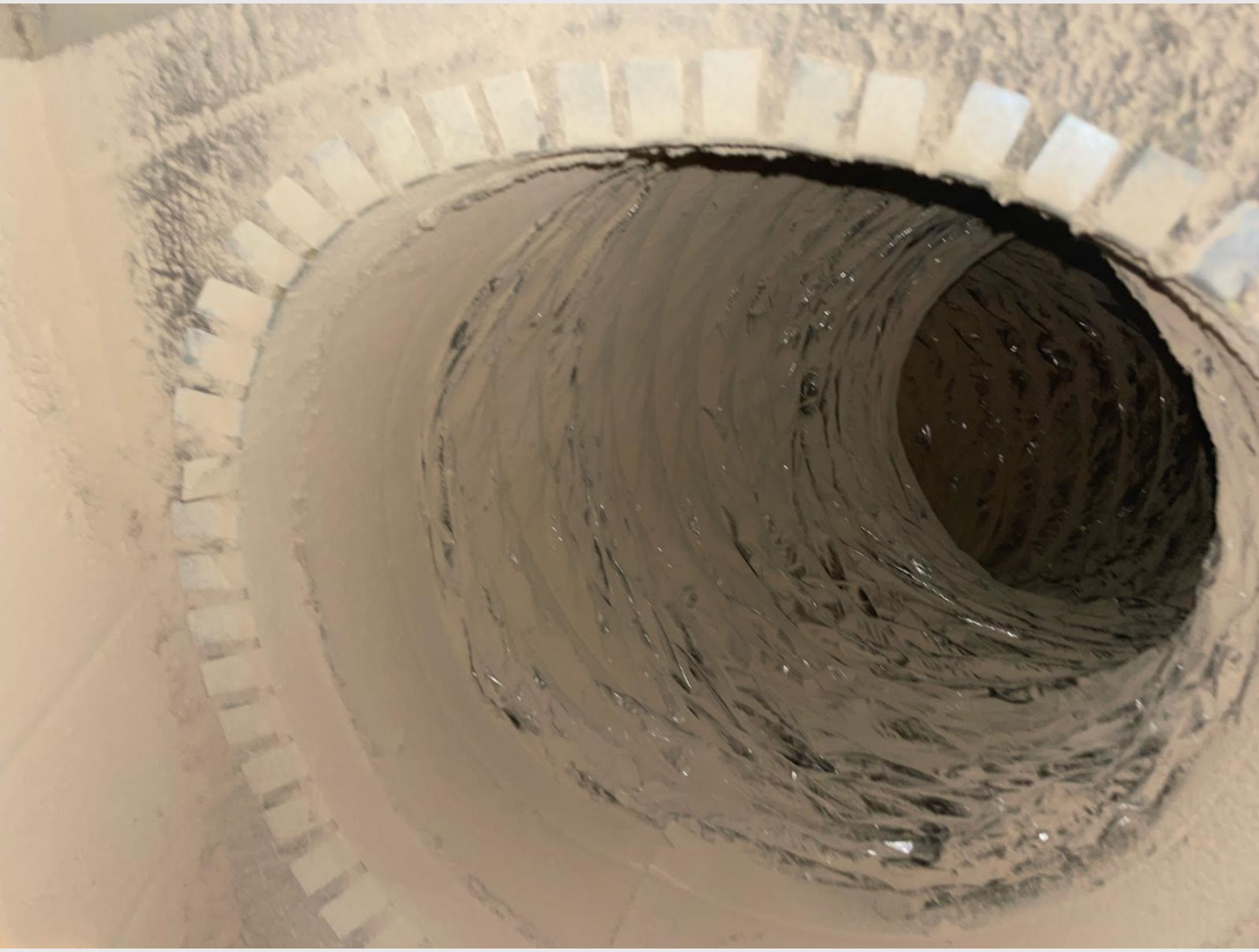
Every time the system cycles on…..

- Dirt
- Dust
- Pet hair and dander
- Smoke
- Mold
- Construction/Renovation projects






Crop




EXIT

Do you want to breathe this air?

When should you clean your HVAC and Ventilation System?

- Over 10 years since last cleaning
- Recent construction or renovation
- System taking longer to cool home or business
- Occupants with allergies, asthma or respiratory conditions
- Odors
- Excessive dust
- Black dust or spots around air vents
- Young children or elderly persons in home

Allergy and asthma sufferers, young children and the elderly tend to be more susceptible to the types of poor indoor air quality that HVAC and proper air duct cleaning can help address.

In 2003, the US Department of Energy endorsed HVAC cleaning citing that "Contaminant accumulation on fan blades, duct surfaces and filters results in decreased system efficiency and inadequate airflow".

A dirty system must work harder which also shortens the lifespan of the equipment. When a system is clean, it doesn't work as hard resulting in lower energy bills.

Air duct cleaning is a misnomer.

- Failure to clean all components of the HVAC system can result in recontamination, thus minimizing the benefits of cleaning.
- Just as you wouldn't clean only half of your living room floor, you also wouldn't want to clean only part of your HVAC system.

Air Ducts	Heat Exchanger
Coils	Blower Assembly
Drain Pans	Air Filter
Register	Grills
Air Plenum	Return

Our process:

NADCA

The HVAC Inspection, Maintenance and Restoration Association

There are two key components to HVAC cleaning.

1. Breaking contaminants loose
2. Collection of contaminants

Breaking Contaminants Loose

Properly cleaning HVAC systems requires removing the sources of contamination. Source removal begins with the use of one or more agitation devices designed to loosen contaminants from the surfaces within the heating and air conditioning system. Examples of agitation devices include: brushes, air whips and compressed air nozzles or “skipper balls.” Agitation can also be achieved through hand-brushing or contact vacuuming.

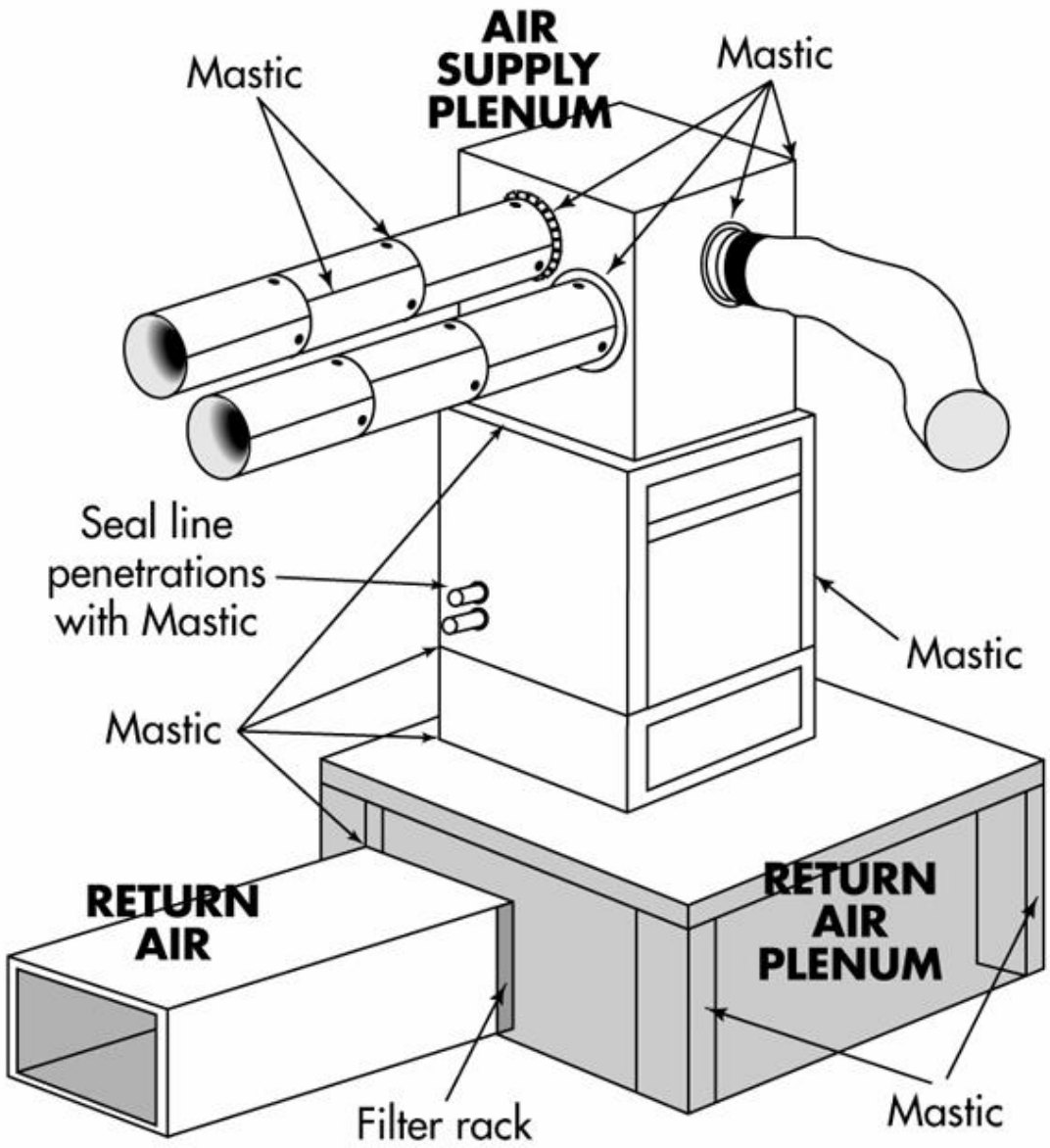
Collection of Contaminants

During cleaning, the entire HVAC system is placed under continuous negative pressure (a vacuum) to prevent the spread of contaminants. Continuous negative pressure allows very fine particles to be removed from the system as they become airborne, ensuring that these particles are not released into the living space when the system is turned on after cleaning. This negative pressure also serves to extract the loosened contaminants, which are collected and removed from the system.

The Cavalry Air Care 12 Step Cleaning Process
HVAC System and Air Duct Cleaning

1. Technicians arrive in PPE gear
2. Set up protective equipment to include HEPA air purifier
3. Protective coverings on entryway and floors of home or business
4. Place protective plastic covering over personal property under air vents
5. Prep and clear clean plenum, supply, return and distribution boxes
6. Clean evaporator coil and blower
7. Remove, clean and disinfect all grills and registers and re-install
8. Clean and disinfect drop down boxes
9. Clean duct whips and compressed air and HEPA vacuum
10. Clean condenser coil
11. Perform electrostatic disinfection with antimicrobial fog of HVAC system
12. Cleanup -Remove prep material, coverings and vacuum work areas

Air Handler


AIR SUPPLY PLENUM
Mastic
Mastic
Seal line penetrations with Mastic
Mastic
Mastic
RETURN AIR
RETURN AIR PLENUM
Filter rack
Mastic

Our Mission

It is our goal to make it as easy as possible to help you ensure that the air that you breathe in your home or business is healthy.

We're a local, Veteran owned company with San Antonio's best interests at heart. If you're looking for a team that understands the meaning of hard work, look no further. Our technicians are highly qualified, experienced and professional. We never cut corners — it's not how we operate. Our standards of excellence are at the core of who we are, so you can be confident that we treat you and your home with the utmost respect.

Michael Chestney and Jason Madero
Owners

Veteran Owned

CAVALRY
AIR CARE

CAVALRY
AIR CARE

Take Our Survey!