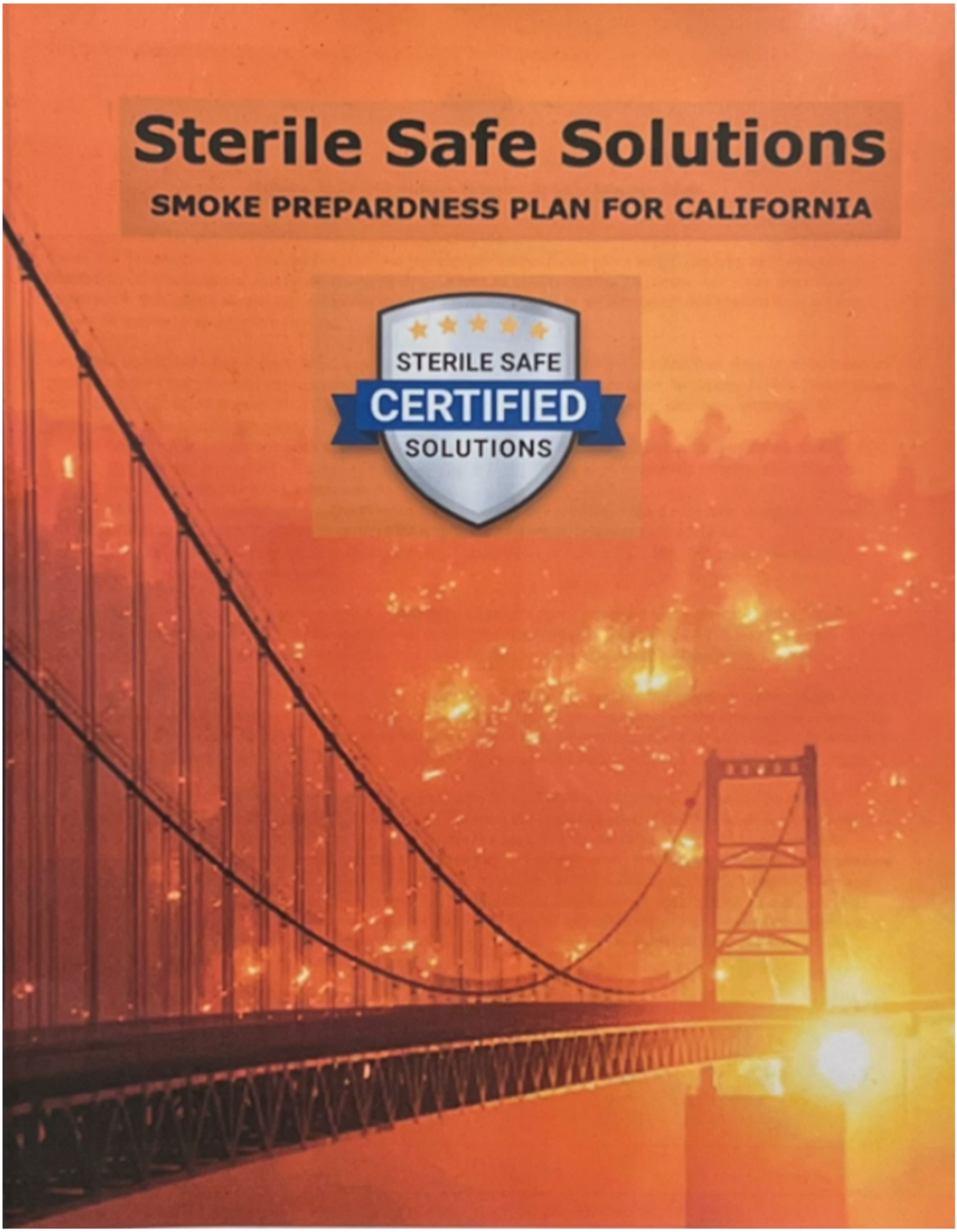
Sterile Safe Solutions

SMOKE PREPARDNESS PLAN FOR CALIFORNIA



Sterile Safe Solutions™
Smoke Preparedness Plan

The purpose of this plan is to outline an augmentation of existing hospital HVAC systems (while adhering to relevant California Codes and design standards) and combine it with an "emergency methods and procedures strategy" to enable hospitals to continue normal operations during severe outdoor air quality events. These events include any outdoor occurrences that create excessively unhealthy outdoor air, such as wildfire smoke, making outdoor air ventilation detrimental to improving indoor air quality.

The *Division of Occupational Safety and Health (DOSH)* or *Cal/OSHA* requires that when California's protection from wildfire smoke standard is in effect, steps must be taken to protect workers from harmful exposure to the harmful pollutants contained within the unhealthy air.

News release number 2020-71, *Protecting Outdoor Workers Exposed to Smoke from Wildfires*, dated August 20, 2020, states: *Smoke from wildfires contains chemicals, gases and fine particles that can harm health. The greatest hazard comes from breathing fine particles in the air, which can reduce lung function, worsen asthma and other existing heart and lung conditions, and cause coughing, wheezing and difficulty breathing.*

"If the Air Quality Index (AQI) for PM2.5 is 151 or greater, employers must take the following steps to protect (employees)."

- *Communication* – Inform employees of the AQI for PM2.5 and the protective measures available to them.
- *Training and Instruction* – Provide effective training and instruction to all employees on the information contained in Section 5141.1 Appendix B.
- *Modifications* – Implement modifications to the workplace, if feasible, to reduce exposure. Examples include providing enclosed structures or vehicles for employees to work in, where the air is filtered.
- *Changes* – Implement practicable changes to work procedures or schedules. Examples include changing the location where employees work.

Also, California Ventilation Code, Section *402.1.3, Ventilation in Health Care Facilities,* directly references the "*Facility Guidelines Institute Guidelines" (FGI)* for the hospital ventilation requirements under Title 24. FGI also publishes "*Guidance for Designing Health and Residential Care Facilities that Respond and Adapt to Emergency Conditions.*"

From *page 248* of the above-referenced document, under the *wildfire event section*, the guideline recommends during a wildfire smoke condition, "*Consider closing outside air dampers to reduce the amount of smoke entering the facility. This action needs to be weighed against its impact on building and space pressurization.*" These recommendations were implemented at Scripps Health in San Diego – see page 535 of the above-linked document. (link https://tinyurl.com/2r9jjtbk)

Wildfire smoke and the proposed response recommendations by Cal/OSHA and Facility Guidelines Institute pose significant challenges for healthcare institutions that do not have the option of ceasing

operations or putting everyone on respirators. Healthcare institutions must be able to withstand severe outdoor air quality circumstances to prevent adverse impacts on their indoor environments.

It is, therefore, crucial that healthcare institutions have a smoke preparedness plan to achieve that objective. With an ideal preparedness plan in place, the hospital's indoor environment can be maintained ***indefinitely*** at ideal indoor air quality levels. In addition, if the preparedness plan is executed correctly, the hospital can also avoid extreme response strategies, including using individual respirators, relocating patients and staff, abandoning the use of various spaces within the facility, and/or shutting down the entire facility. The *Sterile Safe Solutions' Smoke Preparedness Plan* offers this capability.

Preparedness Plan Objectives

1. **Provide the means of monitoring outdoor and indoor air quality** in order to quickly and effectively detect conditions where the preparedness plan should be enacted. This provides the ability to conform to Title 8 and the Facility Guidelines Institute requirements for identifying an emergency situation and validating an effective response plan.

    a. *California Title 8, Chapter 7, Wildfire Smoke Response Section 5141.1* identifies criteria for when protections from wildfire smoke (or particulate matter concentration) must be introduced. *Title 8* identifies a situation where the Air Quality Index (current AQI) for PM2.5 is 151 or greater, regardless of the AQI for other pollutants.

        i. *Title 8* states that an employer must demonstrate that the concentration of PM2.5 in the air does not exceed a concentration that corresponds to a current AQI of 151 or greater by measuring PM2.5 levels at the worksite in accordance with Appendix A.

    b. The *Facility Guidelines Institute* states in the "*Guidance for Designing Health and Residential Care Facilities that Respond and Adapt to Emergency Conditions*" the following:

        i. Identify all possible scenarios or events that could affect the healthcare facility during an active wildfire. Potential concerns include "poor air quality due to wildfire smoke."

        ii. Monitoring indoor air quality will be essential to identify events that could affect the facility correctly.

2. **Provide gaseous contaminant filtration to maintain acceptable indoor air quality** in response to conditions that require outdoor air intake dampers to reduce or close off air intake. Since wildfire conditions can last for weeks or months, requiring the strategy to be sustainable for lengthy durations is absolutely necessary. Thus, the objective is to have a solution to provide acceptable indoor air quality for an indefinite timeframe.

    a. The gaseous contaminant filtration would serve as a substitute for outdoor air ventilation during emergency conditions that require intervention. These filtration devices clean or scrub the indoor air (as opposed to diluting it) of the typical emissions of concern that occur in occupied indoor spaces from people, products, and building

materials (in addition to scrubbing contaminants that may be introduced by contaminated outdoor air).

b. Proper building pressurization would still require a minimum volume of outdoor air introduction in accordance with the healthcare institution's needs.

3. **Provide the greatest possible particulate filtration efficiency** that can be incorporated into existing HVAC equipment to capture the smallest particulate matter introduced into the indoor space.

a. During an emergency situation, a minimal amount of outdoor air will be required to maintain proper facility pressurization. Consequently, some of the outdoor air contaminants will enter the HVAC equipment. Therefore, t he highest filtration efficiency possible should be incorporated to remove even the smallest particulate matter at the highest possible efficiency rate.

i. In a study conducted in conjunction with the *U.S. Department of Agriculture Forest Service, Pacific Northwest,* smoke particulate size, and weight were identified.[1] In addition, the following observations were reported:

1. *"Our airborne measurements of particle size distributions produced some surprises. As in previous studies, a peak in the mass concentration of particles centered around particles 0.25-0.3 µm in diameter. Particle concentrations were dominated by large numbers of Aitken nuclei (median number diameter ≈0.15 µm)."*

2. *"The measurements of the particle size distributions from 0.01 to 4500 µm in diameter permit particle fluxes to be determined over any reasonable number of size intervals for all of the cross sections…"*

b. Providing the highest efficiency filtration possible also provides the most effective means of capturing airborne pathogens to reduce transmission potential significantly.

i. Scientific research shows that the coronavirus is approximately .3 µm in size. Therefore, the more efficiently the filtration can capture particulate of this size, the less chance of transmission exists.

4. **Provide air curtains** on necessary, non-emergency exit and entrance locations.

a. The preparedness plan should include limitations on active entry and exit points for the facility in order to reduce uncontrolled infiltration of outdoor contamination into the building.

[1] *Source: Airborne Monitoring and Smoke Characterization of Prescribed Fires on Forest Lands in Western Washington and Oregon: Final Report Lawrence F. Radke, Jamie H. Lyons, Peter V. Hobbs, Dean A. Hegg, David V. Sandberg, and Darold E. Ward United States Department of Agriculture Forest Service Pacific Northwest Research Station General Technical Report PNW-GTR-251 March 1990.*

b. However, individuals will still need to enter and exit the hospital. If the number and locations of entry/exit points are controlled and limited, measures can be put in place to limit the negative impact of doors being opened.

c. Air curtains are proven to be practical and effective barriers to outdoor air entering a space. Therefore, introducing these in the locations where entry and exit are permitted during the emergency preparedness plan will further reduce the impact of severe outdoor air quality on indoor spaces.

Prescriptive Measures To Achieve Objectives

1. **Introduce Indoor and Outdoor Air Quality Monitoring** throughout the facility. The success of the smoke preparedness plan depends upon the rapid identification of outdoor and indoor air quality conditions that require the plan to be implemented. Based on *Title 8 Chapter 7, Wildfire Smoke Response Section 5141.1*, the plan must be implemented when the Air Quality Index (current AQI) for PM2.5 is 151 or greater. This requires active measurement and reporting of PM2.5.

    a. To achieve this active measurement, *Sterile Safe Solutions™* will introduce and install a network of Indoor and Outdoor Air Quality monitors that wirelessly interface to a management dashboard. The system will measure contaminants of concern and alert staff to take necessary action.

    When wildfire smoke is detected through the outdoor air sensors, the situation can be monitored to ensure the PM concentration does not rise to the levels that would require intervention. If it does, the systems will alert the facility management team to the situation, and the preparedness plan can be quickly enacted.

    Further, while the preparedness plan is in place, the monitoring system will detect any rise in particulate matter or other air quality anomalies trending higher than expected within the hospital. For example, this may indicate an open window, cracked door, or additional unexpected entry of outdoor air. The facility staff will rapidly be notified of the situation through the monitoring system and can immediately proceed with corrective measures.

    b. The system includes the following capabilities:

        i. **Air Quality Anomaly Measurement**: The *AirThings for Business View Plus* sensor network measures C02, Radon, VOCs, PM1, PM2.5, Relative Humidity, Air Pressure, Temperature, Light, and Noise. These sensors cover all indoor air quality anomalies of concern for improving occupant health.

        ii. **Virtual Sensors**: Furthermore, *Airthings* utilizes the measured data to formulate risk levels for certain conditions that can evolve in indoor spaces. For example, the system offers the following indicators:

            1. **Mold Risk virtual sensor**: The mold risk indication seamlessly complements existing sensor functions of monitoring airborne chemicals,

humidity, and temperature. *Airthings* mold risk indication is based on the ASHRAE mold index - the leading global organization focused on setting standards for health and safety through air quality.

2. **Virus Risk virtual sensor**: The *Airthings Virus Risk Indicator* combines data from sensors that monitor CO2, humidity, and temperature into a proprietary algorithm, calculating the risk level of virus transmission in a building. It evaluates four risk factors that correlate with airborne virus spread: virus survival rate, the body's natural defense, room occupancy, and ventilation rate. It promotes indoor environments where people thrive, but viruses don't.

iii. **Data Collection and Trending Dashboard**: The *Airthings Dashboard* gives you the air quality data you need to take action immediately. With on-demand access to current and historical data, you can optimize ventilation and air quality within your building, ensuring you provide a healthy and productive environment for all its users. In addition, administrators can set up and receive automated alerts should indoor conditions change and air quality deteriorates.

iv. **The Airthings API** contains all commands and information needed to pull sensor and device information into an owner's platform to act on real-time values or retrieve historical information from the *Airthings Cloud*. A secure connection to the *Airthings Cloud* through the API ensures that data is only available to authorized users. Easily access device and sensor data through the REST API or subscribe with the Webhook. In addition, *AirThings* never locks away data in proprietary protocols or closed systems, which allows use of sensor data in an existing B.I. solution or as an input to a BAS or BMS.

v. **Generation of custom IAQ reports** sharing with your business or export data as a CSV file for further analysis. Ideal if you need to demonstrate proof to enable action. The ability to process data and share it in a format easily comprehendible to individuals of various technical backgrounds is advantageous to responding to quickly changing conditions affecting hospital operations. Problems can be identified instantly, allowing corrective measures to be implemented before impacting occupant health.

2. Reducing OA Safely During Wildfires and Emergency Events by utilizing *Sorbent Ventilation Technology Filters* when outside air needs to be reduced during Wildfire emergencies, per FGI Guidelines within Title 24.

a. *Title 24, Section 402.1.3, Ventilation in Health Care Facilities* of the California ventilation code, directly references the "*Facility Guidelines Institute Guidelines*" (FGI) for the hospital ventilation requirements. FGI also publishes "*Guidance for Designing Health and Residential Care Facilities that Respond and Adapt to Emergency Conditions*."

i. From *page 248* of that document, under the wildfire event section, the guideline recommends that during a wildfire smoke condition, "*Consider closing outside air dampers to reduce the amount of smoke entering the*

facility. This action needs to be weighed against its impact on building and space pressurization."

These recommendations were implemented at *Scripps Health in San Diego* (see page of the sourced document). *Sorbent Ventilation Technology* is similar to activated carbon but more efficient on gaseous contaminants (like Co2, Formaldehyde, and other COCs present in smoke/indoor environments) and requires less frequent maintenance. This technology will mitigate the negative IAQ impacts of reducing outside air by controlling contaminants of concern within the building envelope.

c. Recommendations from *California Title 8, Chapter 7, Wildfire Smoke Response Section 5141.1* state that, if feasible, provide an enclosed location with filtered air so that employee exposure to PM2.5 is less than a current AQI of 151.

However, with general filtration technology aimed at particulate matter filtration, the proposed solution would only be temporary, as emissions from occupants and building materials would begin concentrating to unhealthy levels, rivaling the health risks of the outdoor air.

Sorbent Ventilation Technologies can capture CO2 and a wide range of contaminants that accumulate in indoor spaces to help ensure that indoor spaces maintain IAQ limits below the California Hospital Association/OSHA's guidelines (i.e., 5,000ppm for Co2).

i. As we know, wildfire events can last for weeks or longer. Therefore, an effective, longer-term solution that involves reducing outdoor air introduction must incorporate the capability to filter indoor gaseous emissions and the particulate matter and gaseous contaminants introduced through outdoor air. Particulate filtration alone will not achieve this objective as it has a limited impact on gaseous outdoor and indoor contaminants. Further, some level of outdoor air will be required to achieve adequate building pressurization, so the indoor space cannot be completely closed off.

c. To achieve this objective, *Sterile Safe Solutions™* will introduce *enVerid HLR Sorbent Ventilation Technology (SVT)* modules on the facility air handlers to be operated during emergencies.

i. Introducing these modules achieves two critical objectives:

1. The amount of outdoor air normally introduced for building ventilation can be reduced to near the level required for building pressurization during emergencies. Reducing OA per 402.1.3 Ca guidelines reduces smoke particulate and harmful gas infiltration.

2. One (1) HLR module is designed to clean air in spaces up to 20,000 square feet and enable the building controls to be adapted to reduce to minimum

outdoor air levels (building pressurization) when outdoor air is of poor quality. Each HLR is designed to provide scrubbing of indoor air equivalent to 1,800cfm to 2,500cfm of clean outside air being brought into the space during normal operation.

3. SVT technology may be used to keep indoor contaminants of concern below their established limits indefinitely when installed and maintained as intended. This includes a wide range of occupant and building material emissions that would concentrate without a ventilation method. With HLR modules in place, the facility can operate consistently in the "smoke preparedness" reduced outdoor air mode until the outdoor AQI returns to normal levels.

4. *The Worker Safety and Health in Wildfire Regions* document provides an exception to providing O.A. in emergencies. It notes, *"Employers should usually avoid eliminating or substantially reducing the outdoor air supply in office buildings and other indoor workplaces. This differs from advice given to members of the public by environmental and public health agencies when affected by wildfire smoke indoors."*

a. The reasoning behind this recommendation makes sense, as particulates are not the only contaminant of concern in an indoor space. Without some means of ventilation (or air cleaning), various emissions from people and building materials will begin concentrating to unhealthy levels. The concentrations must be reduced via some form of filtration or be diluted via outdoor air introduction.

Given that this smoke response plan is being implemented to protect occupants from severe outdoor air quality, it is much more logical to deploy filtration rather than use any more outdoor air than is required. Unfortunately, the committee of individuals that created this recommendation is likely unaware that there is a filtration product that can effectively filter gaseous contaminants.

i. In locations that allow for the use of ASHRAE 62.1 IAQ Procedure for ventilation, *enVerid HLR Systems* are regularly introduced to maintain minimal outdoor air levels at all times without compromising on IAQ.

ii. This is an accepted technology and widely used approach to ventilation in the HVAC industry outside of California, as it balances the optimization of IAQ with reduced energy consumption.

ii. The HLR modules include:

1. *enVerid's SVT non-toxic sorbent-based air cleaning technology* is designed to capture carbon dioxide, ozone, and a wide range of volatile organic compounds (VOCs), including formaldehyde (with zero byproducts).

2. *enVerid SVT technology* includes *enVerid*'s air mixing, controls integration, and the unique regeneration process that allows for the ongoing capture of CO2 produced by human aspiration.

iii. ASHRAE Testing and Validation

1. *enVerid's HVAC Load Reduction modules* are among the only air cleaning products to have undergone independent lab testing for cleaning efficiency for all contaminants of concern using ASHRAE Standard 145.2, the Laboratory Test Method for Assessing the Performance of Gas-Phase Air-Cleaning Systems. Independent lab testing has also confirmed that *enVerid's* sorbents produce zero byproducts.

Sample Efficiencies of Enverid SVT (as verified by third-party lab testing under ASHRAE Standard 145.2) are shown below -

Challenge Gas	Efficiency Measured by RTI Lab[1]
Ozone	70%
Hexane	74%
Xylene	60%
Isopropanol	77%
Toluene	52%
Benzene	87%
Formaldehyde	55%
Carbon dioxide	57%

It must be noted that *enVerids HLR technology* received the *2019 Product of the Year Award* "for safely removing Co2 and all contaminants of concern from indoor air." The product was also called a *"game changer."*

3. **Introduce Electrically Enhanced Filtration Technology into Air Handling Units to Provide the Best Possible Particulate Filtration.** Enhanced filtration efficiency is indispensable when combating severe outdoor air quality situations such as wildfire, as particulate is the primary pollutant of concern. Smoke particulate can range in size from something that a MERV 8 filter could easily handle to a size that would challenge HEPA filter capability.

Although code authorities advise closing outdoor air dampers in response to emergency outdoor events that severely affect air quality, building pressurization requirements necessitate the introduction of a minimal amount of outdoor air. Due to this, it is critical that the particulate filtration system be as efficient as possible at capturing the smallest potential smoke/pollutant particles on a first pass. The objective is to prevent the entry of the particulate to the greatest extent possible.

Furthermore, due to the Covid pandemic, we must also be mindful of our ability to maximize our preventative capabilities against infectious transmission. Enhanced filtration achieves both of these objectives effectively.

a. To achieve this objective, Sterile Safe Solutions™ will introduce and implement *Healthway DFS Electrically Enhanced Filtration Technology* on the facility air handlers.

i. *Title 8, Section 5141, of the California Code* states the following: *"Building operators should consider installation of the highest efficiency filters that do not exceed the static pressure limits of the HVAC system, as specified by the manufacturer or system designer. Pressure gauges should be installed across the filter to indicate when the filter needs replacing, especially in very smoky or dusty areas."*

ii. *California Air Resources Board (CARB)* staff have advised that most HVAC systems should be able to accommodate a pleated, medium-efficiency filter with particle removal ratings of MERV 6 to 11, and some may be able to use filters with ratings of MERV 13 or more. In addition, consider a low-pressure HEPA filter (MERV 17 plus) if the building occupants have respiratory or heart disease conditions or if the building experiences frequent wildfire episodes.

b. *Title 8 and CARB* recommend that the highest efficiency particulate filtration that the HVAC system can accommodate should be deployed. In most cases, today's HVAC systems are limited to a MERV 13 efficiency filter, as the system fan is limited in the amount of system static pressure it can overcome to deliver the required airflow to the spaces. The higher the filter efficiency, the larger the pressure drop presented to the system fan. By exceeding the allowable pressure drop, the operator risks airflow reductions to the space, increased fan energy consumption, and more stress on the fan motor.

i. This is where the Healthway DFS technology excels above other conventional filtration options. *DFS technology* provides better than HEPA filtration performance with the pressure drop equivalent to a MERV 8 filter. This means the best possible particulate filtration efficiency while reducing fan energy consumption and maximizing the airflow capacity of the HVAC system to achieve best-case effective air changes in the building.

ii. The *DFS* product performance aligns perfectly with the mission of capturing a wide range of smoke particulates during wildfire conditions and the ideal filtration capability to combat Covid transmission. By maximizing airflow to increase effective space air changes and providing the best possible filtration capability, we achieve two critical goals of the ASHRAE Epidemic Task Force.

iii. *DFS* also offers the advantage of a longer service life as compared to synthetic media. The filtration efficiency of synthetic media filters can deteriorate in as little as two weeks and by as much as 40-50%. With DFS, the total filtration system is constantly charged, ensuring the highest efficiency for the entire lifetime of the filter, which on average, is two years.

iv. Lastly, the *DFS technology* captures particulates and deactivates pathogens. Facility personnel can feel safe replacing the filter assembly without various PPE measures.

c. *DFS Performance* and how does it do it? The *DFS technology* produces a high-energy field that creates a self-contained, highly ionized state in the main filter. This aggregates or clusters ultrafine particles to make them larger, allowing the main filter to capture these ultrafine particles more effectively. The DFS technology continually creates high energy exposure through the main filter's pleats and fibers, creating a microbiostasis ("prevention of organism growth") in the main filter, preventing live organisms from escaping back into the air. These two mechanisms work together to provide the ultraclean filtration of particles and continual prevention of organism growth in the DFS filter.

i. The result:

1. **A 99.99% at 0.007-micron filtration efficiency**, with a greater gram holding weight capacity, produces an excellent lifetime performance and less maintenance and energy cost.

2. DFS technology is **40 times more efficient than HEPA**.

3. DFS has been rigorously lab-tested and has proven to remove Covid-19 size viruses (SARS-CoV-2) almost completely from the air. According to numerous tests conducted by a private lab, 99.987% of airborne particles were eliminated in just 10 minutes using DFS technology.

4. DFS does all this with **MERV 8 equivalent pressure drop** and a **2-year service life**.

4. **Introduce Air Curtains at Necessary Entrance and Exit Locations.** Air curtains (air doors) protect indoor environments when doors are open. They help maintain a more stable, comfortable, and quality environment that keeps outside temperatures, odors, particulate, and flying insects out – while reducing energy costs.

A significant concern for hospitals is keeping indoor environments stable and sanitary. Air curtains for healthcare facilities are specifically designed to help with that goal. They do this by maintaining indoor temperatures and keeping pollutants such as smoke and vehicle exhaust out. For example, a typical situation air curtains address is keeping ambulance fumes out of the E.R. Another is keeping particulate matter from wildfires from entering the facility to the greatest extent possible.

a. To achieve this objective, *Sterile Safe Solutions™* will introduce and implement ***Berner Air Curtains*** at the following locations:

i. *High-Traffic Main Entrances*: Whether a vestibule exists, air curtains protect the Welcome and Waiting areas from outside contaminants as visitors and staff come and go.

ii. *Emergency Room Entrances*: Keep smoke and exhaust out and the triage and registration areas comfortable, as doors open to allow patients to enter and exit.

iii. *Ambulance Entrances*: Keep smoke and exhaust out and doors open to allow first responders and their patients to enter and exit.

iv. *Loading Dock Areas*: Health Systems use air curtains as a simple and energy-efficient way to keep indoor temperatures stable, fend off flying insects and keep the interior fume and smoke-free when unloading supplies or taking out the recycling.

Potential Future Benefits of Plan Deployment

The design of this *Preparedness Plan* is based on the principles of ASHRAE's 62.1 Indoor Air Quality Procedure, which is an approved ventilation methodology for commercial indoor spaces in most of North America. Facilities designed for this ventilation approach operate continuously, with minimal outdoor air being introduced.

That is why we know this plan will be effective for maintaining optimal indoor air quality even in the presence of severe outdoor air quality situations such as smoke from wildfires.

Our customers choose this HVAC design philosophy for two reasons:

1. It ensures that the ability to achieve optimal indoor air quality is not primarily dependent on the outdoor air quality in the local setting. A flawed assumption is that outdoor air quality is always good, so indoor ventilation via outdoor air introduction is a universally ideal method for keeping indoor spaces healthy. Unfortunately, in many cases, the reality is to the contrary. For example, California is home to some of the worst outdoor air quality in the country. Add to that the propensity for wildfires and heightened ozone levels in California and maintaining indoor air quality becomes a unique challenge for facility managers.

By introducing our IAQ improvement plan, a facility manager can control indoor air quality regardless of the conditions of the outdoor environment.

2. By reducing outdoor air introduction to a building, a lesser volume of air requires conditioning via mechanical heating and cooling. Less supplemental humidification is needed because less is purged from the building. With a proven filtration system maintaining all contaminants of concern at ideal levels, less outdoor air is required to enter/exit the building. Why? Because dilution is unnecessary if the contaminant concentrations do not rise to a level that ***requires*** dilution.

The result: Carbon footprint, emissions, and energy demand will be reduced. And a healthier indoor space with a more sustainable footprint is created.

Moreover, this outdoor ventilation alternative design can save thousands or even hundreds of thousands of dollars and ensure a return on any investment (ROI) to implement this Preparedness Plan.

3. Although California Codes currently prevent applying ASHRAE's 62.1 IAQ procedure for ventilation design, HVAC science is evolving to focus on achieving healthier indoor environments while thoughtfully managing operational costs.

The Covid pandemic and power shortages have spurred product innovations and design alternatives. California regulators will likely see the benefits of the emerging science and HVAC innovation and follow the lead of other states in adopting ASHRAE's 62.1 principles.

When they do, healthcare institutions with the *Sterile Safe Solutions™ Smoke Preparedness Plan* in place will be able to place their systems in the preparedness plan mode permanently and instantly reap the benefits of improved indoor air quality at a fraction of the operating costs they are incurring at present

Sources

• **California's protection from wildfire smoke standard,** Subchapter 7. General Industry Safety Orders, Group 16. Control of Hazardous Substances, Article 107. Dusts, Fumes, Mists, Vapors, and Gases
  - https://www.dir.ca.gov/title8/5141_1.html

• **Guidance for Designing Health and Residential Care Facilities that Respond and Adapt to Emergency Conditions,** FGI Emergency Conditions Committee, Facility Guidelines Institute, March 2021
  - https://fgiguidelines.org/fgi-releases-emergency-conditions-white-paper/

• **Airborne Monitoring and Smoke Characterization of Prescribed Fires on Forest Lands in Western Washington and Oregon: Final Report**
  - https://www.frames.gov/documents/smoke/serdp/lawrence_et_al_1990.pdf

• **The California Department of Industrial Relations – Cal/OSHA Reminds Employers to Protect Workers from Unhealthy Air due to Wildfire Smoke**
  - https://www.dir.ca.gov/DIRNews/2020/2020-71.html

• **State of California—Health and Human Services Agency - California Department of Public Health;** Interim Guidance for Ventilation, Filtration, and Air Quality in Indoor Environments
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• The **California Department of Industrial Relations:** Protecting Indoor Workplaces from Wildfire Smoke with Building Ventilation Systems and Other Methods
  - https://www.dir.ca.gov/dosh/wildfire/Indoor-Protection-from-Wildfire-Smoke.html

• **Fact Sheet from CAL/OSHA – Protecting Workers from Wildfire Smoke**
  - https://www.dir.ca.gov/dosh/wildfire/Protecting-workers-from-Wildfire-Smoke-fs.pdf

