# Why The Pure Maintenance Mold Remediation and Vapor Decontamination is so Effective

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The sporicidal effect of vapor peracetic acid (VPA) was first documented over 50 years ago [1]. More recently, numerous independent, peer-reviewed, published studies have confirmed the efficacy of VPA as a high-level biocidal decontamination disinfectant in multiple settings [2, 3, 4, 5, 6].

## But how does it achieve this level of effectiveness?

We use three critical metrics during our process to ensure that the VPA's effects replicate the results demonstrated in peer-reviewed literature. They are:

1. Parts per million (*ppm*); more specifically (and critically), achieving a 7.5µm particle.
2. Humidity rise and corresponding evaporation leading to the vapor phase change and elevated vapor pressure.
3. Dwell time once the vapor phase change has occurred.

All of these three "magic bullets" are of equal importance. Effectively managing these variables allows us to achieve thorough and effective disinfection and remediation. Using Pure Maintenance's patented equipment, we can create a droplet that is small and dry enough (7.5µm) to stay aloft for an extended amount of time (the dwell time). While suspended, distilled water evaporates from the droplet and effectively raises the *ppm* of peracetic acid vapor and the overall vapor pressure in the treated space. A particle or droplet larger than 7.5µm won't remain aloft for long enough to allow the evaporation process to occur.

Additionally, the surface area of 7.5µm droplets accumulated in a given space off-gas significantly more vapor than would larger droplets occupying the same space. Studies show that a 7µm particle will stay aloft twice as long as a 10µm particle. The Pure Maintenance process ensures that the VPA remains suspended in the air (its accumulated dwell time) to disperse universally, subsequently providing high-level decontamination or remediation of a volume of space as evidenced in the provided published data.

The Pure Maintenance trademarked InstaPure Process uses Minncare Cold Sterilant[1] (MCS) for its peracetic acid. MCS is a registered sterilant as per the U. S. Pharmacopeia General Chapter 1072:

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[1] Pure Maintenance of Santa Barbara and San Luis Obispo Counties employs Minncare Cold Sterilant in its InstaPURE Process. CA DPR License #159455.

*Sterilant: An agent that destroys all forms of microbial life including fungi, viruses, and all forms of bacteria and their spores. Sterilants are liquid or vapor-phase agents.*

Minncare Cold Sterilant's formulation does not require post-application rinsing of food contact surfaces, nor does it threaten municipal waste treatment systems, per its EPA registration label. It is completely biodegradable, does not produce post-treatment toxic vapors, and will decompose to oxygen, water, and acetic acid (acetic acid is the active ingredient in vinegar)

## Process:

**See Diagram 1**. Using distilled water as the delivery vehicle, compressed air drives Minncare Cold Sterilant through "external mix" fog heads, effectively delivering MCS throughout the atmosphere. Dispersing MCS, distilled water, and air raises the relative humidity in the treated space. Over time, this process achieves an elevated vapor concentration as the distilled water naturally evaporates from the surface of the suspended droplet. This evaporation process is the vapor phase change, which elevates the vapor pressure in the treated space. Per Fick's First Law of Diffusion and Brownian Motion, the suspended, concentrated VPA that remains after the vapor phase change disperses evenly and universally during the mandatory dwell time (one hour) and denatures any microbial presence via lysis. The vapor is a much more potent oxidizer than other antimicrobial products currently used in the disinfection and remediation industry - it is also much safer. Nevertheless, it remains critical that all parties to the use of the Pure Maintenance treatment method vacate the treated home, office, or facility of all people and pets during the entire treatment period, at least until the atmosphere in the space has dropped below 0.5ppm $H_2O_2$.

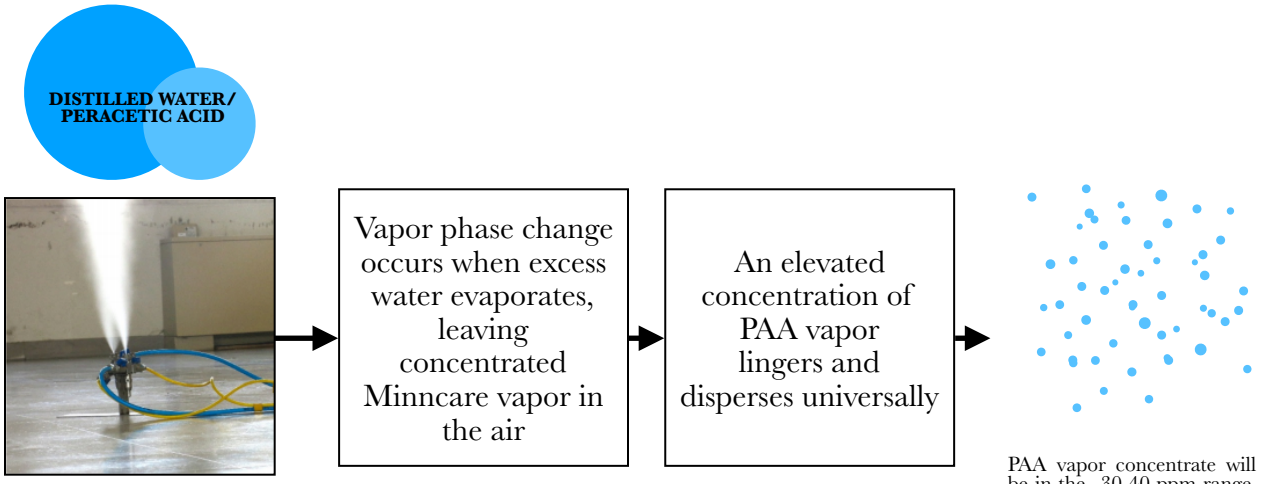


**DIAGRAM 1**: Minncare Cold Sterilant is presented into the treated space with our patented equipment using compressed air.

The process sequence is as follows:
1. Atomized droplets of a size 7.5µm or smaller[2] are emitted into a space, driving up the space's atmospheric humidity.
2. The suspended particles of size 7.5µm or less evaporate $H_2O$ from droplets.
3. The remaining VPA stays aloft during its dwell time, dispersing everywhere and providing comprehensive, high-level decontamination.

**See Diagram 2**. Our process results in a more uniform coverage area and more thorough decontamination of a treated space, as demonstrated in various studies. As a result of the aforementioned elevated vapor pressure, VPA can reach a variety of difficult-to-reach areas. These include the HVAC systems and their components, high corners, underneath desks, chairs, tables, countertops, and baseboards and trim. Essentially, the Pure Maintenance process will reach and affect all areas and surfaces within the treated space. Peracetic acid is a strong oxidizer, in fact, much more potent than chlorine or chlorine dioxide. (see USDA's Technical Evaluation Report[3]). Furthermore, disinfection occurs without getting things wet while presenting a favorable material compatibility profile.


**DIAGRAM 2**: VPA direct gas measurement during dry vapor treatment.

In fact, as a testament to its post-application safety, peracetic acid is often used in organic processing and handling, including post-harvest handling of organically produced plant and animal foods. Section 40 of the Code of Federal Regulations (CFR) 180.940 lists similar information for active and inert ingredients in antimicrobial formulations used to sanitize food contact surfaces. CFR 180.1196 and 180.1197 establish the condition for exemption from the "requirement for tolerance" for peracetic acid and hydrogen peroxide, respectively. For example, it asserts that if the diluted solution that is applied to fruit contains less than 100ppm of peracetic acid, the residue of peracetic acid on the fruit is exempt from tolerance[4]. With the Pure Maintenance treatment, the diluted & atomized solution does not rise to 100ppm, and therefore would be categorically exempt.

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[2] Sub-10µm particles are understood to be dry within the scientific literature.

[3] Compiled by OMRI for the USDA National Organic Program.

[4] "Tolerance" refers to the "tolerated amount" of a substance that is deemed safe on a product. This exemption of tolerance is given by the EPA.

In addition, protein residues do not modify VPA's efficacy. Unlike other antimicrobials, there has been *no reported microbial resistance* (see the USDA's Tech Evaluation Report[5]).

The half-life of vaporized peracetic acid is approximately twenty minutes, and treated spaces are cleared for re-entry within two hours following treatment. This clearance is validated using a gas-sensing direct measurement instrument whereby the concentration of $H_2O_2$ (hydrogen peroxide) is below 0.5ppm per its (MCS) labeling requirements. It leaves no residue behind.

[5] Link. USDA National Organic Program, Handling and Processing, 03 March 2016.