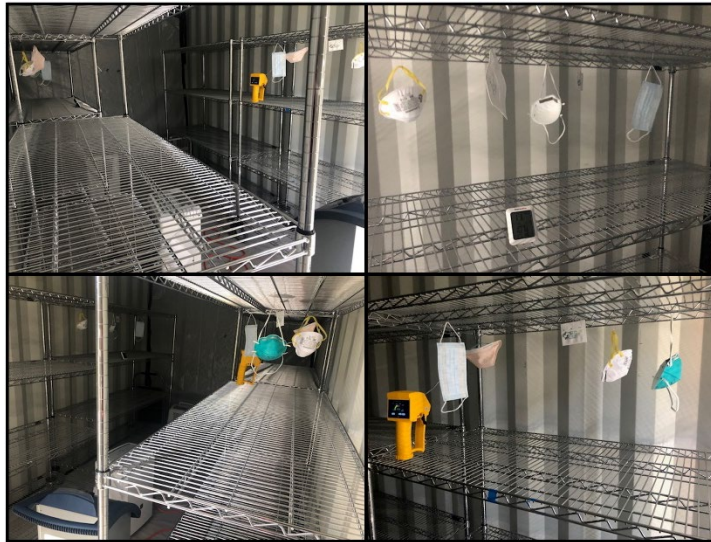


Mobile Personal Protective Equipment Decontamination System

Personal Protective Equipment (PPE) is in short supply in the United States, including N95 respirators, which are critical to protecting our frontline healthcare workers when treating COVID positive patients. To help ensure the availability of these essential items, we have implemented a mobile PPE decontamination system using a conex shipping container and vapor phase hydrogen peroxide (VHP). VHP is a well-know disinfectant capable of inactivating many infectious agents including SARS-CoV-2, the causative agent of COVID-19.

Using metal wire shelving contained within the conex container, hundreds of N95 respirators can be decontaminated per cycle and subsequently placed back into use. While only a handful of respirators and other PPE are shown in the pictures below, the capacity can be realized.



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Once respirators are placed onto shelves within the conex container, a Sanosil Halo Fogger, now known as the Halosil Halo Fogger (halosil.com), is used to produce dry vapor hydrogen peroxide up to ~350 ppm, effectively inactivating all microbial agents. Ensuring the starting environmental conditions for the conex container is paramount for a successful run, even if a de-humidifier must be used prior to the run. Proper “fog”, the time the dry vapor hydrogen peroxide is being produced, and “dwell”, the time post VHP production before the container is unsealed, times are also essential.

Parameters:

- Environmental prior to starting run (within the SEALED conex container):
 - Humidity 30%
 - Temperature: $\geq 70^{\circ}\text{F}$
- Run parameters
 - Fog time: 15 minutes
 - Dwell time: 2 hours

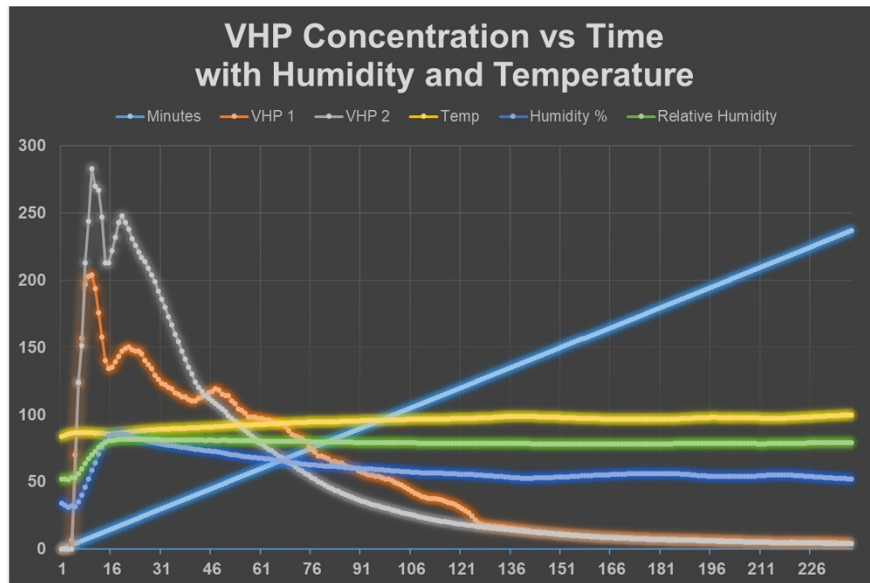


Figure demonstrating an example of the recorded parameters throughout the run. The X-axis represents time in minutes and the Y-axis shows the value for each indicated measurement VHP 1 is the recorded values on a VHP monitor placed outside of the conex container with the sensor only placed inside the sealed container, and VHP 2 is the recorded values on an identical VHP monitor placed wholly inside the sealed container.

Inactivation is evidenced by the 6 log reduction in bioburden using *Bacillus stearothermophilus* spore disc biological indicators. Lack of bacterial growth in tryptic soy broth seeded with the treated spore discs compared to growth in broth seeded untreated spore discs allows for the determination of biological inactivation.

Bacterial Spore Burden	Untreated	Left Wall Low	Left Wall high	Front Wall Low	Front Wall High	Back Wall Low	Back Wall High	Right Wall Low	Right Wall High
10 ⁴	+	-	-	-	-	-	-	-	-
10 ⁵	+	-	-	-	-	-	-	-	-
10 ⁶	+	-	-	-	-	-	-	-	-

+ indicates bacterial growth in TSB; - indicates lack of bacterial growth at 72 hours post inoculation.

We are now exploring the application of this technology to other PPE such are surgical/procedure masks.