

# COVID-19 Response: Decontamination of N95 Respirators with Vaporized Hydrogen Peroxide



Homeland  
Security

Science and Technology

## EXTENDING USE OF CRITICAL PERSONAL PROTECTIVE EQUIPMENT

Reducing person-to-person spread of SARS-CoV-2 virus is a key way to reduce the impact of COVID-19 in the absence of an effective treatment. Transmission is believed to occur primarily through respiratory droplets produced by talking, coughing, and sneezing, though contact with contaminated surfaces and objects may also contribute to spread. Respiratory protection, including N95 filtering facepiece respirators (FFRs), is an effective means of reducing exposure, but are in limited supply because of demand. The Department of Homeland Security (DHS) Science and Technology Directorate (S&T) is executing high-impact projects to help answer critical questions about the SARS-CoV-2 virus and to support the national response, including the assessment of methods for FFR decontamination for reuse.

## ANSWERING CRITICAL QUESTIONS

S&T has evaluated decontamination of FFRs contaminated with SARS-CoV-2 using vaporized hydrogen peroxide (VHP) and assessed the impact of decontamination on FFR performance. VHP decontamination is one of three methods identified as promising by the U.S. Centers for Disease Control and Prevention for FFR decontamination.<sup>1</sup> It is also the method used in the majority of Emergency Use Authorizations (EUA) issued by the U.S. Food and Drug Administration. These EUAs were issued based on results from other pathogens or surrogates and cover a small number of FFR models. S&T generated data demonstrating that VHP is effective against SARS-CoV-2 and expands the number of FFR models for which efficacy has been demonstrated while maintaining performance.

## CURRENT DATA

S&T tested the effectiveness of an FDA-approved VHP system<sup>2</sup> for FFR decontamination against SARS-CoV-2 on eight different FFR models and assessed the impact of up to 20 decontamination cycles on FFR performance. SARS-CoV-2 in culture media was inoculated onto coupons cut from FFRs and then subjected to VHP decontamination. In each case, VHP exposure was sufficient to reduce infectious virus titers to levels below detection. Two FFR models (3M 1860 and 3M 8511) were tested with SARS-CoV-2 in simulated saliva and simulated lung fluid and VHP decontamination reduced

infectious virus concentrations to levels below detection in these tests (Table 1). Performance was tested after 20 decontamination cycles and all eight FFRs passed performance specifications for filtration efficacy, airflow resistance, H<sub>2</sub>O<sub>2</sub> off gassing and visual inspection.

Table 1. Inactivation of SARS-CoV-2 in media, simulated saliva, or simulated lung fluid when subjected to VHP decontamination.

Inactivation Below Detection for Virus in:			
Mask	Media	Simulated Saliva	Simulated Lung Fluid
3M 1860	Yes	Yes	Yes
3M 8210	Yes	<i>Not Tested</i>	<i>Not Tested</i>
3M 8511	Yes	Yes	Yes
3M 1870	Yes	<i>Not Tested</i>	<i>Not Tested</i>
3M 8233	Yes	<i>Not Tested</i>	<i>Not Tested</i>
Moldex 1512	Yes	<i>Not Tested</i>	<i>Not Tested</i>
Moldex 2200	Yes	<i>Not Tested</i>	<i>Not Tested</i>
NS 7210	Yes	<i>Not Tested</i>	<i>Not Tested</i>

## IMPACT

The results generated by S&T verify that VHP is effective in decontaminating SARS-CoV-2 on FFRs for seven different FFR models from three different manufacturers. In addition, the data shows that VHP treatment of these FFRs can be performed up to twenty times while the FFRs maintain performance.

## DISCLAIMER

Individuals assume all responsibility and risk for the use of these procedures for the best practices to decontaminate previously worn FFRs. DHS does not assume any liability for the instructions for best practices contained herein nor do such instructions for best practices create any warranty. Reliance on such instructions for best practices is solely at your own risk. Further, it is important to note that there are multiple steps and variables which may create risk depending upon how the user implements the instructions for best practices.

<sup>1</sup> <https://www.cdc.gov/coronavirus/2019-ncov/hcp/ppe-strategy/decontamination-reuse-respirators.html>

<sup>2</sup> <https://www.fema.gov/fact-sheet/using-critical-care-decontamination-system-tm>

