Frequently Asked Questions
Vaporous Hydrogen Peroxide (VHP) Reprocessing of N95 Respirators and Surgical Masks

1. What is VHP?
Vaporous hydrogen peroxide (VHP) is a concentrated disinfectant that can be used to decontaminate thousands of N95 respirators in one cycle that are contaminated or potentially contaminated with bacteria and viruses, including SARS-CoV-2, the virus that causes COVID-19. To see how the VHP process works, please visit the “N95 Respirator and Mask Disinfection” section of the BILH COVID-19 website to see the BIDMC example.

2. Why am I safe using an N95 respirator or surgical mask that has been disinfected by VHP?
A study published by Battelle, an Ohio-based company now providing VHP services in Somerville, Mass., demonstrated that the VHP decontamination method is fully effective in removing bacterial spores (the industry standard) that are much harder than SARS-CoV-2 without impacting the integrity of the respirator. Both chemical and biologic indicators are monitored to ensure a successful decontaminated disinfection cycle. Battelle has received approval under an Emergency Use Authorization (EUA) from the FDA to decontaminate respirators for SARS-CoV-2 during the national shortage of N95s. Additionally, quality control testing in progress at BIDMC has shown removal of these bacterial spores, as well as continued ability to appropriately filter air and maintain a good seal/fit.

3. I heard the VHP process produces residual hydrogen peroxide vapor, which may have carcinogenic effects. Is this true?
The byproducts of VHP disinfection are hydrogen peroxide and water. However, VHP disinfection may leave residual hydrogen peroxide vapor on the disinfected respirator or mask. It is important to know that hydrogen peroxide is not classified as a human carcinogen by the International Agency for Research on Cancer, a division of the World Health Organization (WHO). We have strict quality assurance processes in place to ensure respirators and masks disinfected by VHP are acceptable for reuse:
- Following VHP disinfection, N95 respirators and masks are held for a minimum of 24 hours to allow for any VHP off-gassing that may occur.
- The air surrounding the disinfected N95s and masks is measured to determine if any residual hydrogen peroxide vapor is present. The Occupational Safety and Health Administration (OSHA) has established a permissible exposure limit of 1 parts per million (ppm) for hydrogen peroxide. N95s and masks that meet this level are cleared for re-distribution.
- Disinfected N95s and masks are then sent through another rigorous inspection to ensure suitability for reuse, including examination for tears, organic material, and overall integrity prior to final packing for return to the home institution.
4. **What types of N95 respirators can be disinfected using VHP?**
   N95s that do not contain cellulose-based materials can safely be disinfected using VHP. Some, but not all, of these approved N95 types are listed on the [Centers for Disease Control and Prevention](https://www.cdc.gov) website. BILH has obtained letters certifying all of our N95 respirators that are not on Battelle’s list are cellulose-free.

5. **What is the purpose of the facility code on the mask?**
   The code tracks the facility of origin for masks that are processed off site, either at Battelle or at one of BILH’s three sites for PPE reprocessing (BIDMC, LHMC, NEBH), and facilitates return to their original location.

6. **What are the numbers on the outside of the N95 or surgical mask for?**
   The numbers on the outside of the N95 respirator or mask track the number of VHP cycles completed. Battelle has been approved for 20 VHP cycles per respirator. A study at [Duke University Medical Center](https://www.duke.edu) has shown safety and efficacy to 40-50 VHP cycles for N95 respirator.

7. **Can I wear makeup, perfume or cologne when using an N95?**
   We ask that you refrain from wearing makeup, perfume or cologne during this time as these things may leave organic material on the mask, which can impact the efficacy of VHP reprocessing. N95 respirators and surgical masks with evidence of makeup or scents will be discarded prior to processing and reduce our PPE supply.

8. **How many shifts should I wear my N95 respirator before placing it in the collection bin for disinfection?**
   Now that we have several options to decontaminate N95 respirators, we will be asking you to place your N95 in the bin after wearing it for three (3) shifts. If your respirator becomes soiled, moist, or contaminated when or before three shifts have passed, please discard it in the trash instead.

9. **How many times should I wear my surgical mask before dropping it in the collection bin?**
   You should wear your surgical mask for one (1) shift before placing it in the bin for reprocessing. If your mask becomes soiled or contaminated before or at the end of your shift, please discard it in the trash rather than placing it in the bin.

10. **How can I do my part to be sure that this program is successful?**
    You can help preserve our Personal Protective Equipment (PPE) supply by taking good care of your N95 respirator and surgical mask. Remember to properly label your N95; do not fold or crumple your PPE or put damaged PPE in the bins. Please avoid wearing makeup, cologne, and perfume; pay attention to placing your PPE in the correct bin; do not dispose of trash in the collection bins;

11. **Can we use the KN95 masks in this program?**
    KN95 masks can be reprocessed in the VHP systems as long as they do not contain cellulose. Please note that we will only send N95 respirators to Battelle but will be processing both N95s and surgical masks in our three BILH facilities.

Updated 5/4/20