

This document is a strategic plan for the indoor air quality of all Corvallis School District buildings during the COVID-19 pandemic. It is based on COVID-19 specific guidance from expert air quality organizations. Additional building specific guidance will be provided by the facilities department to each school in a separate document.

The Oregon Health Authority (OHA)
The United States Environmental Protection Agency (EPA)
The American Society of Heating, Refrigerating and Air-Conditioning Engineers (ASHREA)

Summary: The most effective ways to reduce COVID-19 in the air of district buildings, in order of priority:

1. Reduce COVID-19 Contaminates: Reduce people in building, reduce time in building, wear masks, social distance, effective cleaning.
2. Fresh Air: Maximum outside air supplied to HVAC, open windows.
3. Filtration of Air: Increased air filtration.
4. Temperature and Humidity: 68--70°F, 40-60% humidity.

Reduce COVID-19 Contaminates: The most effective way to reduce air born COVID-19 particles, by far, is to never aerosolize them in the first place. Keeping infected people out of the building, reducing the number of people in a building, reducing the amount of time spent in a building, wearing masks, social distancing and frequent effective cleaning are key. Details for how to do this are outlined in other district plans and will not be evaluated in this document. It is important to emphasize though, all of the following ventilation protocol cannot take the place of these proper COVID-19 practices. Wearing a mask is the single most effective measure to reduce COVID-19 in the air.

Fresh Air: During the pandemic, the goal is to supply as much fresh outside air as possible, and exhaust the existing and potentially contaminated inside air. The challenge is whether the HVAC system can do this during extreme temperatures and maintain a comfortable space. Fortunately Corvallis is fairly temperate, and tests so far have shown this is achievable down to 40°F. Some spaces do not have mechanical systems to provide fresh air. These spaces should open windows to increase ventilation.

Filtration of Air: Ventilation systems throughout the district have air filters designed to remove particles from the air. Filters have a “MERV” rating based on the size of particles that can be removed by the filter. Usually, the district uses MERV-8 filters in most buildings, these have been upgraded to MERV-11 (higher MERV filters are back ordered 9 months). Linus Pauling and Corvallis High have always used MERV-13 filters and will continue to do so. Portable HEPA rated air filters are an effective way to reduce air particles as well, particularly for small spaces with limited access to outside air such as offices without operable windows. The COVID-19 virus is 0.1-1.3 microns, but generally travels attached to other particles such as respiratory droplets which are 3-10 microns.

COVID-19 Air Quality Plan – District Wide

Corvallis School District - Facilities

Updated: 03/29/21

| MERV Rating | 0.3 - 1.0 Microns | 1.0 - 3.0 Microns | 3.0 - 10.0 Microns |
|-------------|-------------------|-------------------|--------------------|
| MERV-16 | >95% | >95% | >95% |
| MERV-15 | >85% | >90% | >95% |
| MERV-14 | >75% | >90% | >95% |
| MERV-13 | >50% | >85% | >90% |
| MERV-12 | >35% | >80% | >90% |
| MERV-11 | >20% | >65% | >85% |
| MERV-10 | - | >50% | >80% |
| MERV-9 | - | >35% | >75% |
| MERV-8 | - | >20% | >70% |

Temperature and Humidity: Studies have shown COVID-19 is more transmissible in cold dry environments. As such the District will maintain a temperature of at least 68°F 3 hours prior to students arriving, and 3 hours after students leave. Corvallis’s climate is naturally humid, and with the increased outside air ensures adequate humidity in schools.

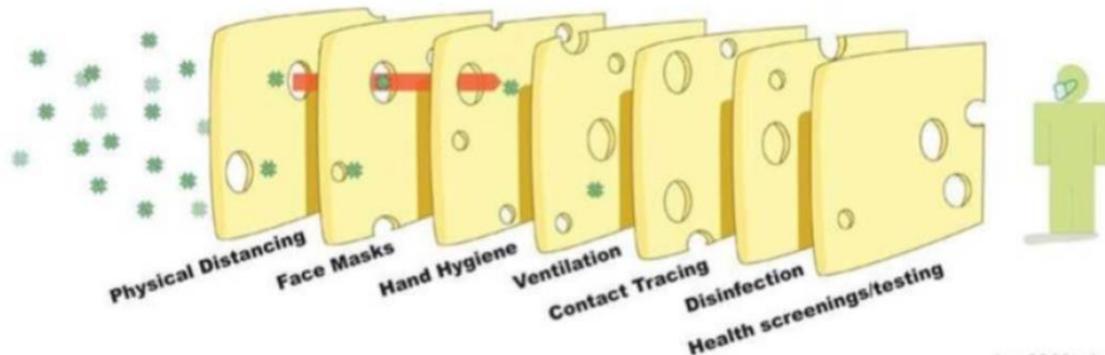
Additional Equipment: Various air purification and sterilization products have been marketed as solutions to COVID-19 air quality. Data showing the effectiveness and safety of these devices has not been substantiated or recommended by the CDC, EPA or ASHREA. Furthermore, many of these systems have the potential to create health risks of their own. At this time, Facilities does not recommend adding any new technology to the ventilation systems in the District.

Example: The data below is from a model developed by researchers from the University of Oregon to show how each of the previous strategies reduces COVID-19 in air. Each approach layers upon the previous, and if all of these precautions are used together reduces the risk of exposure greatly. It is important to emphasize the single most effective measure to reduce COVID-19 in the air is wearing masks. (https://pdxscholar.library.pdx.edu/mengin_fac/325/)

Infectious person, 25 Students, 400sqft Classroom, 2.5 hour exposure.

1. 62% Risk Reduction - Masks worn
2. 82% Risk Reduction - Masks worn, 5 air changes/hour
3. 92% Risk Reduction - Masks worn, 5 air changes/hour, air filtration, 20 min break in the middle of a 2.5 hour class.

The Swiss Cheese Model of COVID-19 Defense



Ian M Mackay
virologydownunder.com
Derived from @sketchplanator
Based on the Swiss cheese model of accident causation, by James Reason, 1990
version 1.3
update: 12oct2020

Additional Information:

CDC: Operational Strategy for K-12 Schools through Phased Mitigation

<https://www.cdc.gov/coronavirus/2019-ncov/community/schools-childcare/operation-strategy.html>

Portland State University: Indoor Air Quality in K-12 Schools

https://pdxscholar.library.pdx.edu/mengin_fac/325/