Ecostratum Insights

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BIOEFFLUENT – ENGINEERED CONTROL

Current outbreaks (90%) are associated with extended time indoors in a shared air environment. The first estimates of allowable exposure time (derived from influenza models) are shown in the green column of the table below. Notice that your allowable exposure decreases as the bioeffluent from persons nearby increases. An excellent test for bioeffluent in buildings is the red line carbon dioxide - see the graph below. It shows bioeffluent can be purged each evening after work. Testing confirms proper engineering starts each workday with fresh air.

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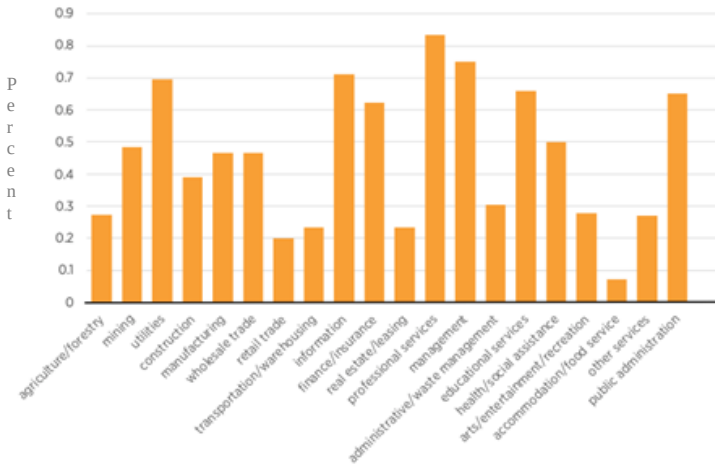
Infection Control Models – CDC & WHO				Building Design Standards – ASHRAE & CCPIA			
Exposure Time (Min.)	Activity of Nearby Person	Exhaled Air (LPM) Bioeffluent	Dist. (ft)	Example Place	SF per Person	Ventilation Rate (CFM per Person)	Air Filter Min. Eff. (MERV)
50	Rest	5	6	Home-Office	20	5	7
5	Speaking	10	6	Auditorium-Classroom	20	7.5	7
5 (30s)	Walking	40	6	Shopping	30	7.5	7
0.05 (3s)	Running	100	6	Gymnasium	50	20	7

Carbon Dioxide as a surrogate for Bioeffluent

Winners and Losers – The Digital Cliff Revealed by the COVID-19 Pandemic

Digitalized businesses fared much better during the pandemic because work was completed from home. Estimates of the impact of partial economic shutdown are for a 5% decline in GDP per month of shutdown ($2.14 Trillion so far - surprisingly close to the $2 Trillion CARES Act). What have we learned? The resiliency of digitalized industries. What does this mean for the future? Substitution. When work output is no longer linked to the workplace, businesses are able to adapt quickly and prevent catastrophic loss in direct proportion to their degree of digitalization. See the chart below for industries that have overcome spatial dependence. Expect this to be emphasized in new pandemic risk management and business plans.

Share of Digital Workers by Industry



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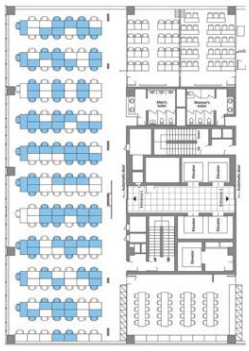
WHAT DOES A COVID-19 SAFE WORKPLACE LOOK LIKE – THE UNSEEN MATTERS MOST?

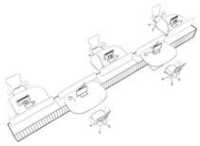
You enter a room. What are the visual cues it is a safe workplace? Answer. Spacing and occupancy limits. How? Lower amounts of aerosol droplets (viruses) are achieved by fewer people spaced at distance. Why? Humans exhale bioeffluent (gas, vapor, droplets) and gravity pulls these droplets toward the ground. Until there is a vaccine, low density and spatial-social distance are the safest – nothing new. Compare the office design from an outbreak location in Seoul, Korea (desk with cases shown in blue) to the concepts of "stagger" and "neighborhood". What's the difference? Desks do not face each other with shared breathing zones and more space. Handwashing stations, surface cleaners, sneeze guards and masks only supplement good design. See the engineering controls article.



The floor plan site of a coronavirus outbreak in Seoul, Korea.

The blue indicates the desks of people with confirmed cases.

Korea Centers for Disease Control and Prevention



Staggered Seating to avoid opposite breathing zones

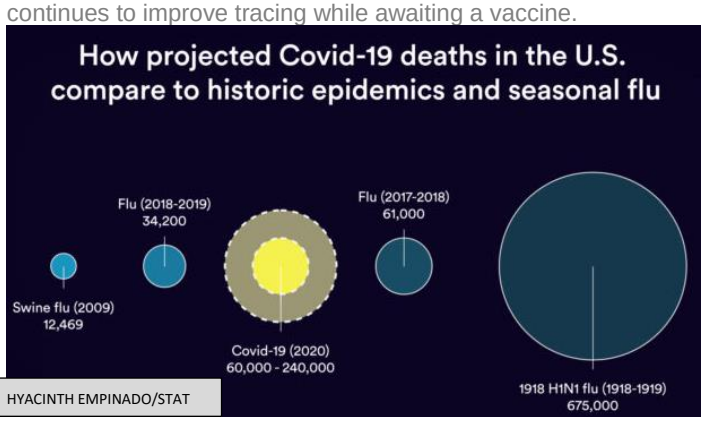
Neighborhood Distancing

Ask the Expert?

Q: How do I know when to test?
A: If there has been an office outbreak, testing is used to demonstrate cleaning effectiveness.
Q: What surfaces are more likely to be contaminated in my office?
A: Floor, Computer Mouse & Key Pad, Phone, Handrail, Trash Can and outlet air filter.

THE PUBLIC HEALTH RENAISSANCE

The coronavirus will not go away, but rather become a seasonal respiratory infection. Flu pandemics in the past ended with adaptation, not eradication, and the strains are still with us. So, before retrospectives claim hoax, watch what happens in Africa, where the pandemic is in its early stages. Meanwhile, the CDC continues to improve tracing while awaiting a vaccine.



Technical developments are presented with a business case underpinning. Contact Steve Rucker at srucker@ecostratum.com