





































Risk Factors can be Rated and Weighted to provide a scorecard for risk assignment

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Occupancy and Space Utilization

- Number and Type of Occupant (Known, Transients)
- Space Density and Duration (Known, Transients)
- Proximity and Aerosol Generation Potential
- Occupant Sensitivity/Susceptibility

Space Configuration and HVAC Operation

- Type and State of HVAC System Operation
- Supply, Exhaust and Airflow Patterns
- Filtration, Recirculation and Re-entrainment
- Special Safety Measures and ECDs

















The recipe for transmission of Covid-19 includes occupants, activity, proximity, duration and ventilation

Risk Factors		RATING									
KISK I	actors	0	1	2	3	4					
	Number	≤1	≤2	≤ 5	≤10	> 10					
Known Occupants	Sensitivity	Very Low	Low	Moderate	High	Very High					
1	Duration	≤ 15 minutes	≤ 1 hr.	≤4 hrs.	≤ 8 hrs.	> 8 hrs.					
Transient	Number	0	1	≤ 5	≤10	> 10					
Occupants	Duration	≤ 15 minutes	≤ 1 hr.	≤4 hrs.	≤ 8 hrs.	> 8 hrs.					
Occupant 1	Proximity	Isolated	Socially Spaced	Mixed Space	Close Contact	Personal Contact					
Aerosol G	eneration	Negligible	Low	Moderate	High	Extreme					
Ventilation Operation		Excellent	Good	Fair	Poor	Compromised or Unknown					
Ventilation Rate		$\geq 1 \mathrm{cfm}/\mathrm{ft}^2$	$\leq 1 \text{cfm}/\text{ft}^2$	$\leq 0.5 \mathrm{cfm}/\mathrm{ft}^2$	$\leq 0.1 \text{cfm/ft}^2$	Negligible or Unknown					
Ventilatio	on Type	100% Outside Air	Recirculation w/>50% OA	Recirculation w/<50% OA	Recirculation w/<10% OA	Recirculation or Unknown					
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Risk Profiles helped identify areas that may require greater scrutiny and application of special safety measures





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		2 ACH -	- Halo-P			
	Aero	solized Salt	Particles	in H ₂ O		
Test Condition	3	Exposure DO	SE by Partie	tle Size (Co	unts x 10 ⁴)
	0.3 μ	0.5 μ	1μ	3μ	5μ	10 µ
Baseline, No Filtration	10,846	850	13.7	1.305	0.646	0.143
Halo-P Filtration:	9,660	698	8.63	0.482	0.241	0.070
Halo-P Filtratio	peration o	of Filters	Reduced	d Exposi	ure [–]	0.029
Halo-P Filtratio	ose by up	to 79%	27.88	00.0889		0.040
Ceiling Filtration	11%	18%	37%	63%	63%	51%
PACIALCEDOR	16%	25%	59%	70%	74%	79%
Wall Filtration Reduction	2071			-		



















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€3Flow

Airflow was measured to evaluate operation of the supplemental exhaust system



Ex. Grille #	Flow (CFM)	Ex. Grille #	Flow (CFM)
6	96	5	59
7	88	4	65
8	76	3	83
9	166	2	102
10	159	1	273

€ 3Flow

• Measurements indicated non-uniform distribution of flow

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VEFF Tests demonstrated effectiveness of Portable Air Filters																		
VEFF Test – Filters OFF																		
	55 - Meter 9306 51 - Meter 9307 - 39006 52 - Meter 9308 - No. 39008 53 - Meter 9303 No. 4004 54 - Meter 9303																	
Channel	Channel 1	Channel 2	Channel 3	Channel 4	Channel 5	Channel 6	S1 - Channel 1	Channel 2	Channel 3	Channel 1	Channel 2	Channel 3	Channel 1	Channel 2	Channel 3	Channel 1	Channel 2	Channel 3
Particle Size	Dose - 0.3 um	Dose - 0.5 um	Dose -1 um	Dose - 3 um	Dose -5 um	Dose - 10 um	Dose - 0.3 um	Dose - 1 um	Dose -5 um	Dose - 0.3 um	Dose - 1 um	Dose -5 um	Dose - 0.3 um	Dose - 1 um	Dose -5 um	Dose - 0.3 um	Dose - 1 um	Dose -5 um
Count DOSE	14258319	1901279	66337	10061	5075	1171	9180385	9180385	5053	9312076	38161	4335	9318477	44349	4342	9074730	37653	4286
Date Time	S5-0.3 um	S5 - 0.5 um	S5-1um	S5 - 3 um	S5 - 5 um	S5 - 10 um	\$1 - 0.3 um	S1-1um	\$1 - 5 um	S2 - 0.3 um	S2-1um	S2 - 5 um	S3-0.3 um	S3-1um	S3-5um	S4 - 0.3 um	S4-1um	S4-5um
VEFF T	VEFF Test – Filters ON																	
			S5 - M	eter 9306			S1	- Meter 9303 - 390	006	S2-	Meter 9303 - No. 3	8008	\$3-	Meter 9303 No. 4	0004		S4 - Meter 9303	
Channel	Channel 1	Channel 2	Channel 3	Channel 4	Channel 5	Channel 6	S1 - Channel 1	Channel 2	Channel 3	Channel 1	Channel 2	Channel 3	Channel 1	Channel 2	Channel 3	Channel 1	Channel 2	Channel 3
Particle Size	Dose - 0.3 um	Dose - 0.5 um	Dose -1 um	Dose - 3 um	Dose -5 um	Dose - 10 um	Dose - 0.3 um	Dose - 1 um	Dose -5 um	Dose - 0.3 um	Dose - 1 um	Dose -5 um	Dose - 0.3 um	Dose - 1 um	Dose -5 um	Dose - 0.3 um	Dose - 1 um	Dose -5 um
Count DOSE	4264813	414965	15402	2449	1214	316	2858324	9325	1162	2749154	8726	1028	2475330	8497	857	2737249	8507	953
Date Time	S5-0.3 um	S5-0.5um	S5-1um	S5-3 um	S5 - 5 um	S5 - 10 um	\$1 - 0.3 um	S1-1um	S1-5 um	S2-0.3 um	S2-1um	S2-5um	S3-0.3um	S∂-1um	53-5um	S4 - 0.3 um	S4-1um	\$4-5um
	Average Reduction Across Particle Size Range = 77%																	

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Implement Prudent Safety Measures and Manage Risk

- Discourage infected people from entering the building
- Implement an Airflow Management Program (Coordinate and Communicate)

Itom	Drudent Measures to Beduce Bick	Risk Level						
nem		0	1	2	3	4		
1	Administrative Controls	х	х	Х	х	Х		
2	Masks and Face Coverings		х	х	х	х		
3	Distancing and Physical Isolation (where possible)		х	Х	х	х		
4	Test and Verify HVAC Function		х	Х	х	х		
5	Consider Airflow Modifications			Х	Х	х		
6	Consider Special In-Room Measures (e.g. Air Purifiers)			Х	Х	х		
7	Utilize Appropriate Personal Protective Equipment			Х	Х	х		
8	Consider Installation of System Filtration				Х	Х		
9	Consider Installing System Bio deactivation (e.g. UVGI)				Х	х		
10	Test and Verify Performance of Safety Measures			х	х	х		

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