December 21, 2015

Re: Indoor Air Quality Testing Summary North Jr. H.S. St. Cloud, MN

Intent

The purpose of the testing was to take air quality readings in a locker area at the school. The tests were conducted to see what effect AtmosAir systems had on IAQ within the space and also test what effect reducing outside air intake would have on the readings, with the AtmosAir systems operating.

Test Conditions

The area chosen for the study was a locker room area. There was no pressing IAQ issue or complaints from the space. (1) AtmosAir model M1002 unit was installed into the supply air entering the space. IAQ Testing was performed to the schedule below:

11/16 – 11/17/15 Baseline testing AtmosAir system not operating.
11/17 – 11/18/15 Testing with AtmosAir system operating.
11/18 – 11/19/15 Testing with AtmosAir system operating and O/A reduced 10%
11/19 – 11/20/15 Testing with AtmosAir system operating and O/A reduced 20%
11/20 – 11/21/15 Testing with AtmosAir system operating and O/A reduced 30%

An Aircuity Optima 500 Monitor was used to perform the air quality testing. The following elements were measured:

Temperature
Relative Humidity
Carbon Dioxide
Particles (PM10)
Particles (PM2.5)
TVOC (Total Volatile Organic Compounds)
Radon
Carbon Monoxide
Ozone

Results

See below summary charts showing the results of the various sensor readings taken.

Baseline Readings taken without the AtmosAir system operating

	Comfort and Ventilation				Air Cleanliness			Building Pollutants		
	CO2 (ppm)	**Temperature (°F)**	**Relative Humidity (%)**	****CFM (Outdoor Air PP)**	**PM 10 (µg/m3)**	**PM 2.5 (µg/m3)**	**TVOC (index)**	**CO (ppm)**	**Radon (pCi/l)**	**Ozone (ppm)**
Locker Room-Post	904	73	44	21	34	11	6	0	0.9	0
Typical/Comfort	< 1100	71 - 74	20 - 60	> 15	< 40	< 20	< 10	< 3	< 2	< 0.1
Recommended	< 1100	68 - 78	20 - 60	> 15	< 40	< 20	< 35	< 9	< 4	< 0.1

Readings with the AtmosAir system operating

	Comfort and Ventilation				Air Cleanliness			Building Pollutants		
	CO2 (ppm)	**Temperature (°F)**	**Relative Humidity (%)**	****CFM (Outdoor Air PP)**	**PM 10 (µg/m3)**	**PM 2.5 (µg/m3)**	**TVOC (index)**	**CO (ppm)**	**Radon (pCi/l)**	**Ozone (ppm)**
Locker Room-Post	672	73	46	39	12	4	7	0	0.9	0.001
Typical/Comfort	< 1100	71 - 74	20 - 60	> 15	< 40	< 20	< 10	< 3	< 2	< 0.1
Recommended	< 1100	68 - 78	20 - 60	> 15	< 40	< 20	< 35	< 9	< 4	< 0.1

Readings taken with the AtmosAir system operating and O/A reduced by 10%

	Comfort and Ventilation				Air Cleanliness			Building Pollutants		
	CO2 (ppm)	**Temperature (°F)**	**Relative Humidity (%)**	****CFM (Outdoor Air PP)**	**PM 10 (µg/m3)**	**PM 2.5 (µg/m3)**	**TVOC (index)**	**CO (ppm)**	**Radon (pCi/l)**	**Ozone (ppm)**
Locker Room-Post	655	73	47	41	13	3	7	0	0.4	0
Typical/Comfort	< 1100	71 - 74	20 - 60	> 15	< 40	< 20	< 10	< 3	< 2	< 0.1
Recommended	< 1100	68 - 78	20 - 60	> 15	< 40	< 20	< 35	< 9	< 4	< 0.1

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Readings taken with the AtmosAir system operating and O/A reduced by 20%

	Comfort and Ventilation				Air Cleanliness			Building Pollutants		
	CO2 (ppm)	Temperature (°F)	Relative Humidity (%)	**CFM (Outdoor Air PP)	PM 10 (µg/m3)	PM 2.5 (µg/m3)	TVOC (index)	CO (ppm)	Radon (pCi/l)	Ozone (ppm)
Locker Room-Post	580	71	30	58	14	6	4	0	0.3	0.004
Typical/Comfort	< 1100	71 - 74	20 - 60	> 15	< 40	< 20	< 10	< 3	< 2	< 0.1
Recommended	< 1100	68 - 78	20 - 60	> 15	< 40	< 20	< 35	< 9	< 4	< 0.1

Readings taken with the AtmosAir system operating and O/A reduced by 30%

	Comfort and Ventilation				Air Cleanliness			Building Pollutants		
	CO2 (ppm)	Temperature (°F)	Relative Humidity (%)	**CFM (Outdoor Air PP)	PM 10 (µg/m3)	PM 2.5 (µg/m3)	TVOC (index)	CO (ppm)	Radon (pCi/l)	Ozone (ppm)
Locker Room-Post	1001	72	28	17	31	12	3	0	0.3	0.006
Typical/Comfort	< 1100	71 - 74	20 - 60	> 15	< 40	< 20	< 10	< 3	< 2	< 0.1
Recommended	< 1100	68 - 78	20 - 60	> 15	< 40	< 20	< 35	< 9	< 4	< 0.1

In looking at the results of the sensor readings, all levels baseline and after show good air quality and no concerning levels. In the second test with the AtmosAir switched on and O/A levels as they had been previously operating, particle levels reduced CO2 levels reduced and other levels stayed similar. In the subsequent test with O/A reduced by 10%, levels stayed similar to the previous day. In the fourth test, with O/A reduced by 20% TVOC reduced all other levels stayed similar. In the fifth with O/A reduced by 30%, CO2 increased from the original baseline of 904 to 1001 ppm, PM levels were very similar to the baseline and TVOC decreased by 50%.

PM10 is particulate matter 10 microns or less in size. These are particles that are small enough to be breathed in and enter into the throat. PM 2.5 is particulate matter 2.5 microns or less in size. These are particles that are small enough to be breathed in and enter the lungs.

TVOC (Total Volatile Organic Compounds) are gaseous elements that can cause odors and irritations. Chemicals, materials off-gassing, etc typically produce TVOC. TVOC exposure can be irritating and sometime toxic.

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Conclusions

In comparing the results from baseline to AtmosAir system operating and O/A reduced by 30%, CO2 increased but at 1001 ppm is below many guidelines of 1,200 ppm and well below the ASHRAE PEL of 5,000 ppm. Particle levels stayed similar and TVOC levels reduced by 50%. This would indicate that the combination of AtmosAir and reduced O/A levels provided air quality that was as good, or better than at standard ventilation rate procedure O/A levels.

Sincerely,

Anthony M Abate CIE CMI
Clean Air Group

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