

IBM Corporation

A LEED IAQ Certification Study



IBM Corporation recently embarked on obtaining a LEED IAQ (EQ) Certification as outlined in the “Green Building Rating System for Commercial Interiors” for their new 60,000 sq. ft. Innovation Center Facility in Foster City, California. The Innovation Center is part of the Parkside Towers Complex that also houses additional tenants, all sharing a single central station HVAC system. In order to meet the EQ requirements of the LEED certification, as shown in figure 1., a building flush-out after construction and prior to occupancy is necessary. This flush-out can be accomplished in a variety of ways. The most common method used is running the HVAC system on 100% outside air at elevated temperatures for an extended period of time, ranging somewhere between 7 to 14 days.

Since there were additional tenants occupying the building, the typical flush-out methodology was not considered an acceptable option. An alternative method would need to be investigated to achieve this important LEED requirement. As it happened, the engineer of record, Glumac International, had successfully employed SecureAire’s PACT System on a previous LEED project to achieve the (EQ) levels and thus recommended the PACT Technology to the projects general contractors, Skanska USA Building.

SecureAire’s PACT or Particle Accelerated Collision Technology is a unique system that utilizes semiconductor airborne contamination reduction technologies to increase the efficiency and effectiveness of all air filtration systems. PACT is the only system that makes airflow the dominant transport mechanism and controls the behavior of fine particulates by creating inelastic collisions between particles on a sub-micron level. These collisions cause smaller particles to combine and form larger particles. This collision process significantly improves the ability of a standard filtration system to remove and reduce suspect indoor and outdoor generated contaminate levels.

L&H Airco, SecureAire’s local representative, was contacted by Skanska USA Building and was asked to provide several of SecureAire’s Portable APS-1000 PACT Systems, which were employed as transfer fans inside the IBM office area. The APS-1000 systems were moved around the facility providing approximately four (4) air changes per hour in the areas being “flushed out”. This flush-out procedure was conducted for a six-day period prior to the “Indoor Air Quality Study for LEED Certification”.



Figure 1: IAQ acceptable levels for LEED certification.

LEED IAQ Air Testing Requirements

Contaminate	Maximum Concentration
Formaldehyde	50 ppb
Particulate (PM-10)	50µg/M ³
Total Volatile Organic Compounds (TVOC)	500µg/M ³
*4-Phenylcyclohexene (4-PCH)	6.5 µg/M ³
Carbon Monoxide (CO)	9 ppm and no greater than 2 ppm above outdoor levels

**This test is only required if carpets and fabrics with Styrene Butadene (SB) latex backing are installed*

In order to confirm that the Innovation Center met the EQ requirements of LEED certification, ACC Environmental Consultants were employed. ACC utilized industry specific sampling and measurement procedures in order to verify the Indoor Air Quality Conditions in the Center.

It is important to note that the measurements and samples were obtained for a minimum of four hours and were taken following the installation of all furnishings but prior to full occupancy of the subject areas.

As can be seen from the following results the SecureAire PACT System was able to control the behavior of small particulates, TVOCs, 4-phenylcyclohexene and formaldehyde. It will be noted that the first testing performed on TVOCs in area one on April 7th showed higher than acceptable results. This was due to the fact that the same time the testing was performed the floors were painted with ESD paint. This accounts for the higher than acceptable level of TVOCs. Testing was repeated on April 21st and the results were acceptable. Also, Carbon monoxide levels in area three on April 10th gave a negative value and therefore was retested on April 21st and provided acceptable results.

Therefore, based on the air samples and measurements collected within the subject areas on April 7th and April 21st the criteria for LEED IAQ were met. All measurements and analytical results indicate that contaminants of concern were well below the LEED EQ criteria as outlined in the Green Building Rating System for Commercial Interiors.

It was estimated that savings using the SecureAire APS-1000 PACT systems versus the typical building flush-out method was in the range of \$50,000 not including the savings the owner realized by moving in the employees two to three weeks sooner than previously scheduled. The objective of PACT was simple; it was to take all contaminants out of the occupied space by using the properties of Particle Acceleration and Collision Technology.

SecureAire's PACT is the only Particle Control Device available in today's marketplace that successfully meets or exceeds all of LEED's IAQ requirements.



SecureAire, Inc.
 3675-B Tampa Road
 Oldsmar, FL 34677
 813.300.6077
www.secureaire.com

Figure 2: Results from sample Measurements for Carbon Monoxide.

Sample Measurement: Carbon Monoxide

245 data points were taken

Date	Location	Min (ppm)	Ave (ppm)	Max (ppm)	Acceptable Levels (ppb)
4/10/08	Area 1, 4th Floor	1	1	2	9
4/10/08	Area 2, 4th Floor	0	0	0	9
4/10/08	Area 3, 5th Floor	-8	-5	2	9
4/21/08	Area 3, 5th Floor	0	0	1	9

Figure 3: Results from sample Measurements for Particulates.

Sample Measurement: Particulates (PM10) Dust Monitoring

240 data points were taken

Date	Location	Min (µg/m³)	Ave (µg/m³)	Max (µg/m³)	Acceptable Levels (ppb)
4/7/08	Area 1, 4th Floor	0	1	15	50
4/21/08	Area 2, 4th Floor	0	6	105	50
4/7/08	Area 3, 5th Floor	0	2	59	50

Figure 4: Results from sample Measurements for TVOC and 4-PCH.

Sample Measurement: Total Volatile Organic Compounds (TVOC) and 4-Phenylcyclohexene (4-PCH)

240 minutes of data points were taken

Date	Location	Volume (L)	Concentration TVOC (µg/m³)	Concentration 4-PCH (µg/m³)	Acceptable Levels TVOCs (µg/m³)	Acceptable Levels 4-PCH (µg/m³)
4/7/08	Area 1, 4th Floor	6.9	943	<0.1	500	6.5
4/7/08	Area 2, 4th Floor	6.8	469	<0.1	500	6.5
4/7/08	Area 3, 5th Floor	6.8	320	<0.1	500	6.5
4/21/08	Area 1, 4th Floor	6.7	440	N/A	500	6.5

Figure 5: Results from sample Measurements for Formaldehyde.

Sample Measurement: Formaldehyde

240 minutes of data points were taken

Sampler Number	Location	Volume (L)	Mass Formaldehyde (ng)	Concentration Formaldehyde (ppb)	Acceptable Levels (ppb)
F-1	Area 1, 4th Floor	125.0	2160	14.1	< 50
F-2	Area 2, 4th Floor	123.4	1940	12.8	< 50
F-3	Area 3, 5th Floor	118.4	1270	8.8	< 50