J.C. Broderick & Associates, Inc.

Environmental Consulting & Testing

420 Lake Avenue
Saint James, New York 11780
631.584.5492
Fax: 631.584.3395
www.jcbroderick.com

September 5, 2009

Mr. Tony Fede
Bethpage Union Free School District
Administration Building
10 Cherry Avenue
Bethpage, New York 11714

Re: Limited Indoor Air Quality Monitoring and Sampling
Bethpage High School
Rooms 109, 111, 113 and 115
10 Cherry Avenue
Bethpage, New York
Monitoring Dates: August 31-September 2, 2009
Sampling Dates: August 28, 2009

JCB#: 09-16227

Dear Mr. Fede:

J.C. Broderick & Associates, Inc. (JCB) was retained to perform limited indoor air quality monitoring and sampling in the above referenced subject school building. The monitoring and sampling was requested based upon occupant concerns regarding the quality of the indoor air. The monitoring and sampling consisted of the following:

- Visual Inspection of Building Materials
- Moisture in Building Materials Sampling
- Mold-in-Air Sampling
- Temperature (°F) and Relative Humidity (%RH) Monitoring
- Total Airborne Particulates Monitoring
- Carbon Monoxide (CO) Monitoring
- Volatile Organic Compounds (VOC) Monitoring

Results of this testing were compared with applicable indoor air quality standards or guidelines. Results which fall outside of these standards/guidelines may represent a source of general occupant discomfort, or may be an indicator of other indoor air quality concerns. The following sections summarize the results of the inspection, monitoring, and sampling performed. Results and laboratory reports, if applicable, are provided as attachments to this report.

Visual Inspection of Building Materials

A visual inspection of each subject space was performed to identify any evidence of mold or moisture that has impacted building materials. In addition, the visual inspection was conducted to identify any obvious conditions which may adversely affect the quality of the indoor air. This included an inspection of the building materials and contents. Any inaccessible plenum spaces or locked cabinets were not included in this inspection. The visual inspection revealed the following significant findings. Please reference the attachments for details pertaining to each space.

- Each of the spaces are utilized as instructional classroom space. Room 109 also contains three (3) storage rooms. Each space contains contents typical of these settings and include desks, chairs, books, etc.
- These spaces are constructed with gypsum or plaster walls, ceiling tiles and vinyl floor tiles.
- Each classroom space is serviced by in-wall unit ventilators. These systems were not in operation at the time of the inspection.
- A limited visual inspection of the accessible ceiling plenums did not identify any obvious conditions which may adversely impact the indoor air quality.
- Moisture stained ceiling tiles were observed throughout the each of the subject spaces. No evidence of any suspect mold growth was observed on these materials.

Moisture in Building Materials Sampling

Moisture in building materials sampling was performed to identify areas of potential moisture impact within the subject space. Areas of moisture intrusion (active or historical) are potential areas of indoor mold growth. The sampling is divided into (1) infrared imaging of building material surfaces and (2) moisture meter sampling. The sampling was performed utilizing an Infrared Solutions IR FlexCam portable infrared system and Tramex Survey Encounter Moisture Meter. Technical information pertaining to these instruments is available upon request.

The science behind infrared imaging is that the water retained within building materials decreases the thermal resistance and increases the heat storage capacity of these materials. Therefore the rate of change of temperatures for wet materials will be different than that of dry materials. That is, the surface temperature over a wet area will respond more slowly to a change in the air temperature than the surface temperature of a dry area. This leads to thermal anomalies on the surfaces of building materials that can be located using the portable infrared system. Therefore the thermal imaging is performed in an attempt to convert the spatial variations in the infrared radiance of the building materials into two-dimensional images where the differing radiance are displayed as a range of colors and tones.

The thermal anomalies are evaluated at the time of the inspection. Moisture Meter sampling was also performed on building materials within the subject space.

The infrared imaging and moisture meter sampling revealed the following significant findings:

- No significant or unexplainable thermal anomalies were observed.
- The moisture meter sampling confirmed that the building materials contain acceptable levels of moisture.

Mold-in-Air Sampling

Sampling for the presence of total airborne mold spores was conducted with a Zefon International Custom Bio-Pump in conjunction with an Air-O-Cell cassette. Technical information pertaining to the Zefon pump and Air-O-Cell methodology is available upon request.

September 5, 2009
Mr. Tony Fede
Bethpage Union Free School District
Limited Indoor Air Quality Monitoring and Sampling
Bethpage High School
Rooms 109, 111, 113 and 115
Monitoring Dates: August 31-September 2, 2009
Sampling Dates: August 28, 2009
JCB#: 09-16227

"Area samples" were collected from representative locations within the subject spaces of the subject structure and "ambient (control) samples" were collected from outside the structure. The samples collected were assigned identification numbers, a chain of custody form was prepared, and the samples were delivered to an accredited independent microbiology laboratory for analysis. The analyses were for total counts of hyphal fragments, pollen counts and fungal spores. The fungal spores found in the samples were identified to the genus level.

Since there are currently no established exposure standards for mold counts by any applicable governmental agency, the best method of evaluating microbial sampling results is to perform a comparison between results observed within a test space to those of ambient or background samples.

The following tables summarizes the sampling locations, laboratory analytical results, and comparison between ambient and area samples.

When the total counts of mold spores in the area samples far exceed the counts of the ambient samples, it suggests that conditions may exist within the sample location, or a surrounding area, that are contributing to mold growth.

Table No. 1 compares the total fungi detected between the ambient and area samples collected.

Table No. 1: Comparison of Total Fungi Detected

Sample Location	Total Fungi (Raw Count)	Pollen (Raw Count)
Sample #1: Ambient Outside Structure	**386**	-
Sample #2: Ambient Outside Structure	**278**	-
Sample #3: Area Composite of Room 109	53	-
Sample #4: Area Composite of Room 111	142	-
Sample #5: Area Composite of Room 113	147	-
Sample #6: Area Composite of Rooms 115	59	-

Stachybotrys is a mycotoxin producing mold that has received considerable recent media attention resulting in it being referred to as the "toxic mold". A reported presence of *Stachybotrys* in an indoor environment typically results in elevated concerns by most occupants. *Stachybotrys* requires and thrives in cellulose rich materials that have been exposed to moisture for prolonged periods of time. Therefore, the presence of this classification of mold suggests that significantly water damaged building materials are present in the areas sampled.

Table No. 2 summarizes the concentrations of *Stachybotrys* detected in the samples collected:

Table No. 2: Detection of *Stachybotrys*	
Sample Location	**Total *Stachybotrys* (Raw Count)**
Stachybotrys was not Observed in any of the Area Samples Collected	

When a comparison between area and ambient samples reveal classifications of mold in the area samples, that are not observed in the ambient samples, it suggests that conditions may exist within the sampled areas, or adjoining spaces, that are contributing to mold growth. This is typically true in samples that reveal these molds in high concentrations and represent a high percentage of the total sample. However, if these molds are observed at low concentrations, or represent a small concentration of the total sample, then their presence is less significant.

Table No. 3 summarizes the classifications of mold that were observed in the area samples, that were not observed in the ambient samples:

Table No. 3: Classification of Molds Observed in Area Samples (Not Observed in Ambient)		
Spore Type	**Sample Location Observed**	**Raw Count**
All the spore types observed in the Area Samples collected were also observed in the Ambient Samples collected.		

When a comparison between area and ambient samples reveal classifications of mold in the area samples, that are significantly elevated to the ambient samples, it suggests that conditions may exist within the sampled areas, or adjoining spaces, that are contributing to mold growth.

Table No. 4 summarizes the classification of molds observed in the area samples at higher concentrations than found in the ambient samples:

Table No. 4: Classification of Molds Observed Elevated in Area Samples (When Compared to Ambient)			
Spore Type	**Sample Location**	**Concentration Reported (Raw Count)**	**Highest Concentration of Ambient Sample (Raw Count)**
Aspergillus/Penicillium	Sample #4: Area Composite of Room 111	34	30
Cladosporium	Sample #4: Area Composite of Room 111	24	14

- The comparisons summarized in Tables 1, 2 and 3 did not identify any significant indoor airborne mold concerns.
- Table 4 revealed the slightly elevated presence of *Aspergillus/Penicillium* and *Cladosporium* in the area sample collected from Room 111 when compared with the ambient samples collected.

Based upon the small margin of elevation, the concentrations observed are not considered to represent a significant indoor airborne mold concern.

Relative Humidity and Temperature Monitoring Results

Monitoring of relative humidity and temperature was performed primarily to ascertain if indoor conditions are providing the potential for mold growth. Monitoring of relative humidity is also performed since a low %RH may lead to increased airborne particulate concentrations and/or occupant discomfort.

The Environmental Protection Agency (EPA) currently suggests an indoor RH range of 45 to 50%, while the American Society of Heating, Refrigeration and Air conditioning Engineers(ASHRAE) recommends that indoor relative humidity(RH) be below 60%.

ASHRAE recommends that the indoor temperature be maintained between 68 to 79 °F. Temperatures above this range may cause occupants to become lethargic and increase the initial out gassing of VOC's from materials. There are different guidelines for temperature in the winter and summer, and are a result of the different dressing habits of the occupants throughout the year. In the winter months, occupants typically wear heavier clothing, and therefore are less comfortable with higher indoor temperatures. In the summer, occupants typically dress with lighter clothing and are less comfortable with lower temperatures.

Monitoring of temperature and relative humidity was performed with an IAQ-Calc Indoor Air Quality Meter Model 8762 Monitor (IAQ-Calc). Temperature was reported in degrees Fahrenheit (°F) and humidity was reported in %RH.

The results of the monitoring performed revealed the following:

- Temperature readings in Room 109 and 115 were observed as exceeding the recommended range for several data points. However, these readings were comparable to the ambient conditions outside the subject structure and are therefore not considered to represent a significant indoor air quality concern.

  All other readings were observed within the recommended range for the remaining of the subject spaces.

- Relative humidity readings were observed within the recommended range for the of the subject spaces.

Airborne Particulate Monitoring Results

Total particulate monitoring was performed utilizing a MIE Portable DataRAM Data-logging Real-time Aerosol Monitor (DataRAM). The DataRAM is a technologically advanced instrument designed to measure the concentration of airborne particulate matter (liquid or solid) providing continuous readout as well as an electronic recording of the information.

The DataRAM is a highly sensitive nephelometric (photometric) monitor whose light scattering sensing configuration has been optimized for the measurement of the respirable fraction of airborne dust, smoke, fumes and mists in indoor environments. Zeroing of the DataRAM was performed by the technician prior to the testing event utilizing a hand-inflatable "zero-air" pouch and inlet filter cartridge. The data points were downloaded into a custom JCB program for review. Technical information pertaining to the DataRAM is available upon request.

The DataRam monitoring results were evaluated utilizing the guidelines established by the American Conference of Governmental Industrial Hygienists (ACGIH) for respirable particulates. In addition, a comparison between concentrations observed within the test spaces and those from control or background locations was conducted

The results of the monitoring performed revealed the following:

- When compared to ACGIH values (3 mg/m^3) and background levels, the airborne particulate concentrations reported during the monitoring period are not expected to pose a significant indoor air quality concern.

Carbon Monoxide (CO) Monitoring Results

Carbon Monoxide (CAS# 630-08-0) in it's physical state is an odorless, tasteless and colorless gas. The gas penetrates easily through walls and ceilings and is absorbed into the body by inhalation.

Carbon monoxide can be a product of incomplete combustion and is typically found in combustion exhaust. The National Institute for Occupational Safety & Health (NIOSH) and ACGIH thresholds for CO are 35 ppm and 25 ppm, however this limit is intended to protect healthy working adults. However since the subject spaces are located within a school building, the presence of any detectable concentrations of CO should be investigated to identify the source.

Monitoring for the presence of CO was performed utilizing the IAQ-Calc Indoor Air Quality Meter Model 8762 Monitor. Concentrations of CO are reported in parts per million (ppm).

The results of the CO monitoring revealed the following:

- No detectable levels of CO were observed in any of the subject spaces.

Volatile Organic Compounds (VOC) Monitoring Results

Volatile organic compounds (VOC's) are organic chemicals that have a high vapor pressure and easily form vapors at standard temperature and pressure (STP). VOC's from out-gassing of fabrics, carpets, building materials, etc. may be a contributor to poor indoor air quality. Several hundred types of VOC's have been identified in indoor air by academic and government investigators. There is concern that even low levels of VOC's found indoors could cause both acute and chronic human health effects. Materials most often implicated as contributing to indoor VOC contamination include paints, adhesives, carpeting, vinyl tiles,

floor products and insulation.

VOC monitoring results were compared to an industry standard 3 ppm total VOC's (TVOC's) . VOC concentrations above 3 ppm have the potential to cause headaches, sore throats, respiratory tract burning, dizziness and fatigue.

Air monitoring was performed utilizing a MiniRAE 2000 Portable VOC Monitor PGM-7600 (VOC Monitor). This instrument reports concentrations of VOC's in parts per million (ppm). Technical information pertaining to the MiniRAE 2000 Portable VOC Monitor PGM-7600 is available upon request.

The TVOC monitoring results from the subject spaces were compared to the industry standard. In addition, a comparison between concentrations observed within the test spaces and those from control or background locations was also conducted.

The TVOC monitoring performed revealed the following significant findings:

- No detectable concentrations of VOC's were observed in the subject spaces.

Recommendations

The results of visual inspection, monitoring, and sampling performed did not identify any specific hazardous indoor air quality conditions. However, to improve the quality of the indoor air within the subject spaces, the following is recommended:

- Isolated areas of stained ceiling tiles was observed throughout the subject spaces. The custodial staff should continue their policy of removing and replacing moisture impacted ceiling tiles and any other cellulose based building materials/contents as soon as they become wetted. Remaining building materials should be dried in place and inspected regularly for mold growth.

It is important to note that this inspection, monitoring, and sampling are limited in that they only report the presence and conditions of the parameters analyzed at the time they were performed. The monitoring and sampling was performed only during non-occupied portions of the day and did not include an assessment of the Heating, Ventilation, and Air Conditioning (HVAC) systems. Therefore, this report should not be misconstrued as a comprehensive indoor air quality assessment. These results can not guarantee the conditions prior to, and subsequent to, when the monitoring and sampling was performed. If the occupants' concerns and/or symptoms persist, further investigation, including more expansive air monitoring and collaboration with the occupants and the occupants' physicians is recommended. Please contact our office if these services are requested.

September 5, 2009
Mr. Tony Fede
Bethpage Union Free School District
Limited Indoor Air Quality Monitoring and Sampling
Bethpage High School
Rooms 109, 111, 113 and 115
Monitoring Dates: August 31-September 2, 2009
Sampling Dates: August 28, 2009
JCB#: 09-16227

If there are any questions or if more information is needed, please feel free to call.

Sincerely,

Kristen Veeck
Environmental Scientist
J.C. Broderick & Associates, Inc.

Edward J. McGuire III
Senior Environmental Scientist
J.C. Broderick & Associates, Inc.

Attach 09-16227/Final