Salazar Consulting Group, Inc.

A professional team of engineers, industrial hygienists, safety experts, physicians, and health scientists.

Indoor Environmental Quality Evaluations
Environmental and Medical Monitoring
EPA/OSHA Compliance
Expert Testimony

Hazardous Waste Control
Hazard Communication
Safety Evaluations
Training

October 30, 2007

Mr. Jeffrey S. Moquin
Director
Risk Management Department
The School Board of Broward County
7770 West Oakland Park Boulevard
Sunrise, Florida 33351-6750

RE: Air-O-Cell Sampling and Limited Indoor Environmental Quality Evaluation
Bethune Elementary School - Building No. 8 (Select Areas)
2400 Meade Street
Hollywood, Florida 33020-1246
SCG File No. 1031.72

Dear Mr. Moquin:

Salazar Consulting Group, Inc. (SCG) performed Air-O-Cell Sampling and a Limited Indoor Environmental Quality (IEQ) Evaluation of select areas of Building No. 8 at the aforementioned school facility on October 23, 2007. The evaluation was requested by The School Board of Broward County reportedly in response to occupant complaints of development of adverse health effects, primarily described as non-specific allergy-type symptoms, allegedly associated with occupancy of various rooms of the building. SCG understands that assessment of indoor areas of the building has previously been provided by others, but specific causes directly attributable to occupant complaints have not been identified to date.

Specific areas evaluated within Building No. 8 were selected by School Board and/or school facility representatives and identified to SCG at the time of the site visit, and such selections were reportedly prompted by receipt of occupant complaints. SCG's evaluation included walk-through observations of indoor and respective outdoor areas of the building and of easily accessible ventilation system components; measurements of environmental parameters to include temperature, relative humidity, and carbon dioxide levels from indoor and outdoor locations; and collection of microbial air samples utilizing Air-O-Cell screening methodologies from indoor and respective outdoor locations. Samples were collected by methods in accordance with generally accepted industry guidelines, and sent to an independent American Industrial Hygiene Association (AIHA)-accredited environmental microbiology laboratory for enumeration and identification of airborne mold (fungal) elements detected.

Original laboratory documents reporting the analytical results of airborne mold samples collected at the time of evaluation are enclosed for reference. The air sampling data indicate detection of the average indoor level of airborne mold elements at less than one-third of the average level detected outdoors. Indoor levels of mold elements ranged

from 95 spores per cubic meter air (s/m^3) to 1240 s/m^3, and averaged 647 s/m^3. By comparison, outdoor levels of airborne mold elements ranged from 2241 s/m^3 to 2670 s/m^3, and averaged 2496 s/m^3.

Indoor/outdoor ratios, calculated by dividing the indoor concentrations by the respective outdoor concentrations and multiplying by one hundred (100) to convert to a percentage value, ranged from 0.04 percent (%) to 46.4 %, and averaged 25.9 %. The "worst-case" indoor/outdoor ratio, calculated by dividing the maximum indoor air concentration by the minimum concentration detected outdoors, was 55.3 %, suggesting that the maximum indoor concentration of airborne mold only slightly exceeded one-half of the lowest level detected outdoors. Interestingly, only within Room Nos. 801 and 807, identified to SCG as "complaint" locations, did levels slightly exceed those detected within Room No. 817, identified to SCG as a "non-complaint" location.

The types of mold elements detected indoors were generally similar to those detected from outdoor sources; mold elements detected exclusively indoors were generally detected at or near the analytical limit of detection. Please be advised that concentrations of certain mold elements detected indoors at times varied from those detected outdoors. However, in the absence of specific standards and/or guidelines for interpretation of such occurrences, SCG is not able to offer comment on the meanings of such outcomes nor on any resulting consequences. Furthermore, SCG cautions that microbial sampling data often varies significantly due to a multitude of factors, and therefore attempting to offer precise meaning of the outcomes reported may prove difficult and perhaps result in development of misleading conclusions.

Limited evaluation of various rooms within Building No. 8 and respective outdoor areas did not reveal any obviously unique conditions unquestionably contributing to degraded indoor environmental quality within the building. Floor coverings presented in generally good condition and clean, but slight stainings were observed sporadically on floor carpets; wood floor systems presented as generally unremarkable. Housekeeping within occupied spaces appeared generally adequate with only slight dust/debris visibly settled sporadically on environmental surfaces/furnishings/contents, despite the availability of numerous items displayed and stored within several classrooms. Suspended ceiling tile systems presented as generally unremarkable, intact, and in good condition, with only one (1) stained ceiling tile detected in each Room No. 806 and the storage room of Room No. 817 (ceiling spaces above suspended ceiling tile systems were not observed at the time of evaluation). Building materials of wall and ceiling (drywall) systems presented in good condition, with only cosmetic-type imperfections visible sporadically. Most importantly, visible indicators of suspect mold activity were not detected within evaluated areas of the building, with the exception of suspect spottings visible on a few art pieces stored within Room No. 817 and reportedly residual effects of a previously detected and corrected problem. Please be advised that although residual evidence of moisture intrusion effects was not detected at the time of evaluation, previously existing moisture intrusion sources/pathways (i.e. moisture intrusion through the parapet roof system, etc.) had reportedly been identified and corrective measures implemented within select areas of the building.

Four (4) air handling units reportedly service Building No. 8. Access of Air Handling Unit Nos. 3, 5, and 7 housed within Mechanical Room No. 815, and Air Handling Unit No. 8 housed within Mechanical Room 801K, revealed internal components of each to be exceptionally clean and coated, presumably with an anti-microbial product. Cooling coils and condensate drain pans of each unit presented similarly. Pleated filters were properly installed and clean, and only within Air Handling Unit No. 5 was one (1) filter panel missing, allowing unobstructed introduction of unfiltered air directly into the ventilation supply air stream. As with observations within the rooms serviced by the respective air handling units, visible evidence of suspect mold activity was not detected within any unit at the time of evaluation.

Indoor environmental parameter data (temperature, relative humidity, and carbon dioxide levels) collected at the time of evaluation are summarized in Table 1. The data were compared with generally recommended criteria levels published by the American Society of Heating, Refrigerating, and Air-Conditioning Engineers, Inc. (ASHRAE). These guidelines generally suggest maintenance of indoor temperature at 69.0 degrees Fahrenheit (°F) to 79.0 °F, relative humidity below 60.0 %, and an indoor-to-outdoor carbon dioxide differential of 700 parts carbon dioxide per million parts air (ppm) or less. Indoor temperature levels within evaluated areas of Building No. 8 ranged from 68.9 °F to 74.8 °F and averaged 72.0 °F, relative humidity levels ranged from 51.0 % to 61.6 % and averaged 56.6 %, and carbon dioxide levels ranged from 534 ppm to 836 ppm and averaged 748 ppm. With the exception of the temperature level detected slightly below the ASHRAE-recommended minimum within Room No. 805 (detected at 68.9 °F), and the relative humidity level detected slightly above the ASHRAE-recommended maximum within Room No. 817 (detected at 61.6 %), environmental parameter data collected within evaluated areas of Building No. 8 remained within recommended criteria ranges published by ASHRAE. Please understand that the slight variations described are minimal and possibly not representative of long-term conditions. Outdoor temperature levels ranged from 88.6 °F to 90.3 °F and averaged 89.2 °F, relative humidity levels ranged from 61.1 % to 65.1 % and averaged 62.9 %, and carbon dioxide levels ranged from 335 ppm to 349 ppm and averaged 344 ppm.

Table 1. Environmental Parameter Data
Bethune Elementary School - Building No. 8
Collection Date: October 23, 2007

LOCATION	TEMP (°F)	RH (%)	CD (ppm)	COMMENTS
Building No. 8				
Room No. 801	69.8	58.5	534	unoccupied
Room No. 805	68.9	58.2	826	unoccupied
Room No. 806	70.3	57.3	683	≈ 11 occupants
Room No. 807	72.3	56.9	836	≈ 11 occupants
Room No. 809	73.7	52.4	784	unoccupied
Room No. 810	74.3	51.0	799	unoccupied
Room No. 817	74.8	61.6	772	≈ 15 occupants
Outdoors – Adjacent to Building No. 8				
Northwest Side	88.8	62.5	335	clear day
Southwest Side	88.6	65.1	349	clear day
East Side	90.3	61.1	348	clear day

TEMP (°F) = temperature (degrees Fahrenheit)
RH (%) = relative humidity (percent)
CD (ppm) = carbon dioxide (parts carbon dioxide per million parts air)
≈ = approximately

Again, conditions observed within evaluated areas of Building No. 8 appeared generally adequate and unremarkable. Observed conditions were supported by the microbial air sampling data collected and reported. Nonetheless, as is often the outcome of any evaluation, a few conditions requiring remedial response measures were identified. Therefore, based solely upon conditions observed, data collected, and information provided at the time of evaluation, SCG recommends implementation of the following response measures:

1. Offer cleaning/sanitizing of carpet floor coverings within Building No. 8, as necessary, to remove visible stainings/soiling.

2. Provide frequent cleaning/sanitizing of environmental surfaces/contents throughout evaluated areas to remove settled dust/debris, as necessary; minimize the availability of displayed and/or stored items to facilitate on-going housekeeping efforts.

3. Accurately identify and effectively eliminate the cause(s) of stainings to ceiling tiles in each Room No. 806 and the storage room of Room No. 817.

4. Further evaluate conditions within ceiling spaces above suspended ceiling tile systems of Building No. 8; provide response measures as deemed necessary.

5. Accurately identify and effectively eliminate the cause(s) of suspect spottings presenting sporadically on artwork available within Room No. 817; appropriately clean/sanitize or eliminate the art pieces accordingly.

6. Confirm the provision of thorough evaluation of building materials having sustained known or suspect water contact effects (such as drywall wall materials and respective wall cavities within rooms affected by previous water intrusion events, parapet roof-related or otherwise); provide corrective measures as dictated by discovered conditions and by methods in accordance with generally accepted industry guidelines.

7. Replace the air filtration media missing from the filter bank within Air Handling Unit No. 5 (housed within Mechanical Room No. 815) to prevent entrainment of unfiltered air into occupied indoor spaces.

8. Further evaluate temperature control within Building No. 8 to verify maintenance of temperature levels within the ASHRAE-recommended guidelines, and to ensure temperature variations between indoor spaces remain minimal.

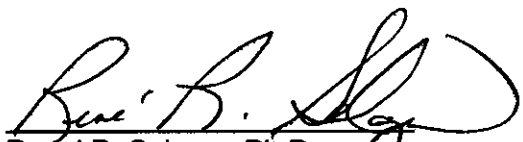
9. Further evaluate relative humidity control within Building No. 8 to attempt maintenance below the ASHRAE-recommended maximum of 60.0 %.

Although the need for additional improvement measures beyond those described above are not expected, such measures should be provided if existing conditions change and/or their need is deemed necessary. Of course, consultation and sharing of details of this evaluation with an appropriate health practitioner/professional is recommended for any person(s) alleging development of adverse health effects with occupancy of any given room within Building No. 8; response to the outcome of such medical consult should be provided accordingly.

SCG appreciates the opportunity to be of assistance in this regard. Please do not hesitate to contact us should you have any questions, comments, or require additional information.

Sincerely,

SALAZAR CONSULTING GROUP, INC.

By: 

Rene' R. Salazar, Ph.D.
Certified Industrial Hygienist

Enclosure

Rec'd 10/29/07

PathCon® Laboratories

October 25, 2007
Final Report P2365

Rene Salazar
Salazar Consulting Group, Inc.
6607 Heatherton Court
Tampa, FL 33617

Re: Project No. 1031.72

Dear Dr. Salazar,

The analysis of environmental samples submitted to PathCon Laboratories (see Table 1) has been completed. Samples were received and analysis initiated on October 24, 2007. Samples received in acceptable condition were analyzed and reported herein. Results are presented in attached table(s). Results in this report are based on samples submitted by the on-site investigator.

The purpose of this report is to identify and quantify fungi from collected samples at the time they are submitted. It is not the intent of this report to make any suggestions or associations concerning potential health effects of building occupants, nor to suggest any remediation procedures. There are no governmental regulations concerning permissible numbers of fungi in environmental samples.

Your invoice will follow under separate cover. Thank you for your business.

Sincerely,

PATHOGEN CONTROL ASSOCIATES, INC.
By:

Brian G. Shelton, M.P.H.
President/CEO

270 Scientific Drive Suite 3 Norcross, Georgia 30092
Phone: 770-446-0540 Fax: 770-446-0610

Table 1. Identification of Air-O-Cell Sampling Sites

Site No.	Description
01	Sample 071023-RS-01, 9:10A, Room No. 801, Unoccupied
02	Sample 071023-RS-02, 9:21A, Room No. 805, Unoccupied
03	Sample 071023-RS-03, 9:44A, Room No. 810, Unoccupied
04	Sample 071023-RS-04, 10:00A, Room No. 809, Unoccupied
05	Sample 071023-RS-05, 10:18A, Room No. 806, 11 occupants
06	Sample 071023-RS-06, 10:35A, Room No. 807, 11 occupants
07	Sample 071023-RS-07, 10:52A, Room No. 817, 15 occupants
08	Sample 071023-RS-08, 11:14A, Outdoors, Northwest side of Bldg. No. 8, Clear day
09	Sample 071023-RS-09, 11:29A, Outdoors, Southwest side of Bldg. No. 8, Clear day
10	Sample 071023-RS-10, 11:53A, Outdoors, East side of Bldg. No. 8, Clear day
11	Sample 071023-RS-11, Control, Unexposed

Table 2. Results of Microbiological Analysis of Air-O-Cell Sample(s)

Sample	Concentration[1,2,3]	Spore Types[4]
01	1240	*Penicillium/Aspergillus*-like (18) *Cladosporium*-like (4) Unidentified spores (3) Hypha (1)
02	95	Unidentified spores (2)
03	238	Unidentified spores (3) *Cladosporium*-like (1) *Curvularia*-like (1)
04	143	Unidentified spores (2) *Penicillium/Aspergillus*-like (1)
05	763	Unidentified spores (10) Hyphae (4) *Curvularia*-like (1) *Ulocladium*-like (1)
06	1049	Unidentified spores (10) *Curvularia*-like (6) Hyphae (5) *Cladosporium*-like (1)

[1] Estimated number of fungal spores per cubic meter of air. Counts may include other fungal fragments if present.

[2] Counts are based on an airflow rate of 15.1 liters per minute and a sample exposure time of 10 minutes.

[3] Limits of the test were approximately 48 fungal spores per cubic meter of air.

[4] Genera listed in descending order of occurrence.

* Counts may have been influenced due to presence of a large amount of debris.

Table 2. Results of Microbiological Analysis of Air-O-Cell Sample(s)

Sample	Concentration[1,2,3]	Spore Types[4]
07	1001*	*Penicillium/Aspergillus*-like (17) *Cladosporium*-like (1) *Curvularia*-like (1) Unidentified spore (1) Hypha (1)
08	2241	Unidentified spores (19) *Cladosporium*-like (17) *Curvularia*-like (4) *Penicillium/Aspergillus*-like (4) *Bipolaris*-like (1) Hypha (1) *Pyricularia*-like (1)
09	2575	Unidentified spores (39) *Cladosporium*-like (6) *Curvularia*-like (3) *Fusarium*-like (2) *Torula*-like (2) *Bipolaris*-like (1) *Pithomyces*-like (1)

[1] Estimated number of fungal spores per cubic meter of air. Counts may include other fungal fragments if present.

[2] Counts are based on an airflow rate of 15.1 liters per minute and a sample exposure time of 10 minutes.

[3] Limits of the test were approximately 48 fungal spores per cubic meter of air.

[4] Genera listed in descending order of occurrence.

* Counts may have been influenced due to presence of a large amount of debris.

Table 2. Results of Microbiological Analysis of Air-O-Cell Sample(s)

Sample		Concentration[1,2,3]	Spore Types[4]
10		2670	Unidentified spores (21) *Curvularia*-like (17) *Penicillium/Aspergillus*-like (10) Hyphae (3) *Spegazzinia*-like (2) *Cladosporium*-like (1) *Pyricularia*-like (1) *Tetraploa*-like (1)
11	Blank	0	

[1] Estimated number of fungal spores per cubic meter of air. Counts may include other fungal fragments if present.

[2] Counts are based on an airflow rate of 15.1 liters per minute and a sample exposure time of 10 minutes.

[3] Limits of the test were approximately 48 fungal spores per cubic meter of air.

[4] Genera listed in descending order of occurrence.

* Counts may have been influenced due to presence of a large amount of debris.

SALAZAR CONSULTING GROUP, INC.

6607 Heatherton Court, Tampa, Florida 33617
(813) 980-1915 • FAX (813) 988-7486

CHAIN OF CUSTODY

Project BCSB / BETHUNE ES **Project No.** 1031.72
Location HOLLYWOOD, FL **Date:** 10/23/07
Sampled by: R. SALAZAR

SAMPLE NO.	LOCATION	TYPE	COMMENTS
071023-RS-01	Room No. 801	AIR-O-CEL	UNOCCUPIED
071023-RS-02	Room No. 805		UNOCCUPIED
071023-RS-03	Room No. 810		UNOCCUPIED
071023-RS-04	Room No. 809		UNOCCUPIED
071023-RS-05	Room No. 806		≈ 11 OCCUPANTS
071023-RS-06	Room No. 807		≈ 11 OCCUPANTS
071023-RS-07	Room No. 812		≈ 15 OCCUPANTS
071023-RS-08	OUTDOORS - NORTHWEST SIDE OF BLDG. NO. 8		CLEAR DAY

9:10A
9:21A
9:44A
10:00A
10:18A
10:35A
10:52A
11:14A
CONTINUOUS COMPLIANT

Laboratory Instructions:

- ***Please invoice Salazar Consulting Group, Inc.***
- ***FAX preliminary results and mail final results.***
- ***Other:*** PUMP FLOW RATE = 15.1 LPM
  SAMPLE TIME = 10 MIN.

CHAIN OF CUSTODY DATA:

Collected by: R. SALAZAR **Date:** 10/23/07
Packaged/Sent by: R. SALAZAR **Date:** 10/23/07
Transporter: FED EX **Date:** 10/23/07
Laboratory: PATH CON
Lab Receiver: D. Hauck **Date:** 10/24/07
Lab Analyst: _____ **Date:** _____

PLEASE RETURN THIS FORM WITH ANALYTICAL RESULTS

Salazar Consulting Group, Inc.

Project BCSB / BETHUNE ES

Project No. 1031.72

Date 10/23/07

CHAIN OF CUSTODY

	SAMPLE NO.	LOCATION	TYPE	COMMENTS
11:29A	071023-RS-09	OUTDOORS - SOUTH SIDE OF BLDG. NO. 8	AIR-D CELL	CLEAR DAY
11:53A	071023-RS-10	OUTDOORS - EAST SIDE OF BLDG. 8		CLEAR DAY
—	071023-RS-11	CONTROL		UNEXPOSED
	071023-RS-12			