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

June 5, 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: Limited Indoor Environmental Quality Assessment – May 16, 2007
Technology & Support Services Center – Second and Third Floors
7720 West Oakland Park Boulevard
Sunrise, Florida 33351
SCG File No.: 1031.46

Dear Mr. Moquin:

Salazar Consulting Group, Inc. (SCG) performed a Limited Indoor Environmental Quality Assessment at the aforementioned facility on May 16, 2007. SCG understands that the assessment was prompted by occupant reports of development of adverse health symptoms allegedly associated with building occupancy. Evaluative activities were limited to second and third floor areas of the facility, and included discussions with facility representatives/occupants; observations of interior areas, ceiling plenum spaces, and a representative sampling of easily accessible ventilation system components servicing respective areas; moisture testing of select building materials within evaluated areas; and measurements of environmental parameters to include temperature, relative humidity, carbon dioxide, and total and respirable particulate levels at indoor and respective outdoor locations. Details of information provided, conditions observed, and data collected on the date of evaluation follow.

Occupant Remarks

A few building occupants offered comments to SCG at the time of evaluation; some of those who commented mentioned that indoor building conditions which have persisted "for years" are allegedly attributed to development of their adverse health symptoms. Occupants generally reported development of health effects described primarily as non-specific allergy (nasal congestion, eye irritation, etc.)- and upper respiratory-type symptoms. Complaints of thermal variations were frequent.

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General Indoor Observations

Second Floor

P. Bevaraggi's Office

1. Floor carpet obviously worn/soiled.
2. Water intrusion through exterior window systems reported; marble sill loosened but exposed building materials surrounding sill appear generally unremarkable; moisture levels low within drywall wall materials tested, even surrounding loosened sill location.
3. Suspended ceiling tile system intact.
4. Slight dust/debris available on environmental surfaces, but housekeeping generally adequate.
5. One (1) live foliage plant displayed.
6. Numerous decorative items displayed.
7. Ceiling spaces above suspended ceiling tile system appear as typical and generally unremarkable.

M. Arauz's Office

1. Floor carpet obviously worn/soiled.
2. Air movement through exterior window systems reportedly occurs (detected by sound of air passing through window system and resulting movement of decorative blinds).
3. Suspended ceiling tile system intact.
4. Slight dust/debris available on environmental surfaces, but housekeeping generally adequate.
5. One (1) live foliage plant displayed.
6. Numerous decorative items displayed.
7. Ceiling spaces above suspended ceiling tile system appear as typical and generally unremarkable.

R. Jones' Office

1. Floor carpet obviously soiled.
2. One (1) live foliage plant displayed.
3. Suspended ceiling tile system intact.
4. Housekeeping apparently adequate.
5. Presumed water intrusion effects visible on surfaces of drywall materials installed interior of exterior wall system; loosened paint/staining on drywall surfaces directly beneath affected window system.
6. Moisture levels low within drywall wall materials tested, even at stained location directly beneath exterior window system.
7. Ceiling spaces above suspended ceiling tile system appear as typical and generally unremarkable.

Help Desk Area (non-complaint/comparison area)

1. Floor carpet buckled; moderate soiling/staining visible.
2. Suspended ceiling tile system generally intact, but with one (1) misaligned and one (1) missing tile.
3. Numerous foliage plants displayed.
4. Slight dust/debris on environmental surfaces visible sporadically, but housekeeping appears generally adequate.

Food & Nutrition Services

1. Floor carpet obviously soiled/stained/aged.
2. One (1) occupant wearing personal air purifying device; reportedly physician-recommended.
3. Numerous decorative items displayed; significant amounts of dust/debris accumulated on displayed items.
4. Suspended ceiling tile system intact.
5. Routine vacuuming questioned by occupants.
6. Ceiling spaces above suspended ceiling tile system appear as typical and generally unremarkable.

Third Floor

A. Coluzzi's Office Areas

1. Suspended ceiling tile system intact.
2. Ceiling spaces above suspended ceiling tile system appear as typical and generally unremarkable.
3. Floor carpet buckled and obviously aged/soiled.
4. Housekeeping appears generally adequate.
5. Detection of "musty" odor reported by occupants.

S. Laljie's Office

1. Floor carpet slightly soiled/aged.
2. Numerous foliage plants displayed.
3. Housekeeping appears generally adequate.
4. Suspended ceiling tile system intact.
5. Ceiling spaces above suspended ceiling tile system appear as typical and generally unremarkable.

Payroll Department Areas

1. Floor carpet moderately soiled/aged.
2. Multiple live foliage plants displayed.
3. Suspended ceiling tile system intact.

4. Moisture levels low within drywall wall materials installed on interior surfaces of exterior wall systems.
5. Heavy accumulations of dust/debris visible on interior window sills of exterior window systems.

Special Investigation Unit

1. Floor carpets moderately aged/soiled.
2. Suspended ceiling tile system generally intact, but one (1) penetrated and several stained ceiling tiles.
3. Ceiling plenum spaces above suspended ceiling tile system appear as typical and generally unremarkable, even at stained ceiling tile locations.
4. Numerous foliage plants displayed.
5. Numerous decorative items displayed throughout personal work areas.

Ventilation System Observations

P. Bevaraggi's, R. Jones', S. Laljie's Offices

Ventilation supply air register surfaces generally unremarkable/clean.

Help Desk Area (non-complaint/comparison area)

1. Paper blocking one (1) ventilation supply air register in attempt to limit air flow.
2. Several occupants use portable heaters at work stations; occupants complain of temperatures being typically too cold.

Food & Nutrition Services

1. Ventilation supply air registers generally unremarkable/clean.
2. Occupants complain of extreme thermal variations.

Special Investigations Unit

Slight spottings visible sporadically on ventilation supply air registers.

Men's Restroom (Room No. 227)

Supply air ventilation into restroom questioned by building occupants.

Air Handling Unit No. 2 (reportedly services portions of second floor)

1. Significant amount of standing water and subsequent biofilm development in condensate drain pan.
2. Dust/debris/discolorations readily visible on cooling coils of unit and sporadically on internal component surfaces.

Air Handling Unit No. 3 (reportedly services portions of third floor)

1. Stagnant water and resulting biofilm available within condensate drain pan.
2. Slight dust/debris and suspect spottings visible on internal components.
3. Slight dust/debris visible on cooling coils.
4. Dust/debris visible on interior surfaces of metal return air duct segment.

Environmental Parameter Measurements

Environmental parameter data collected on the date of evaluation are summarized in Table 1. Temperature levels detected within second floor areas of the facility ranged from 73.7 degrees Fahrenheit (°F) to 76.3 °F and averaged 74.5 °F, relative humidity levels ranged from 44.1 percent (%) to 51.4 % and averaged 47.2 %, carbon dioxide levels ranged from 1061parts carbon dioxide per million parts air (ppm) to 1267 ppm and averaged 1211 ppm, total particulate levels ranged from 0.004 milligrams particulate per cubic meter air (mg/m^3) to 0.036 mg/m^3 and averaged 0.013 mg/m^3, and respirable particulate levels ranged from 0.004 mg/m^3 to 0.023 mg/m^3 and averaged 0.010 mg/m^3.

Temperature levels detected within third floor areas of the facility ranged from 70.9 °F to 75.7 °F and averaged 73.7 °F, relative humidity levels ranged from 44.5 % to 61.1 % and averaged 51.1 %, carbon dioxide levels ranged from 1111 ppm to 1335 ppm and averaged 1235 ppm, total particulate levels ranged from 0.006 mg/m^3 to 0.010 mg/m^3 and averaged 0.008 mg/m^3, and respirable particulate levels ranged from 0.006 mg/m^3 to 0.011 mg/m^3 and averaged 0.009 mg/m^3.

Outdoor temperature, relative humidity, carbon dioxide, and total and respirable particulate levels were detected at 91.8 °F, 56.3 %, 503 ppm, 0.051 mg/m^3, and 0.050 mg/m^3, respectively.

NOTE: Indoor environmental parameter data (temperature, relative humidity, and carbon dioxide levels) collected 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 °F to 79.0 °F, relative humidity below 60.0 %, and an indoor-to-outdoor carbon dioxide differential of 700 ppm or less. Indoor particulate concentrations were compared to those detected outdoors, with detection of indoor particulate concentrations at or below those detected outdoors considered ideal.

Table 1. Environmental Parameter Data
Technology and Support Services Center
Collection Date: May 16, 2007

LOCATION	TEMP (°F)	RH (%)	CD (ppm)	PARTICULATE (mg/m^3)		COMMENTS
				TTL	RSP	
Second Floor						
C. Bevaraggi's Office	74.5	47.1	1259	0.010	0.007	1 occupant
M. Arauz's Office	76.3	44.1	1267	0.006	0.005	1 occupant
R. Jones' Office	74.8	45.9	1246	0.005	0.008	1 occupant
Help Desk Area	74.4	46.8	1174	0.006	0.006	≈ 10 occupants
Food & Nutrition Services	73.8	45.5	1364	0.004	0.004	4 occupants
Men's Restroom (Room No. 227)	74.2	49.9	1061	0.023	0.015	unoccupied
Women's Restroom (Room No. 226)	73.7	51.4	1102	0.036	0.023	unoccupied
Third Floor						
A. Coluzzi's Office	70.9	61.1	1111	0.006	0.006	unoccupied
S. Laljie's Office	75.4	53.2	1162	0.007	0.009	unoccupied
Payroll Department Areas	75.7	51.7	1335	0.007	0.009	1 occupant
Special Investigations Unit (west areas)	73.5	44.5	1302	0.008	0.011	1 occupant
Special Investigations Unit (east areas)	73.2	45.0	1263	0.010	0.009	unoccupied
Outdoors						
Front of Building	91.8	56.3	503	0.051	0.050	overcast

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

Recommendations

Based upon conditions observed, data collected, and information provided at the time of evaluation, SCG recommends timely implementation of the following remedial measures:

1. Improve the condition of floor carpets installed throughout evaluated areas.

   Floor carpets observed within evaluated areas generally presented as moderately worn/soiled. SCG recommends that the conditions of these flooring materials be improved by cleaning/sanitizing accordingly, followed by routine and frequent cleaning/sanitizing to minimize development of visible effects. Replacement of carpet materials with more durable (non-porous) floor coverings should be considered as a long-term measure.

2. Further evaluate exterior wall systems within P. Bevaraggi's, M. Arauz's, and R. Jones' Offices; properly remediate affected building materials, as necessary.

   Wind and/or water migration through the respective wall systems was reported at the time of evaluation. Further evaluation of the respective wall systems is recommended to determine existing conditions of building materials. Voids allowing air and/or water migration indoors should be accurately identified and effectively eliminated; any affected building materials should be remediated by methods in accordance with generally accepted industry guidelines.

3. Minimize the availability of personal/decorative items within work areas; improve routine housekeeping practices to minimize dust/debris accumulations on environmental surfaces throughout.

   Minimizing the availability of personal and/or decorative items within work areas should be encouraged to better facilitate routine and frequent housekeeping/dusting practices.

4. Discourage use of live foliage plants indoors, particularly within areas occupied by individuals with known or suspect allergies/sensitivities.

   Indoor foliage serves as a prime source of microbial (mold) and other biological allergens. Foliage allergens may be associated with the plant material itself, or with the medium (soil) in which it is growing. Therefore, to minimize indoor allergen reservoirs, limit use of live plants indoors.

5. Eliminate tripping hazards posed by "buckled" floor carpets installed within the Help Desk Area (second floor) and A. Coluzzi's Office (third floor).

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6. Properly align and/or remove/replace any misaligned, penetrated, or missing ceiling tiles, respectively, available within evaluated areas.

   Ceiling tile alignment and/or replacement activities should strive to eliminate, or at least minimize, interaction of ceiling space air with that of occupied spaces beneath.

7. Accurately identify and effectively eliminate the source(s) of stainings to stained ceiling tiles within evaluated areas; properly remove/replace affected tiles accordingly.

   Stained ceiling tiles are typically indicative of water sources migrating through building roof/wall systems and/or associated with ventilation system components. Moisture affected tiles may provide adequate sources of moisture and nutrients for growth of allergenic microorganisms (molds). Therefore, moisture sources should be promptly identified and eliminated, and stained ceiling tiles removed and replaced accordingly.

8. Verify routine and frequent vacuuming of floor carpets within evaluated areas; use of HEPA (high-efficiency particulate arrestance)-filtration devices is recommended.

9. Further evaluate the provision of ventilation air into the Help Desk Area.

   The ventilation supply air register servicing this location was obstructed with "paper" to restrict air flow. Air flow into this space should be further evaluated and improvement measures implemented to maximize occupant comfort.

10. Further evaluate temperature control within Help Desk and Food & Nutrition Services.

    Temperature levels within evaluated areas remained generally within the ASHRAE-recommended range. However, building occupants report noticeable temperature differentials (warmer or cooler, dependent on location) between facility areas. Further evaluation of temperature control within evaluated areas is recommended to confirm that temperature levels are consistent and optimal, and that temperature differentials are minimized. Consultation with an appropriate ventilation system professional may be required to determine effective response options.

11. Clean/sanitize ventilation supply air registers servicing the Special Investigations Unit.

    Spottings were observed on ventilation supply air register surfaces within the respective location. The air registers should be thoroughly cleaned/sanitized by damp-wiping with a dilute detergent or other appropriate sanitizing solution, and by methods in accordance with generally accepted industry guidelines.

12. Verify the provision of ventilation supply air into the Men's Restroom (Room No. 227).

13. Clean/sanitize internal components of air handling units and respective air conveyance duct segments servicing evaluated second and third floor locations.

    Internal components of respective air handling unit and air conveyance duct segments should be cleaned/sanitized by methods in accordance with generally accepted industry guidelines.

14. Further evaluate drainage of condensate water from drain pans of Air Handling Unit Nos. 2 and 3; clean/sanitize respective drain pan surfaces.

15. Further evaluate relative humidity control within A. Coluzzi's Office; provide improvement measures as deemed necessary.

    Relative humidity within this location only slightly exceeded ASHRAE's recommended maximum of 60.0 %. Nonetheless, relative humidity control within this office should be further evaluated and improvement measures provided as deemed necessary.

16. Further evaluate ventilation adequacy within the offices of C. Bevaraggi, M. Arauz, and R. Jones, and areas of Food & Nutrition Services, the Payroll Department, and the Special Investigations Unit.

    Carbon dioxide levels within these locations exceeded the ASHRAE-recommended maximum of 700 ppm beyond the outdoor level detected at the time of evaluation (1203 ppm serves as the respective maximum for the date of evaluation). Further evaluation of the design, operation, and functioning of the respective ventilation system(s) is recommended to ensure adherence to the ASHRAE guideline. Consultation with a qualified, licensed, and experienced ventilation system professional is recommended to determine appropriate and necessary response measures.

With regard to implementation of remedial measures in response to known or suspect moisture contacted building materials, please remain mindful that such activities should be performed by individuals knowledgeable in proper handling of water damaged building materials. Workers performing project tasks should be free of any predisposing health conditions, be made aware of potential exposure hazards associated with project activities, be provided and properly don appropriate personal protective equipment, and complete tasks by methods in accordance with generally accepted industry guidelines. Disturbance of affected materials by building occupants should be discouraged. Of course, observations during completion of such tasks should dictate the provision of additional remedial measures.

Please understand that the recommendations provided herein should not be considered exhaustive or comprehensive. The recommendations described may require supplementation as deemed necessary and as dictated by further details anticipated or discovered during project progression. Reference to currently available publications which discuss generally accepted moisture and/or mold response practices, such as the United

States Environmental Protection Agency's guidelines titled Mold Remediation in Schools and Commercial Buildings (March, 2001; www.epa.gov/iaq), is highly recommended as a source of additional information.

Finally, please be advised that conditions observed, data collected, and remedial recommendations, as described in this report, are relevant only to the time of evaluation. Conditions observed on the date of evaluation may continue to change until remedial tasks are completed. Given the expected variations in indoor environmental conditions, SCG is not able to offer comment on the suitability for occupancy of any area of the facility prior to, during, or after completion of any implemented response measures; comment on the suitability of the facility for occupancy by any specific individual(s) should be provided by an appropriate health professional/practitioner. Furthermore, the decision to continue occupancy at any given time while improvement measures are in progress should be dictated by prevailing conditions and relevant circumstances.

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

Sincerely,

SALAZAR CONSULTING GROUP, INC.

By: _____
Rene' R. Salazar, Ph.D.
Certified Industrial Hygienist