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February 15, 2002

Mr. Bernard P. Orlan
Director, Environmental Health & Safety
New York City Board of Education
28-11 Queens Plaza North
Long Island City, NY 11101-4008

Re: Indoor Air Quality Assessment
P.S. 89M
201 Warren Street
New York, NY 10282
ATC Project No. 15-19125-0297

Dear Mr. Orlan:

ATC Associates Inc. (ATC) is pleased to provide this report of indoor air quality (IAQ) measurements collected on February 14, 2002, at the referenced school. The New York City Board of Education (BOE) requested these measurements to evaluate air quality in the school building prior to re-occupancy.

SCOPE OF WORK

ATC conducted this evaluation to assess the basic parameters of temperature, relative humidity, carbon dioxide (CO_2) and carbon monoxide (CO).

ATC measured temperature, relative humidity, CO_2 and CO with a Q-Trak® Model 8551, manufactured by TSI, Inc.

ATC measured concentrations of respirable particulates ($PM_{2.5}$) with a Dust-Trak® Aerosol Monitor Model 8520, manufactured by TSI, Inc.

ATC measured concentrations of TVOCs using a RAE Systems, Inc. MiniRAE® photoionization detector (PID).

Mr. Jimmy Choy, Industrial Hygienist of ATC's New York City office, conducted the assessment.

ATC's findings and conclusions are based on a visual inspection, real-time environmental measurements and conditions present in the school at the time of the assessment.

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The assessment was performed consistent with generally accepted indoor air quality assessment practices. As with all such assessments, there were inherent limitations created by constraints of time, operational and work practice variability, variations in indoor air quality parameters and sampling and analytical accuracy. The results of the sampling represent conditions found on the dates of the survey and may not represent conditions found at other times. The information presented in this report should be used by the BOE as a guide to assess the need for further improvements in current indoor air quality control activities.

EVALUATION CRITERIA

Currently, there are no regulatory standards for indoor air quality in non-industrial buildings, such as offices and schools. For the real-time data collected, ATC uses the commonly accepted guidelines cited in the following publications:

- *Ventilation for Acceptable Indoor Air Quality (ASHRAE 62-1999)*, American Society of Heating, Refrigerating, and Air-Conditioning Engineers (ASHRAE);
- *Thermal Environmental Conditions for Human Occupancy (ASHRAE 55-1992);*
- *Industrial Hygienists Guide to Indoor Air Quality Investigations* (1993), American Industrial Hygiene Association (AIHA).

Table 1 lists target guidelines for the parameters that ATC evaluated during this investigation. Meeting one, some, or all of the listed values does not assure that acceptable indoor air quality will be achieved at all times.

TABLE 1
TARGET GUIDELINES FOR INDOOR AIR QUALITY PARAMETERS EVALUATED

PARAMETER	TARGET LEVEL	AGENCY OR ORGANIZATION
Carbon Dioxide (CO_2)	<700 parts per million (ppm) above background level	ASHRAE 62
Carbon Monoxide (CO)	9 ppm	ASHRAE 62 (adopted from USEPA NPAAQS)
Respirable Particulates ($PM_{2.5}$)	65 micrograms per cubic meter of air ($\mu g/m^3$) 24-hour average	USEPA NPAAQS
	40 $\mu g/m^3$ 24-hour average	USEPA – recommendation for children/sensitive individuals
Temperature	Summer: 73-79°F at 50% RH Winter: 68-75°F at 50% RH	ASHRAE 55
Relative Humidity	30 – 60 %	ASHRAE 55
Total Volatile Organic Compounds (TVOC)	1 ppm	AIHA

USEPA = United States Environmental Protection Agency
NPAAQS = National Primary Ambient-Air Quality Standard
AIHA = American Industrial Hygiene Association

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REAL-TIME ENVIRONMENTAL MEASUREMENTS

ATC collected eighty (80) sets of real-time environmental measurements consisting of eight (8) outdoors and thirty-two (32) inside in the morning (A.M.) and the same number of readings in the afternoon (P.M.). All five floors of the school were surveyed. The field data sheets are found in the Attachment. Readings began at 8:00 A.M. and concluded after 3:30 P.M. The results are described below:

Temperature

Indoor dry bulb temperature measurements ranged from 67.3°F to 75.1°F (A.M.) and 68.3°F to 75.3°F (PM). In the morning, five (5) of the measurements were below and one (1) measurement was above the range of 68 to 75°F (at 50 percent relative humidity) recommended by ASHRAE Standard 55-1992 during the heating season (wintertime conditions). In the afternoon, one (1) measurements was above the recommended range. The average outdoor temperature was 37.2°F (A.M.) and 45.4°F (P.M.).

Relative Humidity

The relative humidity indoors ranged from 7.4 to 14.3 percent (A.M.) and 11.0 to 19.8 percent (P.M.). All measurements were below the ASHRAE-recommended range of 30 to 60 percent for occupant comfort. The outdoor relative humidity averaged 11.9 percent (A.M.) and 13.0 percent (P.M.).

Carbon Dioxide Concentration

Carbon dioxide concentrations indoors ranged from 513 to 1090 ppm (A.M.) and 489 to 899 ppm (P.M.). All CO_2 measurements collected were below the ASHRAE Standard 62-1999 recommended maximum concentration of <700 ppm above the background level. The outdoor (background) CO_2 concentrations averaged 501 ppm (A.M.) and 478 ppm (P.M.). Therefore, the maximum acceptable level of CO_2 at this location was 1201 ppm (background level + 700 ppm). The highest indoor level was measured in Classroom 402. Levels above the recommended maximum do not indicate a health risk. Carbon dioxide measurements are used as an indicator of available outdoor air. The primary source of CO_2 indoors is occupant respiration. The 2nd and 3rd floors of the school building were not occupied during ATC's assessment.

Carbon Monoxide Concentration

Carbon monoxide was not detected indoors (0 ppm). The outdoor CO concentration was 1 ppm (A.M.) and 1 ppm (P.M.).

Respirable Particulates ($PM_{2.5}$)

Respirable particulate concentrations* indoors ranged from 10 $\mu g/m^3$ to 26 $\mu g/m^3$ (A.M.) and 7 $\mu g/m^3$ to 15 $\mu g/m^3$ (P.M.). All indoor measurements were below the NPAAQS of 65 $\mu g/m^3$ (24-hour average). The average $PM_{2.5}$ concentration* for the entire school building was approximately 18 $\mu g/m^3$ (A.M.) and 10 $\mu g/m^3$ (P.M.). None of the indoor measurements were above the USEPA recommended concentration of 40 $\mu g/m^3$ for sensitive individuals such as

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asthmatic people and children. The outdoor respirable particulate concentration averaged 24 $\mu g/m^3$ (A.M.) and 16 $\mu g/m^3$ (P.M.).

* The measurements made during this assessment were instantaneous readings, the NPAAQS is a 24-hour average.

TVOC Concentration..

TVOCs were not detected (0.0 ppm) anywhere inside or outside the building.

OBSERVATIONS

During this assessment, ATC noted the following:

- The interior of the building appeared clean and free of dust and debris;
- The school was partially occupied (I.S. 89) at the time of the assessment;
- No smoke odor was detected in the building.

FINDINGS

Based on the real-time measurements, the following findings are presented:

1. Concentrations of $PM_{2.5}$, CO_2, CO and TVOCs were within applicable guidelines.
2. Five (5) temperature measurements were below and two (2) were above the ASHRAE-recommended range.
3. All indoor measurements of relative humidity were below the ASHRAE recommended range of 30 to 60 percent for occupant comfort.

It is our pleasure to provide these indoor air quality services to the New York City Board of Education. If you have any questions about this report, please call (212) 353-8280, extension 261 or 212.

Sincerely,
ATC ASSOCIATES INC.

Yiannis Efstathiou
Project Manager

James R. Cohn, CIH, CSP
Regional Manager
Industrial Hygiene Division

Attachment

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