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ATC ASSOCIATES INC.

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August 29, 2002

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

Re: Indoor Air Quality Assessment
Meyer London School (P.S. 2M)
122 Henry Street
New York, New York
ATC Project No. 15-19125-0341

Dear Mr. Orlan:

ATC Associates Inc. (ATC) is pleased to provide this report of indoor air quality (IAQ) measurements collected on August 23, 2002 at the referenced school. The New York City Department of Education (DOE) requested these measurements as part of a program to verify that acceptable indoor air quality is being maintained.

SCOPE OF WORK

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

Total volatile organic compounds (TVOCs) and respirable particulates were also measured.

Mark Nakhumovich, Environmental Technician of ATC's New York City office, conducted the assessment. ATC's findings are based on a visual inspection, real-time environmental measurements and conditions present in the school at the time of the assessment.

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).

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.

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The results of the sampling represent conditions found on the date of the survey and may not represent conditions found at other times. The information presented in this report should be used by the DOE 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 62-2001)*, 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 fifty (50) sets of real-time environmental measurements consisting of forty-eight (48) in the school building and two (2) outdoors. All floors of the school were surveyed. Field data sheets are found in the Attachment. Readings were collected during school hours. The results are described below.

Temperature

Indoor dry bulb temperature measurements ranged from 81.9 to 87.1 °F. All indoor measurements were above the range of 73 to 79 °F (at 50 percent relative humidity) recommended by ASHRAE Standard 55-1992 during the summer season. The outdoor temperature measurements were 81.6 and 82.2 °F collected before and after the indoor samples.

Relative Humidity

The relative humidity indoors ranged from 41.6 percent to 62.4 percent. Four (4) of the indoor measurements for relative humidity were slightly above the ASHRAE-recommended range of 30 to 60 percent for occupant comfort. The outdoor relative humidity measurements were 61.6 and 61.8 percent collected before and after the indoor samples.

Carbon Dioxide Concentration

Carbon dioxide concentrations indoors ranged from 642 ppm to 1210 ppm. All indoor measurement for CO_2 were below the ASHRAE Standard 62-2001 recommended maximum concentration of <700 ppm above the background level. The average outdoor (background) CO_2 concentration was 559 ppm. Therefore, the maximum acceptable level of CO_2 at this location was 1259 ppm (background level + 700 ppm). Carbon dioxide measurements are used as an indicator of available outdoor air. The primary source of CO_2 indoors is occupant respiration.

Carbon Monoxide Concentration

Carbon monoxide concentrations indoors ranged from 2 ppm to 3 ppm. These concentrations were below the NPAAQS/ASHRAE guideline of 9 ppm. The average outdoor CO concentrations was 2 ppm.

Respirable Particulates ($PM_{2.5}$)

Respirable particulate concentrations* indoors ranged between 33 $\mu g/m^3$ to 49 $\mu g/m^3$. All indoor measurements collected for $PM_{2.5}$ were below the NPAAQS of 65 $\mu g/m^3$ 24-hour average concentration of particulate matter 2.5 micrometers or less in aerodynamic diameter. Thirty one (31) of the forty-eight (48) instantaneous indoor readings were above the USEPA recommended concentration of 40 $\mu g/m^3$ for sensitive individuals such as asthmatic people and children. The two outdoor respirable particulate concentrations were 58 $\mu g/m^3$ and 57 $\mu g/m^3$ with an average of 57.5 $\mu g/m^3$. Both outdoor measurements for $PM_{2.5}$ were below the NPAAQS of 65 $\mu g/m^3$ 24-hour average concentration of particulate matter 2.5 micrometers or less in aerodynamic diameter.

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

TVOC Concentration

TVOC concentration indoors ranged from 0.0 ppm to 0.1 ppm. The AIHA guideline for odor control is 1 ppm. The outdoor TVOC concentration was 0.2 ppm and 0.1 ppm collected before and after the indoor samples.

OBSERVATIONS

During this assessment, ATC noted the following:

- Several class rooms and offices have window mounted A/C units;
- The building has no central A/C; ASHRAE standards do not apply directly to a naturally-ventilated building;
- The interior of the building appeared clean and free of dust and debris;
- People observed in several classrooms in the building;

FINDINGS

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

1. Concentrations of CO_2, CO and TVOCs were within applicable standards and guidelines.
2. All indoor temperature measurements were above the range of 73 to79 °F (at 50 percent relative humidity) recommended by ASHRAE Standard 55-1992 during the summer season.
3. Four (4) of Forty eight (48) indoor measurements for relative humidity were slightly above the ASHRAE-recommended range of 30 to 60 percent for occupant comfort.
4. All indoor measurement for $PM_{2.5}$ were below the NPAAQS of 65 $\mu g/m^3$ 24-hour average concentration of particulate matter 2.5 micrometers or less in aerodynamic diameter. Thirty one (31) of the forty-eight (48) instantaneous indoor readings were above the USEPA recommended concentration of 40 $\mu g/m^3$ for sensitive individuals such as asthmatic people and children. Both outdoor measurements for $PM_{2.5}$ were below the NPAAQS of 65 $\mu g/m^3$ 24-hour average concentration of particulate matter 2.5 micrometers or less in aerodynamic diameter.

It is our pleasure to provide these indoor air quality services to the New York City Department of Education. If you have any questions about this report, please call (212) 353-8280, extension 370 or 212.

Sincerely,
ATC ASSOCIATES INC.

Tenzin Namgyal
Industrial Hygienist

Reviewed By:

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

Attachment

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