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February 28, 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
High School for Leadership & Public Service (M894)
90 Trinity Place
New York, New York 10006
ATC Project No. 15-19125-0290**

Dear Mr Orlan

ATC Associates Inc (ATC) is pleased to provide this report of indoor air quality (IAQ) measurements collected on February 27, 2002, at the referenced school. The New York City Board of Education (BOE) requested these measurements as part of a program to determine if 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 (CO₂) and carbon monoxide (CO)

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

Mariana Medinets, 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, CO₂ 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)

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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 (µg/m ³) 24-hour average	USEPA NPAAQS
	40 µg/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 one hundred and forty-one (141) sets of real-time environmental measurements consisting of one hundred and thirty-six (136) in the school building and five (5) outdoors. All fourteen floors of the school were surveyed. Field data sheets are found in the Attachment. Readings began at 8:17 A.M. and concluded after 1:43 P.M. The results are described below.

Temperature

Indoor dry bulb temperature measurements ranged from 66.8°F to 74.9°F. Ten (10) were below the range of 68 to 75°F (at 50 percent relative humidity) recommended by ASHRAE Standard 55-1992 during the heating season (wintertime conditions). The outdoor temperature range was 41.7°F to 54.5°F.

Relative Humidity

The relative humidity indoors ranged from 29 percent to 30.8 percent. 24 readings were below the ASHRAE-recommended range of 30 to 60 percent for occupant comfort. The outdoor relative humidity range was 28.6 to 40 percent.

Carbon Dioxide Concentration

Carbon dioxide concentrations indoors ranged from 375 ppm to 1064 ppm. None of the measurements were above the ASHRAE Standard 62-1999 recommended maximum concentration of <700 ppm above the background level. The outdoor (background) CO₂ concentrations ranged from 332 ppm to 599 ppm. Therefore, the maximum acceptable level of CO₂ at this location was 1108 ppm (background level + 700 ppm). The highest reading was recorded in Room 515 at around 1:03 P.M. 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 CO₂ indoors is occupant respiration.

Carbon Monoxide Concentration

Carbon monoxide concentrations indoors were 1-2 ppm. These concentrations were below the NPAAQS/ASHRAE guideline of 9 ppm. The outdoor CO concentrations were 2-4 ppm.

Respirable Particulates (PM_{2.5})

Respirable particulate concentrations* indoors ranged between 2 µg/m³ to 37 µg/m³ with an average 9 µg/m³. None of the measurements were above the NPAAQS of 65 µg/m³ 24-hour average concentration of particulate matter 2.5 micrometers or less in aerodynamic diameter. The outdoor respirable particulate concentrations ranged from 51 µg/m³ to 95 µg/m³ with an average of 66 µg/m³.

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

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TVOC Concentration

The TVOCs concentrations was 0 ppm inside the building These concentrations were below the AIHA guideline for odor control of 1 ppm The outdoor TVOC concentration was 0 0 ppm

OBSERVATIONS

During this assessment, ATC noted the following

- The interior of the building appeared clean and free of dust and debris,
- The building was occupied at the time of the assessment,
- No smoke odor was detected in the building,

FINDINGS

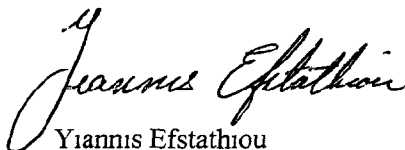
Based on the real-time measurements, the following findings are presented.

1. Concentrations of CO₂, CO and TVOCs, were within applicable standards and guidelines
2. Ten temperature measurements were below the range of 68 to 75°F (at 50 percent relative humidity recommended by ASHRAE Standard 55-1992 during the heating season (wintertime conditions)
3. Twenty-four (24) of the relative humidity measurements were below the ASHRAE recommended range of 30 to 60 percent for occupant comfort
4. None of the indoor respirable particulate measurements were above the EPA recommended guideline for children and sensitive individuals of 40µg/m³ One of the outdoor readings were above the NPAAQS of 65 µg/m³

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

Reviewed by



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

Attachment