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April 26, 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, New York 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 April 25, 2002, at the referenced school. The New York City Board of Education (BOE) requested these measurements to evaluate air quality in the school building.

#### **SCOPE OF WORK**

ATC conducted this evaluation to assess the basic parameters of temperature, relative humidity, carbon dioxide (CO<sub>2</sub>) and carbon monoxide (CO).

ATC measured temperature, relative humidity, CO<sub>2</sub> and CO with a Q-Trak<sup>®</sup> Model 8551, manufactured by TSI, Inc.

ATC measured concentrations of respirable particulates (PM<sub>2.5</sub>) with a Dust-Trak<sup>®</sup> Aerosol Monitor Model 8520, manufactured by TSI, Inc.

ATC measured concentrations of Total Volatile Organic Compounds (TVOCs) using a RAE Systems, Inc. MiniRAE<sup>®</sup> photoionization detector (PID).

Mr. Kevin Fitzpatrick, Environmental Technician, 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.

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

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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**

| <b>PARAMETER</b>                             | <b>TARGET LEVEL</b>                                                       | <b>AGENCY OR ORGANIZATION</b>                               |
|----------------------------------------------|---------------------------------------------------------------------------|-------------------------------------------------------------|
| Carbon Dioxide (CO <sub>2</sub> )            | <700 parts per million (ppm) above background level                       | ASHRAE 62                                                   |
| Carbon Monoxide (CO)                         | 9 ppm                                                                     | ASHRAE 62 (adopted from USEPA NPAAQS)                       |
| Respirable Particulates (PM <sub>2.5</sub> ) | 65 micrograms per cubic meter of air (µg/m <sup>3</sup> ) 24-hour average | USEPA NPAAQS                                                |
|                                              | 40 µg/m <sup>3</sup> 24-hour average                                      | USEPA – Recommendation for children / sensitive individuals |
| Temperature                                  | Summer: 73-79°F at 50% RH<br>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

### REAL-TIME ENVIRONMENTAL MEASUREMENTS

ATC collected eighty (80) sets of real-time environmental measurements consisting of seventy (70) from inside the school building and ten (10) from outdoors. All five floors of the school building were surveyed. These results are described below.

Field data sheets are found in Attachment 1. Readings began at 8:00 A.M. and concluded at approximately 11:30 A.M.

#### Temperature

Indoor dry bulb temperature measurements ranged from 64.3 °F to 76.1 °F. Sixty-nine (69) of the indoor measurements for temperature were below the range of 73 to 79°F (at 50 percent relative humidity) as recommended by the ASHRAE Standard 55-1992 during the summer season. The outdoor temperature measurements ranged from 53.1°F to 53.5°F.

#### Relative Humidity

The relative humidity indoors ranged from 34.1 to 38.7 percent. All of the indoor measurements for relative humidity were within the ASHRAE-recommended range of 30 to 60 percent for occupant comfort. The outdoor relative humidity measurements ranged from 33.6 to 33.9 percent.

#### Carbon Dioxide Concentration

Carbon dioxide concentrations indoors ranged from 510 ppm to 1112 ppm. All of the indoor measurements for CO<sub>2</sub> were below the ASHRAE Standard 62-1999 recommended maximum concentration of <700 ppm above the background level. The maximum outdoor (background) CO<sub>2</sub> concentration was 461 ppm. Therefore, the maximum acceptable level of CO<sub>2</sub> at this location was 1161 ppm (background level + 700 ppm). Levels above the recommended maximum do not indicate a health risk. Carbon dioxide measurements are used as an indicator of available outside makeup air. The primary source of CO<sub>2</sub> indoors is occupant respiration. The school building was occupied during ATC's assessment.

#### Carbon Monoxide Concentration

Carbon monoxide concentrations indoors was 1 ppm for all readings. These concentrations were below the NPAAQS/ASHRAE guideline of 9 ppm. The outdoor CO concentration was also 1 ppm for all collected readings.

#### Respirable Particulates (PM<sub>2.5</sub>)

Respirable particulate concentrations\* indoors ranged between 13 µg/m<sup>3</sup> to 21 µg/m<sup>3</sup>. The average PM<sub>2.5</sub> concentration for the entire school building was approximately 17 µg/m<sup>3</sup>. All of the indoor and outdoor measurements were below the NPAAQS of 65 µg/m<sup>3</sup> 24-hour average concentration of particulate matter 2.5 micrometers or less in aerodynamic diameter and the USEPA recommended concentration of 40 µg/m<sup>3</sup> for sensitive individuals and children. The outdoor respirable particulate concentration measurements ranged from 21 to 23 µg/m<sup>3</sup> with an average of 22 µg/m<sup>3</sup>.

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

#### TVOC Concentrations

TVOCs were not detected anywhere inside the building (0.0 ppm). The outdoor TVOC concentration was also 0.0 ppm.

#### OBSERVATIONS

During this assessment, ATC noted the following:

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

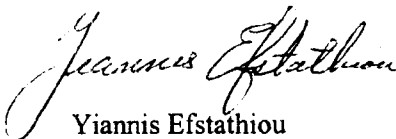
#### FINDINGS

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

1. Concentrations of CO<sub>2</sub>, CO, and TVOCs were below applicable standards and guidelines.
2. All of the indoor measurements for temperature were below the range of 73 to 79°F (at 50 percent relative humidity) as recommended by the ASHRAE Standard 55-1992 during the summer season .
3. All of the indoor measurements for relative humidity were within the ASHRAE-recommended range of 30 to 60 percent for occupant comfort.
4. All of the indoor and outdoor measurements were below the NPAAQS of 65 µg/m<sup>3</sup> 24-hour average concentration of particulate matter 2.5 micrometers or less in aerodynamic diameter and the USEPA recommended concentration of 40 µg/m<sup>3</sup> for sensitive individuals and children.

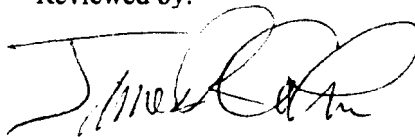
It is our pleasure to provide these indoor air quality services to the New York City Board of Education. If you have any questions about this report, please call (212) 353-8280, extension 211 or 212.

Sincerely,  
**ATC ASSOCIATES INC.**



Yiannis Efstathiou  
Senior Project Manager

Reviewed by:



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

Attachment