



600 West Cummings Park, Suite 6500  
Woburn, Massachusetts 01801-6350  
www.atc-enviro.com  
781.932.9400  
Fax 781.932.6211

February 8, 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. 234M  
292 Greenwich Street  
New York, New York 10007  
ATC Project No. 15-19125-0279**

Dear Mr. Orlan:

ATC Associates Inc. (ATC) is pleased to provide this report of indoor air quality (IAQ) measurements collected on February 7, 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 (CO<sub>2</sub>) and carbon monoxide (CO) with a Q-Trak® Model 8551, manufactured by TSI, Inc.

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

ATC measured concentrations of Total Volatile Organic Compounds (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 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.

Mr. Bernard P. Orlan  
Indoor Air Quality Assessment  
P. S. 234M

February 8, 2002  
Page 2  
ATC Project No. 15-19125-0279

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 <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

Mr. Bernard P. Orlan  
Indoor Air Quality Assessment  
P. S. 234M

February 8, 2002  
Page 3  
ATC Project No. 15-19125-0279

### REAL-TIME ENVIRONMENTAL MEASUREMENTS

ATC collected sixty (60) sets of real-time environmental measurements consisting of fifty (50) from inside the school building and ten (10) outdoors. All three floors of the school were surveyed. These results are described below.

Field data sheets are found in Attachment 1. Readings began at 10:00 A.M. and concluded after 12:55 P.M.

#### Temperature

Indoor dry bulb temperature measurements ranged from 67.1 °F to 75.0 °F. Three (3) measurements were below the range of 68 to 75°F (at 50 percent relative humidity) as recommended by ASHRAE Standard 55-1992 during the heating season (wintertime conditions). The outdoor temperature measurements ranged from 38.6 to 41.0 °F.

#### Relative Humidity

The relative humidity indoors ranged from 18.9 percent to 35.5 percent. Twelve (12) of the measurements were within the ASHRAE-recommended range of 30 to 60 percent for occupant comfort. All other measurements were below the recommended range. The outdoor relative humidity ranged from 43.1 to 46.9 percent.

#### Carbon Dioxide Concentration

Carbon dioxide concentrations indoors ranged from 544 ppm to 3102 ppm. Fourteen (14) CO<sub>2</sub> measurement was above 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 503 ppm. Therefore, the maximum acceptable level of CO<sub>2</sub> at this location was 1203 ppm (background level + 700 ppm). The highest measurement was recorded in room 315. At the time of ATC's assessment room 315 was occupied by 36 people. 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<sub>2</sub> indoors is occupant respiration.

#### Carbon Monoxide Concentration

Carbon monoxide concentrations indoors ranged from 0 to 1 ppm for all readings. These concentrations were below the NPAAQS/ASHRAE guideline of 9 ppm. The outdoor CO concentrations ranged from 0 to 1 ppm.

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

Respirable particulate concentrations\* indoors ranged between 21 µg/m<sup>3</sup> to 42 µg/m<sup>3</sup>. All 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. The average PM<sub>2.5</sub> concentration for the entire school building was approximately 34 µg/m<sup>3</sup>. This average concentration was below the USEPA recommended concentration for sensitive individuals such

Mr. Bernard P. Orlan  
Indoor Air Quality Assessment  
P. S. 234M

February 8, 2002  
Page 4  
ATC Project No. 15-19125-0279

as asthmatic people and children. The outdoor respirable particulate concentration ranged from 40 to 51  $\mu\text{g}/\text{m}^3$  with an average of 46  $\mu\text{g}/\text{m}^3$ .

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

#### TVOC Concentration

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 building was occupied at the time of the assessment;
- No smoke odor was detected in the building.

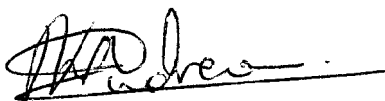
#### FINDINGS

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

1. Measurements of temperature and concentrations of CO and TVOCs were within applicable standards and guidelines.
2. None of the  $\text{PM}_{2.5}$  measurements were above the NPAAQS of 65  $\mu\text{g}/\text{m}^3$  and only two (2) readings were above the USEPA recommended  $\text{PM}_{2.5}$  concentration of 40  $\mu\text{g}/\text{m}^3$  for sensitive individuals and children.
3. Fourteen (14)  $\text{CO}_2$  measurements were above the range recommended by ASHRAE 62-1999. All others were below the maximum concentration.
4. Three (3) indoor measurements of relative humidity were within the ASHRAE recommended range of 30 to 60 percent for occupant comfort. All other measurements were below the recommended range.

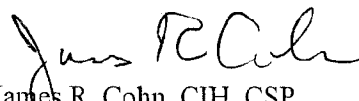
It is our pleasure to provide these indoor air quality services to the New York City Board of Education. If you have any questions about this report, please call (212) 353-8280, extension 261 or 212.

Sincerely,  
ATC ASSOCIATES INC.



Andreas C. Andreou  
Senior Project Manager

Reviewed by:



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

Attachment