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ATC ASSOCIATES INC.

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January 11, 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: Real-Time Air Monitoring
P. S. 234M
ATC Project No. 15-19125-0297

Dear Mr. Orlan:

ATC Associates Inc. (ATC) is pleased to provide this report of the results of real-time air monitoring conducted on December 8, 9, 11 & 12, 2001, at the referenced school. The New York City Board of Education (BOE) requested this monitoring at the recommendation of Environ Corp., the consultant to the parents association.

SCOPE OF WORK

ATC assessed the basic indoor air quality (IAQ) parameters of temperature, relative humidity, carbon dioxide (CO_2) and carbon monoxide (CO).

In addition, total volatile organic compounds (TVOCs), respirable particulates ($PM_{2.5}$), sulfur dioxide (SO_2), hydrogen sulfide (H_2S), nitric oxide (NO) and nitrogen dioxide (NO_2) were also measured.

Tenzin Namgyal and Wagdi Abdelshahid, Industrial Hygienists, and Marianna Medinets, Environmental Technician, from 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.

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

ATC recorded 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). Nitrogen oxides and SO_2 were measured using a RAE Systems, Inc. VRAE® multi-gas detector. H_2S was measured using a BioSystems PhD Ultra® gas detector.

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The assessments were 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 Board of Education 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
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
Hydrogen Sulfide (H_2S)	0.01 ppm (one hour)	NYS DEC
Sulfur Dioxide (SO_2)	0.14 ppm (24-hour average)	USEPA NPAAQS
Nitrogen Dioxide (NO_2)	0.053 ppm (annual average) 0.05 ppm ($100ug/m^3$) (annual average)	USEPA NPAAQS NYS DEC

USEPA = United States Environmental Protection Agency
NPAAQS = National Primary Ambient-Air Quality Standard
AIHA = American Industrial Hygiene Association
NYS DEC = New York State Department of Environmental Conservation

* Guidelines for NO are not available.

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REAL-TIME SAMPLING RESULTS

ATC collected real-time environmental measurements in eight locations three times on December 8, 9 and 10 and twice on December 12. Four sets of readings were collected outdoors and four sets were collected indoors. These measurements were made while the building was unoccupied except for ATC and custodial personnel. As such, the results may not reflect conditions when school is in session and the building is fully occupied by students and staff. IAQ field report forms are provided in the attachment.

The sampling locations, specified by the parents association consultant, were: Cafeteria, Room 118, 2nd floor hallway, Room 315, Outdoors by main entrance, Outdoors in front courtyard, Outdoors in back playground, Roof by the air intake.

Basic Parameters

Temperature, relative humidity, CO_2 and CO readings were within acceptable ranges on all four days considering that that building was not occupied. CO_2 levels, which would be expected to rise over time in an occupied building, were virtually indistinguishable from outdoor levels in this case. Relative humidity and CO were also the same, indoors and outdoors. All of the indoor measurements were collected when the building was unoccupied except for ATC and custodial personnel and do not indicate conditions when students, faculty and staff are present. The temperature and relative humidity levels were below guideline ranges (Table 1), other parameters were acceptable. There were no appreciable changes any of the values over the measurement period. Temperature and CO_2 levels would be expected to rise when the building is fully occupied.

Respirable Particulates ($PM_{2.5}$)

Table 2 summarizes the $PM_{2.5}$ data for each day. Indoor levels consistently reflected outdoor levels.

TABLE 2
$PM_{2.5}$ LEVELS
MICROGRAMS PER CUBIC METER (ug/m^3)

DATE	LOCATION	AVERAGE	HIGH	LOW
Dec. 8	Indoors	27	68	13
	Outdoors	26	35	20
Dec. 9	Indoors	22	27	7
	Outdoors	23	27	17
Dec. 10	Indoors	36	55	18
	Outdoors	51	61	45
Dec. 12	Indoors	35	44	23
	Outdoors	52	66	46

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Only one indoor reading, recorded in Room 315 on the afternoon of December 8th, exceeded the value of the EPA ambient-air quality standard of 65 ug/m^3. It bears repeating that the standard is a 24-hour average and the measured level is an instantaneous reading. All other indoor readings were below 65 ug/m^3.

Nitrogen Dioxide (NO_2)

Table 3 summarizes the NO_2 data for each day. As with the particulate data displayed above, the indoor levels were consistent with outdoor levels.

TABLE 3
NO_2 LEVELS
PARTS PER MILLION (ppm)

DATE	LOCATION	AVERAGE	HIGH	LOW
Dec. 8	Indoors	0.2	0.6	0.0
	Outdoors	0.2	0.6	0.0
Dec. 9	Indoors	0.1	0.4	0.0
	Outdoors	0.2	0.6	0.0
Dec. 10	Indoors	0.2	0.6	0.1
	Outdoors	0.3	0.6	0.0
Dec. 12	Indoors	0.3	0.6	0.0
	Outdoors	0.4	0.7	0.1

Eleven of forty-four indoor readings were 0.0 ppm, all other indoor readings were 0.1 – 0.6 ppm. The EPA ambient-air quality standard of 0.053 ppm is an *annual average.* The same is true of the New York State standard of 0.05 ppm (100 ug/m^3). The measurements summarized in the table are instantaneous readings. A direct correlation between these readings and the standards cannot be made.

Other Parameters

NO, SO_2, H_2S and TVOC were *not detected* on any of the four days.

FINDINGS

Based on the visual inspection of the occupied spaces and real-time measurements, the following findings are presented:

1. Measurements of concentrations of temperature, relative humidity, CO_2 and CO were within recommended guideline ranges (building unoccupied);

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2. Levels of respirable particulates ($PM_{2.5}$) indoors (with one exception) were less than 65 ug/m^3;

3. TVOCs, H_2S, NO and SO_2 were not detected.

4. NO_2 was detected at similar levels indoors and outdoors.

CONCLUSION

Based on our observations and measurements of the specified parameters, ATC concludes that the indoor air quality at the assessed location was acceptable at the time of ATC's investigation.

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

Sincerely,
ATC ASSOCIATES INC.



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

Attachments

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