

**Illinois Department of  
Public  
Health**

*John R. Lumpkin, M.D., M.P.H., Director*

2125 South First Street • Champaign, Illinois 61820-7499

#612059601

January 24, 1997

**CHAMPAIGN COUNTY (MAHOMET) - Indoor Air Survey**

Mr. Lee Jessup, Principal  
Lincoln Trail Elementary  
102 E. State, Box 200  
Mahomet, Illinois 61853

Dear Mr. Jessup:

Per Mr. John Alumbaugh's request, Cary Ware from the Department conducted an indoor air survey at the Lincoln Trail Elementary on December 5, 1996. Some teachers at the school have allegedly experienced upper respiratory health symptoms and complained of inadequate air circulation, temperature variations (too hot) and dust in the air. Mr. Alumbaugh was particularly concerned about a student experiencing a number of asthma attacks soon after arriving to school.

The following air parameters were sampled: temperature, relative humidity, carbon dioxide (CO<sub>2</sub>), and carbon monoxide (CO). Enclosed is Table 1 which contains the short-term air sample results collected on December 5, 1996. Insignificant CO levels were detected.

The long-term (December 5-12) sampling results detected CO<sub>2</sub> levels from 350 (weekend) parts per million (ppm) to 3000 ppm and relative humidity levels averaging 20%. The CO<sub>2</sub> concentrations climbed steadily (week days) until noon and also elevated again in the late afternoon. More specifically, the Music Room had the lowest recorded peak CO<sub>2</sub> concentrations at approximately 900 ppm. Room 5-C CO<sub>2</sub> concentrations peaked at 1300 ppm on December 6 and 1100 ppm on December 9. The highest CO<sub>2</sub> concentrations were recorded in Room 5-F. On December 6, the CO<sub>2</sub> concentration peaked at 2500 ppm while on December 9 the CO<sub>2</sub> concentration peaked at 3000 ppm. In both rooms, 5-C and 5-F, December 10 and 11 CO<sub>2</sub> concentrations were recorded at or below the recommended guidelines.

Since it is difficult and labor intensive to sample for all the possible indoor air contaminants, we approach potential indoor air problems by trying to eliminate and narrow down the range of possible causes. Towards that end, carbon dioxide levels were measured because it is a normal constituent of exhaled breath and, if monitored, can be used as a screening technique to evaluate whether adequate quantities of outside air are being introduced into the building. During the investigation, the carbon dioxide concentrations approached 3000 ppm, approximately 8 times the outdoor (background) level. The recommended 1000 ppm guideline, if exceeded, is indicative that there is an inadequate supply of fresh air being brought into an occupied space. Hence, indoor air pollutants increase and potentially cause short-term and long-term health problems for students and staff.

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In 1989, the American Society of Heating, Refrigerating, and Air Conditioning Engineers (ASHRAE) published its "Standard 62: Ventilation for Acceptable Indoor Air Quality." This standard recommends air-supply rates for classrooms and other institutional facilities be provided at a minimum of 15 cubic feet per minute (cfm) of outdoor air per person. It appears that this recommended standard was not being met based on the carbon dioxide levels measured during the investigation.

In addition, ASHRAE has published standards for thermal environmental conditions, "Standard 55: Thermal Environmental Conditions for Human Occupancy." The comfort zone lies between 73 and 77°F and 20 to 60% relative humidity. Limited studies show that some tight buildings and/or sick building syndrome complaints (stiffness, headaches, irritability, etc.) may be alleviated by simply lowering the thermostat 2°F. Relative humidity levels falling around 20% are associated with increased discomfort and drying of mucous membranes.

The temperatures in the classrooms were within the comfort zone. The relative humidity levels measured during the investigation were in the lower end of the comfort zone.

The following recommendations can improve indoor air quality and reduce the number of health complaints.

1. Increase the amount of outdoor air supplied to all classrooms (particularly classrooms in the new addition) during the entire time they are occupied. The ASHRAE recommend supplying classrooms with outdoor air at a minimum rate of 15 cfm per person. In some cases, outdoor air may be supplied by opening windows. Mechanical ventilation should be properly designed and functioning. An ideal ventilation system:
  - controls temperature and humidity to provide thermal comfort;
  - distributes adequate amounts of outdoor air; and
  - isolates and removes odors and pollutants through pressure control filtration; and exhaust fans.
2. Replace water stained/damaged ceiling tiles in the hallway (adjacent to Room 5-E). Water-damaged porous finished items should be discarded rather than disinfected/cleaned in order to effectively eliminate microbial contamination.
3. Clean carpet on a regular basis. Tracking areas may need to be cleaned more than once a year.
4. When possible, substitute cleaning products for less toxic compounds. Cleaning products containing petroleum and ammonium compounds (Liquid Dust Control and Chalkboard Cleaner) can be upper respiratory irritants. Continue not to use these products when school staff and students are present.

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If you have any questions regarding this survey, please contact Cary Ware or me at our Champaign Regional Office located at 2125 South First Street, Champaign, Illinois 61820, telephone (217) 333-6914.

Very truly yours,



Mark Kuechler, P.E.  
Regional Engineer

CW:kgb

cc: Champaign Regional Office <sup>CW</sup>  
Division of Environmental Health ✓  
John Alumbaugh, Superintendent,  
Mahomet-Seymour Community Schools  
[REDACTED]

TABLE 1. LINCOLN TRAIL ELEMENTARY  
December 5, 1996

Room/Area	Time	Temp (°F)	RH (%)	CO (ppm)	CO <sub>2</sub> (ppm)	Comments
Principal's Office	11a	70.6	29.0	>1	759	2 people
5-B	11:20a	---	---	0	90	Unoccupied
Music	11:25a	72.4	26.0	>1	<550	Unoccupied
New Addition Hallway	11:35a	70.0	36.0	1	>1100 ppm	Samples collected after students went to lunch
Computer	11:40a	72.5	26.4	2	550	19 students, 2 teachers
5-F	11:45a	74.4	29.4	2	1070	Students had recently left for lunch
5-C	11:52a	74.0	28.4	2	1025	Unoccupied. Students had recently left for lunch
Library	Noon	74.5	25.4	2	600	Unoccupied

Temp - temperature  
RH - relative humidity  
CO - carbon monoxide  
CO<sub>2</sub> - carbon dioxide