

Illinois Department of
**Public
Health**

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#602109701

March 14, 1997

CHAMPAIGN COUNTY (MAHOMET) - Indoor Air Quality

Mr. Mark Cabutti, Principal
Sangamon Elementary
601 E. Main, Box 198
Mahomet, Illinois 61853



Dear Mr. Cabutti:

Per Mr. John Alumbaugh's request, Cary Ware from the Illinois Department of Public Health (IDPH) conducted an indoor air quality evaluation at Sangamon Elementary February 10, through February 14, 1997. Mr. Alumbaugh's primary concerns were that some students and staff allegedly developed asthma, throat illnesses, and aggravated existing asthma conditions while occupying the building.

The following air parameters were sampled: temperature, relative humidity, carbon dioxide (CO₂), carbon monoxide (CO), and particulate matter (dust). Carbon monoxide levels were checked during the walk-through investigation; the levels detected were insignificant.

The purpose of the sampling was to determine if the heating, ventilation, and air conditioning (HVAC) system was operating properly. An HVAC system includes all heating, cooling, and ventilation equipment serving a building. A properly designed HVAC system provides thermal comfort; distributes adequate amounts of outdoor air to meet ventilation needs of all building components; and isolates and removes odors and contaminants through passive control, filtration, and exhaust fans. HVAC systems have been identified as a major contributing cause of occupant complaints in the indoor air quality investigations conducted by IDPH.

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, long-term concentrations of CO₂ did not exceed 950 parts per million (ppm) in representative Rooms 125 and 207. 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 complaints such as headaches; fatigue; and eye, nose and throat irritations may be anticipated.

The American Society of Heating, Refrigerating, and Air Conditioning Engineers (ASHRAE) Ventilation for Acceptable Indoor Air Quality (62-1989) recommends the amount of outdoor air that should be supplied to buildings. This standard recommends air-supply rates for classrooms and other institutional facilities be supplied with a minimum of 15 cubic feet per minute (cfm) of outdoor air per person. It appears that this recommended standard was being met based on the carbon dioxide levels measured during the investigation.

In general, the classroom temperatures were maintained within the comfort zone recommended by ASHRAE (Thermal Environmental Conditions for Human Occupancy 55-1992). During the heating season, the ASHRAE thermal comfort range is 68 to 74 degrees Fahrenheit (°F). The classrooms had an average temperature of 72°F. Limited studies show that some tight buildings and/or sick building syndrome complaints (stiffness, headache, irritability, etc.) may be alleviated by simply lowering the thermostat 2°F.

Also, relative humidity is checked in indoor air investigations. Relative humidity can be an important factor for occupant comfort. High relative humidity reduces the body's ability to lose heat and can increase levels of body odors. Sensitivity to odors increases with increased humidity, as does release of gases from some building materials. High relative humidity (above 60%) can support microbial growth inside buildings. Relative humidities that are too low can dehydrate skin and mucous membranes. Recent studies have found higher rates of nasal, eye, skin, and mucous membrane symptoms; lethargy, and headaches in low relative humidity environments. The upper nose and throat airways are responsible for the humidification and warming of air breathed into the respiratory system. Many indoor pollutants are exacerbated by lower humidity. Occupants who wear contact lenses often have problems with low relative humidities, due to lenses irritating the eyes from lack of moisture. Acceptable ranges of relative humidity are between 30% and 60%. The average relative humidity in the school was below 30%. Low relative humidities are not uncommon during winter months. Relative humidity is often considered a major controlling factor for indoor allergens.

Total particulate matter (dust) was collected at a maximum of 30 micrograms per cubic meter ($\mu\text{g}/\text{m}^3$) of air in Room 207. A comparison sample was subsequently collected at the IDPH Champaign Regional Office. The total dust peaked at about 20 $\mu\text{g}/\text{m}^3$. These dust concentrations are similar to Champaign County's long-term ambient particulate matter reported in the 1995 Illinois Environmental Protection Agency's Illinois Air Quality Report. These dust concentrations are well below the Occupational Safety and Health Administration (OSHA) Workplace Permissible Exposure Limit of 15,000 $\mu\text{g}/\text{m}^3$.

Although certain individuals may be very sensitive to low humidities and dust found during this sampling event, no immediate or long-term health threats have been identified in the building. The following recommendations can improve indoor air quality and increase occupant comfort:

1. Maintain relative humidity within the ASHRAE recommended guideline.
2. Replace water stained/damaged ceiling tiles (i.e. Room 218).
3. Continue to maintain temperature and ventilation rates at the ASHRAE recommended guidelines.
4. Cleaning products containing petroleum and ammonium compounds can be upper respiratory irritants. Minimize exposure to school staff and students. When possible, substitute cleaning products for less toxic compounds.

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If you have any questions regarding this evaluation, 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:kgg ✎
cc: Champaign Regional Office ^{UW}
Division of Environmental Health ✓
John Alumbaugh, Superintendent
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