

**Illinois Department of
Public
Health**

George H. Ryan, Governor • John R. Lumpkin, M.D., M.P.H., Director

525-535 West Jefferson Street • Springfield, Illinois 62761-0001

Case #910230101

December 19, 2001

Wes Riva, Principal
South Fork Elementary School
Kincaid, IL 62540

Dear Mr. Riva:

Per your request, I have performed an additional investigation of South Fork Elementary School. Specifically, you asked me to evaluate mold and moisture problems in Classroom 6, and the health concerns of one teacher who has experienced sore throats, loss of voice, sneezing, and coughing since the initiation of construction activities that occurred this summer.

On December 7th, I placed a Telaire 7001 indoor air quality monitor and a HOBO datalogger in Classroom 6 and the complainant's classroom to evaluate carbon dioxide, temperature, and relative humidity. The indoor air quality monitors continuously collected data from December 7th to December 14th. The results are discussed briefly in the sections that follow. For a description of the air sampling parameters, refer to Attachment 1 at the end of this document.

Classroom 6

According to the teacher who uses Classroom 6, moisture accumulates on and around the windows in Classroom 6. A white, mold-like substance also collects on the window sills and reappears within one day of a thorough cleaning. On December 7th, I did not observe moisture, and the window sills had recently been cleaned so I did not see anything remarkable on them. I used a Tramex Moisture Meter; however, and determined that the wall is holding an excess volume of moisture.

On December 14th, water was visibly leaking into the classroom from the ceiling-wall intersection. In some areas, a crack had formed between the ceiling and the wall. Efflorescence was also present on multiple window sills.

The sampling data I collected from this classroom indicate that it is poorly ventilated, even though it has windows that can be opened. Moreover, the temperature in this classroom was consistently less than 68 degrees, and with one exception, it dipped below 60 degrees at every night. The relative humidity

levels in this classroom were consistently between the acceptable range of 30 to 60 percent.

Complainant's classroom

I inspected the complainant's classroom for general indoor environmental conditions, including a visual inspection of the filters from her portable HEPA air cleaner, but I did not see obvious conditions to which her symptoms could be attributed. Three other teachers who were present during my inspection mentioned that musty odors are common in this classroom. I did not notice musty odors during my inspection.

The sampling data I collected from the complainant's classroom indicate that it is also poorly ventilated. The temperature in this classroom was acceptable; however, the thermostat was set at 55 degrees on December 14th and it was reading 72 degrees. This may indicate a problem with her thermostat. The relative humidity levels in this classroom were consistently between the acceptable range of 30 to 60 percent.

I also inspected the Special Education room and the Computer Lab during my investigation of the school. The roof above the Special Education room has visibly deteriorated in one location, and water was leaking onto a computer and desk below it. The Computer Lab is adjacent to Classroom 6 and efflorescence was present on two of the windows sills.

Based on the information gathered during our discussions, a visual inspection of multiple classrooms, and limited air sampling, I have the following conclusions and recommendations:

- Find, eliminate, and permanently repair the source of excess moisture and water leakage in all classrooms. The conditions present in certain classrooms, especially Classroom 6, are unacceptable.
- Consult with a heating, ventilation, and air conditioning specialist about installing a centralized ventilation and air conditioning system. The current systems that are being used in both sections of the school are inadequate.
- Check and, if necessary, repair the thermostat in the complainant's classroom.
- Maintain a regular cleaning and maintenance plan that includes the current heating system.

I will continue to be available for consultation and assistance should it be necessary. If you have any further questions or concerns, please contact me at (217) 782-5830.

Sincerely,

A handwritten signature in black ink, appearing to read 'Aaron Martin', with a stylized flourish at the end.

Aaron Martin
Environmental Toxicologist

Cc: Barbara Behrends, Christian County Health Department

DESCRIPTION OF INDOOR AIR QUALITY SAMPLING PARAMETERS

CARBON DIOXIDE

Carbon dioxide (CO₂) is a normal component of exhaled breath, so measurements can be used to determine if a sufficient quantity of fresh, outdoor air is being introduced into the indoor environment. The American Society of Heating, Refrigerating, and Air-Conditioning Engineers (ASHRAE) maintains a standard which specifies minimum ventilation rates and indoor air quality that would be acceptable to occupants. This standard presently recommends providing schools with 15 cubic feet of outdoor air per minute (cfm) per person. Indoor CO₂ levels are dependent on the outdoor level, but 15 cfm will result in an indoor CO₂ level approximately equivalent to 700 parts per million (ppm) greater than the outdoor level (1). This ventilation rate is expected to reasonably dilute odors and contaminants common to schools. Carbon dioxide levels in excess of ASHRAE's standard indicate that an insufficient volume of outdoor air is being supplied to the building to mix with recirculated air.

Complaints of headaches, fatigue, and eye, nose, and throat irritation are commonly reported in buildings where CO₂ is present at high levels, but these symptoms are not caused by CO₂. At the levels typically found in indoor environments CO₂ is not a health hazard, and several studies have demonstrated that it will not cause measurable health effects until it is present at levels much greater than the current occupational guideline (5,000 ppm) enforced by the Occupational Safety and Health Administration (OSHA). High CO₂ levels within a building indicate a lack of ventilation which could allow other contaminants common to schools to be present at elevated levels and be responsible for occupant complaints.

TEMPERATURE

Temperature is frequently identified in indoor air complaints because it is directly linked to occupant comfort. Excessively high or low temperatures can lead to general thermal discomfort and occupant dissatisfaction. ASHRAE (Standard 55-1992 section 5.1.2) recommends that building temperatures be maintained between 68 degrees and 75 degrees (71 degrees is optimal) during the winter months and between 73 degrees and 79 degrees (76 degrees is optimal) during the summer months. Because of individual differences, it is impossible to recommend a thermal environment that will satisfy everyone. The purpose of this standard is to recommend a thermal environment that is acceptable to approximately 80% of the occupants.

RELATIVE HUMIDITY

RH is an important factor in indoor air quality because moisture levels are linked to occupant comfort and other considerations. High moisture levels impair the body's ability to lose heat, and can lead to microbial growth. This growth may lead to irritating odors, cause permanent damage to building components, and result in a variety of infectious, toxic, or allergic illnesses for building occupants. Excessively low moisture levels result in dry air that can irritate the lungs, eyes, nose and throat. ASHRAE (Standard 55-1992) recommends that RH be maintained between 30% and 60%.