

Illinois Department of
**Public
Health**

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

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

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August 11, 1995

Mr. Domingo Trujillo, Principal
Eli Whitney Elementary School
2815 South Komensky
Chicago, IL 60623

Dear Mr. Trujillo:

The Illinois Department of Public (IDPH) has conducted an indoor air quality investigation at Eli Whitney Elementary School in Chicago, Illinois. The investigation consisted of a walk-through inspection, an indoor air quality questionnaire, continuous air monitoring of carbon dioxide (CO₂), temperature, and relative humidity, and dust wipe sampling. The investigation was conducted on June 7 through June 13, 1995. This letter summarizes results of the indoor air quality questionnaires and the indoor air and dust monitoring.

The indoor air quality questionnaire was included as part of the investigation to document employee complaints associated with the building. The number of employees that responded with complaints indicates that building related problems are likely associated with the indoor air quality. Below is a cumulative summary of the questionnaires from occupants of the main building (circa 1902):

<u>1. Building Complaints</u>	<u>Respondents</u>
-temperature too cold	48%
-temperature too hot	54%
-lack of air circulation	69%
-noticeable odors	32%
-dust in air	82%
-disturbing noises	13%
<u>2. When do these problems occur?</u>	
-Morning	26%
-afternoon	22%
-all day	65%
-no noticeable trend	11%
-daily	28%

3. Which persistent health symptoms do you experience while in the building?

-eye irritation	46%
-eye infection	7%
-sinus irritation	50%
-sinus infection	35%
-runny nose	35%
- dry/sore throat	82%
-cough	50%
-wheezing	7%
-difficulty breathing	15%
-chest pain	0%
-headaches	46%
-dizziness	9%
-fatigue/drowsiness	35%
-nausea	6%
-abdominal pain	2%
-diarrhea	6%
-constipation	2%
-rashes	7%

4. Do the above symptoms clear up within 1 hour after leaving work?

yes - 52% no - 35%

5. Do you have any health problems or allergies which might account for any of the above symptoms?

yes - 24% no - 65%

6. Symptoms become more severe:

-during warm humid weather	24%
- during the heating season	74%
-on cold days when indoor humidity is low	32%
-when building is ventilated by opening doors and windows	9%

Symptoms become less severe:

-during warm humid weather	6%
-during the heating season	4%
-on cold days when indoor humidity is low	3%
- when building is ventilated by opening doors and windows	39%

7. Symptom Onset (Date) Questionable

8. Onset of symptoms associated with:

-moving into the building	28%
-different work location	6%
-newly renovated	0%
-recent insulation	2%
-implementation of energy conservation measures with significantly reduced heat loss	0%
-new furniture or draperies	4%
-installation of carpeting	4%
-pest control spraying	11%
-Use of chemicals, cleaners, solvents, etc.	13%

9. Have you discussed the problem with a doctor?

yes - 41% no - 44%

10. Do you smoke?

yes - 4% no - 86%

11. Do others in your immediate work area smoke?

yes - 2% no - 85%

12. Do any of the following apply to you?

-wear contact lenses	22%
-operate video display terminals at least 10% of the work day	7%
-operate photocopier machines at least 10% of the work day	7%
-use or operate special office machines	6%
-currently taking medication	

yes - 19% no - 52%

Other comments and observations concerning the indoor environment cited on the questionnaires were:

- Dusty, dirty air
- Paint chipping and peeling
- Need to change air filters

The summary of complaints from occupants located in the annex building are as follows:

- Temperature too hot
- Lack of air circulation
- Dry/Sore throat
- Symptoms more severe during heating season

The IDPH performed continuous air monitoring of the CO₂, temperature, and relative humidity to evaluate the efficiency of the heating, ventilation, and air conditioning system (HVAC) to supply make-up air (outside air) to the building. This monitoring was conducted using a Ventilation Efficiency Measurement System (VEMS) and was programmed to record the CO₂ levels, temperature, and relative humidity every 20 minutes.

Since CO₂ is a normal constituent of exhaled breath, measurements can be used to determine if the quantity of outdoor air that is being delivered to occupants is adequate. High concentrations of CO₂ indicate outside air is not being adequately supplied to the building to mix with recirculated air. Currently, there are no regulations for the amount of outdoor air that is supplied to buildings. The IDPH follows the American Society of Heating, Refrigerating, and Air Conditioning Engineer's (ASHRAE) guideline of 1,000 parts per million (ppm) for determining if adequate amounts of make-up air are being introduced into the building. Buildings that have CO₂ concentrations above 1000 ppm usually have occupants complaining of headaches, fatigue and eye/nose/throat irritations. If CO₂ concentrations are maintained below 1,000 ppm, complaints about indoor air quality are usually minimal. The elevated CO₂ concentration itself is not responsible for the complaints; however, high CO₂ concentrations are indicative of stale stagnant air which does cause occupant complaints.

The results of the air monitoring indicate that CO₂ concentrations were slightly above the 1,000 ppm guideline during the sampling period in only two areas. One area was in the basement classroom and the other was in the annex building's copy room. Overall the CO₂ concentrations were very low due to the open windows in the building. CO₂ measurements are not ideally taken when windows are open and the air exchange rate is very high; therefore, monitoring will be conducted again during the heating season when make-up air is usually reduced.

Relative humidity is also routinely sampled 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. Occupants that wear contact lenses often have problems with low relative humidities, due to lens irritating the eyes from lack of moisture. ASHRAE's Ventilation Standard 62-1989 recommends that relative humidity be maintained between 30% and 60%. Relative

humidities in the buildings were within this range during the continuous sampling period.

Temperatures were maintained within the comfort zone recommended by ASHRAE's "Thermal Environmental Conditions for Human Occupancy". At a relative humidity of 40%, the ASHRAE thermal comfort range is from 74 to 80 degrees.

On June 13, 1995, six surfaces were sampled for lead by taking dust wipes. Below is a summary of the wipe samples collected and their results. Lead concentrations are reported in micrograms per square foot (ug/ft²).

<u>Area Sampled</u>	<u>Lead Concentration (ug/ft²)</u>
Room 109, vent ledge	6,050
Cold air exchange room	111
Warm air exchange room (in duct)	1,413
Basement, desk	71
Asst. Principal office	91
Gym floor	60

There is no work place standard for surface contamination by lead; however, IDPH utilizes the IDPH Lead Poisoning Prevention Act and Code's lead abatement clearance standard of 200 ug/ft² of lead dust on horizontal interior surfaces when evaluating lead contamination. Two wipes indicated very high surface contamination. These high results may be attributed to lead based paint disturbances from renovating or remodeling or from deterioration due to age.

The potential health risks associated with surface lead dust is when individuals transfer lead from these contaminated surfaces to their mouth via hands (food, drink, or tobacco products) or when lead dust is disturbed by persons walking in the area, by sweeping, or dusting. Inhalation of lead dust and/or vapors may present another potential health risk.

In addition to the general indoor air parameters described above, other conditions were noted during the walk-through inspection:

1. Room 307 had a large hole in the plaster ceiling revealing the wire lathe. Numerous plaster pieces were found on the floor. Many rooms throughout the building had damaged plaster and peeling paint, which accumulated on the floor and created a very dusty environment. The gym was in extremely poor condition with plaster chunks laying on the floor, creating a physical hazard.

2. Due to the poor condition of the building, most surfaces were very dusty. The air exhausts in the classrooms contain a ledge which were covered with thick dust. The air blows over the ledge thereby causing dust particles to become airborne.

3. The basement air recirculation room contained stored chemicals.

4. The cold air exchange room had peeling paint on walls where the air flows over and is recirculated throughout the building.

Based on our sampling, our observations, and the concerns of the employees, IDPH recommends the following:

1. An environmental consultant should be contacted to conduct a comprehensive lead investigation at the school. Based on our limited sampling, a lead hazard may be present. Paint, dust, and air should be sampled and analyzed for lead content to determine if a lead health hazard exists.

2. Consult with a HVAC contractor or mechanical engineer to evaluate the present system and to maintain it in proper working condition.

3. Make sure make-up air (outdoor air) is adequate in both the old building and the annex building, especially during the heating season, to meet the ASHRAE guideline of 15 cubic feet per minute (CFM) per occupant.

4. All air recirculation areas should not have stored items in them, such as chemicals. These areas should be maintained in a clean condition.

5. As indicated in the Illinois Department of Labor (IDOL) and Primera Engineers, Ltd. investigation reports dated June, 1995, the building should be repaired to prevent health hazards and future damage and cleaned to restore the building to be a safe environment.

6. The IDOL report noted the location of the air intakes at ground level, as did our investigation, and we concur with IDOL to limit bus drivers from running their engines for extended periods of time.

If necessary, another investigation will be conducted during the heating season since most of the employees symptoms or complaints were more severe during that time. Please contact me, when problems begin to arise, for this investigation.

If you have any questions or require additional information, please contact me at (217) 782-5830.

Sincerely,



Monica J. Rebbe
Environmental Toxicologist

cc: 