A 9-year-old girl is forced to switch school districts due to poor indoor air quality.

They said that Jane was diagnosed with severe mold-induced asthma and suffered headaches, migraines, blurred vision, rashes on her face, stomach aches, and nausea while attending Darlington Elementary and Middle school, Darlington, Wis. The symptoms subsided when she transferred to another school under doctor's orders, as reported by WISC-TV 3 Madison, Wis.[3]

IAQ and Public Schools:

An Argument for HVAC Cleaning & Restoration

By Justin Vondra, ASCS, CVI
Dirty Ducts Cleaning, Environmental & Insulation, Inc.

Like American adults, children spend more then 90 percent of their time indoors.[2] Young people are particularly susceptible to indoor air pollution because their bodies are continuing to develop. Because children breathe in more air per pound than adults, if indoor air quality is poor they inhale and absorb a greater volume of contaminants in the lungs.

In fact, the Environmental Protection Agency (EPA) states that levels of air pollution inside a building can be two to five times higher—and occasionally 100 times higher—than outdoor levels.[2] So it's not surprising that the EPA has declared indoor air quality as one of the top five most urgent environmental risks to public health.

There are four elements that lead to the development of indoor air quality problems: [8]

Source: there is a source of contamination or discomfort indoors, outdoors, or within the mechanical system of the building. Today's buildings have as many as 900 contaminants indoors with thousands of sources—including new furniture, cleaning agents, smoking, new building material, pesticides and even perfumes and other cosmetics. Many contaminants are microbiological or otherwise organic triggering pollutants—such as bacteria, pollen spores, and dust mites. The key to controlling contaminants from continuous circulation of your building is to properly maintain your HVAC components and remove all dirt, dust, and debris that can eventually build bacteria.

HVAC: the HVAC system is not able to control existing air contaminants and ensure thermal comfort. Health Buildings International (HBI), of Fairfax, VA reported that out of 813 building studies carried out between 1980-1992, involving 750,000 building occupants, three-quarters (75.5 percent) of indoor air quality problems were traced back to operating failures and/or poor maintenance of the HVAC system. Dust and allergenic fungi compromised more then half (60 percent) of the most significant pollutants or factors found.

Pathways: one or more pollutant pathways connect the pollutant source to the occupants and a driving force exists to move pollutants along the pathway(s). The HVAC system is the predominant pathway and driving force for all air movement in buildings.

Occupants: building occupants are present. Schools have approximately four times as many occupants as office buildings for the same amount of floor space.

Studies have shown that poor indoor air quality does not only have tremendous health risks, but also compromises the ability of learning.

Charles Young Elementary School in Washington, DC, had indoor air problems. They were committed to change it, and started implementing indoor air quality programs: they minimized particles and chemicals in the air, mechanically captured dirt and dust and removed it rather then moving it around, and they promoted safety and prevented cross contamination. They did a study of academic performance before and after, the findings ended up being remarkable.[7]

- Math scores at basic or above increased from 51% to 76%
- Reading scores at basic or above increased from 59% to 75%
- School attendance increased from 89% to 93%

As if better air quality and a more successful learning environment isn't enough, maintaining your HVAC system can save you money in the long run. The second highest costly fix for schools to ensure good indoor air quality: the ventilation system has been allowed to deteriorate.

With tight budgeting for today's schools, how can I afford to make operations and maintenance a priority?

While your HVAC system may seem like it's working efficiently, if not properly maintained it can never run to complete capacity. Capacity, the maximum or optimum amount that can be produced, correlates strongly with energy efficiency. Being energy efficient, is yet another benefit of proper HVAC maintenance. Space conditioning (heating, cooling, and ventilation) uses more than half the energy consumed in school buildings. It is a major target for significant energy savings, much of which can be achieved at little cost.[4]

> "Every dollar spent on maintenance and repair will save districts six to ten times that amount in the long run" – Claire Barnett, Director of Healthy Schools Network.[4]

Each year, school districts are faced with tough decisions on how and where to cut costs to meet tight budgets. Increasing cost of energy and replacement of equipment continually generate problems for school district budgets. Nationwide schools spend eight billion per year on energy. Although this may seem like a staggering amount, energy costs represent only 2 to 4 percent of school districts budgets. Therefore school administration may be tempted to pay little or no attention to managing or monitoring energy cost at the facility level.[4]

Despite this relatively low percentage of overall district budgets, energy costs actually represent a much higher proportion of district variable or "manageable" costs and expenses that are not mandated by contractual and other legal obligations. For example, school administrators have little or no near-term flexibility to reduce staff salaries or benefits embedded in long-term labor agreements. Nor can they readily reduce other "fixed" costs, which can represent up to 85 percent of annual district budgets. In contrast, energy costs represent, on average, 16 percent of "controllable" costs. As a result, in this era of tight budgeting, energy cost management has the potential of becoming a major source of avoidable district expenditures. Energy-efficient operation and maintenance is a critical element in working towards a more flexible budget for the future.

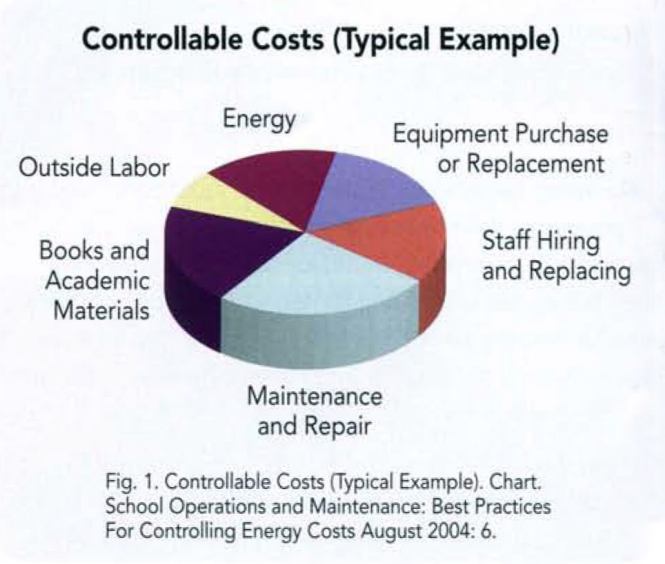

Fig. 1. Controllable Costs (Typical Example). Chart. School Operations and Maintenance: Best Practices For Controlling Energy Costs August 2004: 6.

Unfortunately, many school districts have been decreasing, not enhancing, school maintenance efforts. Operation and maintenance spending per student is at the lowest it has been in 30 years, inevitably resulting in more poorly maintained and operated facilities. Today many administrators are put in the position to make operation and maintenance cuts because of "low cost" or "no cost" strategies to survive in a tough fiscal environment.[4]

To counter this short-term "penny-wise, pound-foolish" perception, it is essential to show the tangible benefits

of maintaining good operations and maintenance practices in contrast to the actual costs of operation and maintenance spending reductions.

As reported in the Federal Energy Management Program (FEMP) *Operations and Maintenance Best Practices Guide,* "It has been estimated that operations and maintenance programs targeting energy efficiency can save 5 to 20 percent on energy bills without a significant capital investment."

In conclusion, making operations and maintenance a priority will make your school a better functioning facility over all. By performing proper operations and maintenance, you will have a safer and more successful learning environment for both your students and your faculty, you will maintain the longevity of your HVAC system, and you will save money daily by having an energy efficient school system. ●

The dirty duct pictures in this document were taken in ductwork of schools throughout the state of Wisconsin by Dirty Ducts Cleaning, Environmental & Insulation, Inc.

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