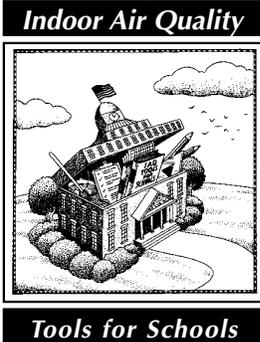




CASE STUDY

KING-MURPHY ELEMENTARY SCHOOL

Clear Creek School District, Colorado



King-Murphy Elementary School, part of the Clear Creek School District, is located in Evergreen, Colorado, about 30 miles west of Denver. Two hundred and fifty students in grades K through 6 attend the school.

Approach—Project Description

School Description

The two-story King-Murphy Elementary School was built in 1982, using a passive solar design. The heating, ventilating, and cooling (HVAC) system consists of unit ventilators and five new rooftop units for heating and cooling the second-floor classrooms.

Prior to the indoor air quality (IAQ) campaign at King-Murphy, the school district hired a new Facilities and Maintenance Director. He negotiated a performance contract with an energy service provider, who would design a plan, install energy-efficiency technologies, and guarantee their performance. The contract covered upgrading the school's HVAC system and installing a district-wide energy management system (EMS). District staff knew that IAQ problems existed in some of their schools and were committed to considering the effects of energy efficiency upgrades on IAQ as the upgrades were planned and implemented.

IAQ Team

The school formed an *IAQ Tools for Schools (TfS)* steering committee in October 1998, led by the principal and the custodian. The team also included the District Facility Maintenance Supervisor, a teacher, a student from the Environmental Science Club, and a parent. They developed a 5-month plan for implementing *IAQ TfS*.

Problem Identification

The first IAQ meetings revealed very real concerns, including hazardous waste removal and management, exhaust fumes in the building, irregular filter replacement schedules, general inadequacy of the air-handling system, and overheating from the south-facing clerestory windows. The potential for radon gas was also a concern because the school is located near mountains containing old coal mines. Seepage of the radon gas from these mines was an issue not to be overlooked. All concerns were ultimately addressed by implementing *IAQ TfS*.

The teachers completed their IAQ checklists in December, and the head custodian and principal coordinated completion of the remaining lists. Then the team reviewed the checklists and prepared for a walkthrough. The walkthrough consisted of one-on-one interviews with teachers who had identified specific concerns, and visual inspection of certain areas of the school with identified or potential problems. Staff measured and recorded carbon dioxide (CO₂) levels and room temperatures, along with any observations and interview information, on a spreadsheet.

The walkthrough revealed that diesel fumes from idling buses entered several rooms on the south side of the building through the unit ventilators. The team also noted that the outside air dampers were set to allow air in only when the temperature is above 40° F to prevent freezing coils, thus leaving classrooms without adequate outside air during most of the heating season. Radon testing showed low radon levels (below EPA's action level) throughout the school.

Although many IAQ issues were identified, the team was aware of concerns about the impact of the new program on the maintenance staff's workload, as they were already very busy. The Facilities Director addressed these concerns and also assured the maintenance staff that the IAQ issues and operational changes identified were not a critique of their performance. The IAQ work at the elementary school commenced soon after.

"The IAQ TfS Kit prompted us to track our student health problems, like asthma and allergies, and try to relate them to our past IAQ improvements. We've really been noticing the number of student absences decreasing since the IAQ improvements were initiated."

*-Art Benton
Facilities and
Maintenance Supervisor*

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“I got a lot more out of IAQ Tools for Schools than I anticipated. The program has really helped us because we are addressing things that needed to be fixed and we can take this to other schools [in our district].”

*–Art Benton
Facilities and
Maintenance
Supervisor*

Lessons Learned

Short-term Solutions

As a result of the walkthrough in January 1999, the team developed a set of IAQ policies for King-Murphy Elementary School. Staff are advised to do the following:

- Keep unit ventilators clear of books, papers, and other items.
- Maintain the temperature between 68° and 72° F.
- Keep warm-blooded pets out of classrooms or, when they visit, limit time of exposure and ensure good ventilation.
- Be aware of the cleaning schedule and expectations for keeping horizontal surfaces clean.

Staff are also encouraged to know the proper procedures for storing and discarding chemicals. Material Safety Data Sheets on the chemicals will be kept on file and updated whenever necessary. The district sought a waiver from Health and Human Services to use a bleach alternative for weekly cleaning, and that has become the rule. The policies were communicated to all staff and included in the new-teacher and beginning-of-year information packets.

The school also worked with its energy service provider to address IAQ problems related to the HVAC system. The contractor adjusted the outside air dampers and added glycol to the water pipes to increase the amount of outside air during the heating season. Timers were installed to shut off the outside air supply during the 15-20 minutes the buses are loading. This will prevent diesel fumes from entering classrooms on the south side of the building through the unit ventilators. The school arranged to install tinted clerestory windows to reduce overheating in upstairs classrooms. Plans were also made to replace metal air filters with pleated paper filters, which are up to 80-percent efficient. The school's preventive maintenance plan specifies that the filters are to be replaced every 90 days.

The IAQ team members noticed a dramatic improvement in their comfort levels and a decrease in IAQ-related complaints between the first and last scheduled IAQ meetings.

Long-term Practices and Policies

Implementing the *IAQ TFS* Kit was a positive learning experience for the Clear Creek School District. Participants agreed that the onsite involvement of knowledgeable staff from EPA's regional office was key to the successful implementation of the Kit at King-Murphy Elementary School. As a direct result of implementing the *TFS* Kit, the district is now establishing hazardous waste training sessions for all staff members. One year ago such programs were not considered necessary, but the success of the *IAQ TFS* Kit helped pave the way for new environmental issues to be addressed.

District staff are making *TFS* a learning experience for students, too. From the very beginning, the Superintendent requested that the students be included as much as possible. King-Murphy students helped complete checklists, collected particulate samples, and wrote about what they learned. IAQ provided an opportunity for students to get involved in their own education and increase their awareness of the indoor environment.

In a new program beginning September 2000, Art Benton, Facilities and Maintenance Supervisor, is establishing an internship for high school students from the district. They will review the recorded sick days of students and staff from all district schools that implemented the *IAQ TFS* Kit and record the reason for the sick day—whether it can be attributed to asthma, allergies, flu, or simply missing the bus. Also in September, Georgetown Elementary School will begin to participate in the *IAQ TFS* program.

***For more information, contact
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