

NEWS, ANALYSIS, AND UPDATES

High CO₂ Levels in Portable School Buildings May Have Implications Far Beyond Austin, Texas

Tests of air quality inside portable classrooms in Austin, Texas, revealed carbon dioxide (CO₂) levels that were usually three or more times higher than the maximum recommended limit under the American Society of Heating, Refrigerating and Air-Conditioning Engineers' (ASHRAE) standard for indoor air quality.

The measured levels, ranging from 3,000 to 3,500 parts per million (ppm), were within limits set by the US Occupational Safety and Health Administration (OSHA). OSHA and the American Conference of Governmental Industrial Hygienists have established that when the air in a building contains 5,000 ppm or more of CO₂, the occupants can potentially start to suffer permanent adverse effects.

What the levels found in the Austin portable classrooms indicate is that those classrooms get little or no fresh air to flush out the CO₂ that students and teachers exhale. In addition, CO₂ levels in the vicinity of 3,000 ppm would violate code requirements in many US localities, though they may not in Austin. In response to the high CO₂ findings, Austin plans to test 55 of its 550 portable school buildings, which contain two classrooms each. The tests are meant to determine if the portable-building heating, ventilation, and air-conditioning (HVAC) units pose IEQ issues the school district must address. After the school district evacuated Hill Elementary School eight months ago due to mold contamination, remediators examined the school's 10 portable buildings. They discovered mold in the HVAC units, in classroom paper materials, and in some furnishings.

Vince Torres, associate director of the University of Texas' Institute for the Indoor Environment in Austin, and a registered professional mechanical engineer with expertise in HVAC systems, tells *IEQS*, "We have a lot of unanswered questions about the portable classrooms. Are the HVAC units performing below capability? Are the outside-air units open? Can we introduce more fresh air

without compromising interior humidity levels? Should we upgrade their air-filtration systems? We hope to find out, so that next year, we have a better protocol for operating the portable buildings. One thing we hope to do is introduce more fresh air into them for the students and staff."

It was Torres who took the air readings in Hill's 10 portable classrooms that showed high CO₂ levels in December 1999. He explains that he took those readings at least 45 minutes after students began classes in the morning and took second readings when possible in the same classrooms in the afternoon. ASHRAE's standard calls for a maximum of 1,000 ppm in an office, which is somewhat akin to most school classrooms. Torres tells *IEQS* that most of his readings in the portable classrooms showed between 3,000 and 3,500 ppm of CO₂. "A couple of classrooms had less than 3,000 ppm of CO₂, but none were within the ASHRAE standard of 1,000 ppm," he says. The windows in those portable classrooms don't open, he adds.

For both teachers and students, such high levels of CO₂ can only blunt clear thinking and academic performance. Occupants of buildings with CO₂ levels that exceed 1,000 ppm frequently complain of headaches, a reduced ability to concentrate, drowsiness, fatigue, and being lightheaded (see the *IEQS* case study, September 2000). People in such settings are also prone to catching more colds and other respiratory illnesses. In Austin's case, even if the portable buildings don't violate building codes, having windows that don't open poses a potentially tragic outcome should fire ever strike the classrooms that have only one door.

Torres' CO₂ readings and the mold discovered in Hill's portable buildings earlier this year have implications for many school districts throughout the US and elsewhere. So-called portable buildings were sold as "temporary" structures. Their designation as temporary buildings often meant they weren't required to meet building requirements. Unfortunately, many school systems — apparently

including Austin's — became dependent upon them as a low-cost way of providing more classrooms for burgeoning student populations, and

many communities have continued to use these "temporary" buildings for a decade or more — far longer than they were ever meant to be used.

Federal Access Board to Research Impact of IEQ on Health and Actions That Might Reduce "IEQ Barrier" Some Buildings Pose

Another US federal agency is responding to growing health concerns and urgings by citizens made ill by chemical substances commonly found in buildings. On September 13, 2000, the US Architectural and Transportation Barriers Compliance Board, commonly called the Access Board, voted to commit 25% of its fiscal year 2001 budget for a research project on indoor environmental quality (IEQ). David Yanchulis, accessibility specialist for the Access Board, wasn't certain how large the board research budget is, but says it "would probably be at least \$75,000 to more than \$100,000" in fiscal year 2001.

Jim Raggio, counsel, tells *IEQS* that the project will focus on what substances in built environments can, in effect, become barriers to people with asthma, allergies, multiple chemical sensitivity (MCS), and other respiratory and systemic illnesses. The project will also seek input from "the building industry" about which kinds of chemicals commonly used in construction could be reduced or eliminated over a two- to five-year period, he says.

"What we're looking at is bringing together various stakeholders — people affected by illnesses and building industry representatives — to learn what people think are the most burning issues," Raggio explains. "We want to ask experts what in the next two to five years would make a difference in your lives and then ask the building industry what it is ready to act on within that time frame. We want to figure out what we can effectively do over that time frame and then pick a limited number of issues and figure out what the next step should be on them. We're getting into this because we have been urged on by people with MCS," he says. "We are looking at the broader issue, however, of environmental illnesses, which include asthma, allergies, MCS, and so on that may qualify as barrier issues if they limit what afflicted persons can do."

The Access Board has traditionally dealt with physical barriers such as sidewalks and building

entrances that make it difficult or impossible for persons in wheelchairs or on crutches to get over curbs or enter buildings with stairs. If it tackles chemicals in the built environment that present a barrier to certain people, the Access Board would take on an issue it hasn't previously addressed in terms of enforcement. The board has undertaken new issues involving barriers before, but only after ascertaining through research that such action was within its purview. The approved IEQ research project apparently is a first step toward determining whether the board has the authority to act and toward identifying which IEQ issues it must address.

In a related matter, Raggio says that the Access Board did not commit at its August 23, 2000, meeting to issuing a Technical Guidance Bulletin on MCS. The board may, however, issue a "technical assistance document" on MCS at some point, he adds. On September 26, 2000, the National Center for Environmental Health Strategies, Inc., a non-profit organization that represents the MCS community, issued a press release that stated the Access Board had made a commitment to issue an MCS guidance bulletin. Instead, Raggio explains, "The Access Board has formed an ad hoc committee of board members [on MCS] to examine these issues. Those committee members have discussed doing a technical assistance document, but it is only at a discussion stage. There has been no vote." If the ad hoc committee on MCS proposes an MCS document for consideration, the full board would then discuss and possibly approve such a document. On a more positive note, however, Raggio tells *IEQS*, "It is likely the board will put something out [issue a document on MCS] but it's uncertain what. We think the issue is timely. The concerns we're having aren't much different from those the US Environmental Protection Agency identified in its unfinished document, *Healthy Buildings, Healthy People*," he says. (See *IEQS*, June 2000.)