Portable Classroom Investigation

Synopsis

Portable classrooms have been used by schools for as long as 50 years. Most portable classrooms in Santa Cruz County are from 10 to 15 years old. Teachers, parents and the public have raised concern regarding potential health risks in portable classrooms. Concerns focus on immediate health complaints such as eye irritation, allergies, asthma, headache and fatigue as well as more serious risks of chronic exposures to formaldehyde, lead, pesticides, and other air toxins. A recent study by the state Department of Health Services (DHS) and the Air Resources Board (ARB) provides important information for state and local decision makers working to assure a safe, healthful, and productive learning environment for California children. This study summarizes conditions that need to be addressed at the state and local levels, and discusses options for assuring healthful conditions in both portable and traditional classrooms.

Definitions

Formaldehyde: A colorless gas, which is used for disinfectant, preservation and in chemical synthesis. This chemical is used to preserve carpets. The effect of excess exposure includes headaches, dizziness, breathing difficulty, and upper respiratory infection.

HVAC: Heating Ventilation and Air Conditioning unit.

Particle Matter: A small substance of a large body, such as dust, metals, pollens and spores.

Radon: A radioactive gas produced by the natural decay of organic material in particle matter. The natural forming gas radon has been linked to lung cancer. Exposure to this gas is a result of poor ventilation.

Toxic Material: Items that contain toxins, such as furniture, carpeting, or pesticides.

Toxins: Poisonous substances.

Background

Portable classrooms were introduced to schools as an inexpensive, temporary solution to classroom overcrowding. However, portable classrooms have become a permanent fixture on school campuses.

A "portable classroom" is defined as "a classroom building of one or more stories that is designed and constructed to be relocated and transportable over public streets…"[1] Based on a DHS survey of California school districts, just under one-third of the state's kindergarten to twelfth grade (K-12) public school classrooms in the 2000-2001 school year were portable classrooms. It is estimated that about 80,000 to 85,000 were in use as California public schools classrooms in 2003.[2]

Portable classrooms serve an important need in public schools. They are more quickly constructed and deployed to school sites, they can be moved from school to school and they often have a lower first cost than traditional, site-built buildings. These features allow schools greater flexibility in meeting fluctuating enrollment levels.[3]

Throughout their school careers, it is likely that all students will have a class in a portable classroom.[4]

A variety of studies was done before the November 2003 comprehensive study on portable classroom environmental health conditions was done by the California Air Resource Board (CARB) and Department of Health Services (DHS).

In a nationwide survey of school facilities conducted in 1995, California was ranked last, having more unsatisfactory environmental conditions in schools than any other state. Seventy-one percent of California schools reported at least one inadequate building feature (HVAC, plumbing, roof, framing, floor, foundation, wall, window, door, interior and exterior finish), 41% of schools reported inadequate HVAC systems and 40% reported roof problems.

Another study in 1997 of California schools, investigated by the National Institute for Occupational Safety and Health (NIOSH), found the most common building-related problem was inadequate ventilation with outside air. The second most common problem was water damage to building elements, leading to mold contamination and growth.

The California Energy Commission investigated ventilation in California schools. They found that schools consistently had lower ventilation rates than required and that one-third of the classrooms tested had an air exchange rate less than 50% of the level required by state regulations.

A DHS survey of lead hazards from paint, soil and water in a representative sample of 200 California elementary schools and child care facilities found that nearly all schools had some lead-containing paint. Almost 40% had some paint that is deteriorated, 6% had lead levels exceeding the U.S. Environmental Protection Agency reference value for soil contamination and 18% had lead in drinking water at or above the U.S. Environmental Protection Agency action level (15 ppb).

[1] California Education Code, 17070.15 (k).
[2] Environmental Health Conditions in California's Portable Classrooms Report.
[3] Environmental Health Conditions in California's Portable Classrooms Report.
[4] Santa Cruz County Grand Jury Portable Classroom survey.

One survey documented the widespread use of pesticides in public schools. It found 87% of the districts reported using one or more of 27 particularly hazardous pesticides.

A small study of portables conducted by the University of California, Los Angeles in 1999-2000 found low concentrations of toxic and odorous VOCs (volatile organic chemicals or compounds). The main sources of toxic materials were interior finish materials and furnishings made of particleboard without lamination. Outdoor sources such as vehicles influenced high values in specific portables.[5]

Pursuant to Health and Safety Code 39619.6 (Assembly Bill 2872, Shelley, 2000), the Environmental Health Conditions in California's Portable Classrooms study was prompted by concerns that California's schools, especially portable classrooms, might not provide healthy environments for students or teachers. These concerns were based on the potential for mold contamination, inadequate ventilation, poor temperature control, elevated levels of volatile chemicals and excessive use of some pesticides. The study was funded to help understand the extent of these problems and to determine whether those problems warranted response by the state and/or schools or school districts.

The results of this study provide important information for state and local decision-makers regarding the degree to which our classrooms provide a safe, healthful and productive learning environment for children. The Environmental Health Conditions in California's Portable Classrooms report provides an overview of the study, summarizes conditions identified in the study that need to be addressed at the state and local levels and discusses options for improving conditions in both portable and traditional classrooms.

In November 2003, the California Air Resource Board (CARB) and Department of Health Services (DHS) conducted a comprehensive study on portable classroom environmental health conditions. Prior to this study there had been no comprehensive study of environmental conditions in California public schools. Various investigations had been conducted over the past decade that addressed specific components or looked at a limited subset of school facilities. A sample of the studies follows:

Over half of American schools have problems with air quality.[6] This can result in the following problems:

- Asthma.
- Loss of productivity.
- Classroom equipment breakdown.
- Legal liability.
- Student and staff absentee rate.

[5] Environmental Health Conditions in California's Portable Classrooms Report.
[6] U.S. Environmental Protection Agency Web site.

The following problems associated with portable classrooms have been identified by the U.S. Environmental Protection Agency (EPA):

- Poorly functioning HVAC systems.[7]
- Loud HVAC systems.
- Lack of ventilation which allows natural forming gases such as radon to accumulate.
- Chemical breakdown releasing gases from pressboard and other materials.
- Toxins and exhaust from vehicles.

Portable classrooms contain a higher level of particle matter.[8]

The recommended safe levels of formaldehyde exposure are:

- Twenty-seven parts per billion (ppb) (eight hours indoors).
- Seventy-six ppb (one hour indoor).

Fifty percent of portable classrooms have been measured at levels of over 27 ppb and four percent of portables have been measured for over 76 ppb.[9]

Scope

This investigation examines the use of portable classrooms and how school districts ensure that health hazards are minimized. The Grand Jury gathered statistics from all of the Santa Cruz County school districts on information such as the number of portables in use, whether use is rotated, non-classroom use and workmen's compensation cases in standard classrooms vs. portables.

Sources

2003-2004 Grand Jury survey of all Santa Cruz County School districts.
California Air Resources Board and California Department of Health Services Study.
California Educational Code.
"Environmental Health Conditions in California Portable Classrooms" report.
Environmental Protection Agency Web site.
Samet and Spengler, Indoor Air Pollution: A Health Perspective.
Santa Cruz Sentinel newspaper articles.

Findings

1. There are an estimated 80,000 portable classrooms in use in California.[10] Santa Cruz county has over 600 portable classrooms in use.

[7] U.S. Environmental Protection Agency Web site.
[8] U.S. Environmental Protection Agency Web site.
[9] U.S. Environmental Protection Agency Web site.
[10] California Air Resources Board and California Department of Health Services study.

2. Locally, portable classrooms are not used exclusively for classrooms. Some are used for district offices, music, art, computer labs and a library. At least one school is entirely made up of portables and one school has no portables.

3. The age of portables in Santa Cruz County ranges from one month old to 50 years old. Several school districts replace portables when they have been in use for 15 years.

4. The EPA has not set guidelines for portable classroom air quality. However, several school districts have had their portable air quality tested. The results have shown that air quality in the portables is within the same ranges as regular classrooms.

5. The best way to ensure good air quality is to use the HVAC system (a machine which pumps heated or cooled air into the classroom). The HVAC system must be maintained for greatest effectiveness.[11] In Santa Cruz County, schools clean their HVAC systems from once every four months to once a year.

6. New portable classrooms contain outgasing pollutants such as formaldehyde and chloroform, used in carpets.[12] Most local schools said that portables are not occupied for several weeks, allowing outgasing to take place. In addition, portables are not used until the HVAC system has been operating for up to 98 consecutive hours at a moderate temperature. One school does not occupy a portable building until it is released by the Inspector of Record as habitable. Districts have the option to request portables that contain lower toxic chemical levels for classroom purposes.

7. Portable classrooms are exempt from having sprinkler sytems for a three-year period. This exemption can be renewed every three years.[13] Some Santa Cruz County portable classrooms have no sprinkler system. All portables must have a working fire alarm.

8. The California Education Code 17077.10 requires all classrooms to have a telephone. Eighty-three percent of local portable classrooms do not have a telephone, although some do have an intercom. One district reported that at one school site, the permanent portables have phones but the temporary portables have no phones.

9. All portables have natural lighting.

[11] California Air Resources Board and California Department of Health Services study.
[12] Environmental Health Conditions in California's Portable Classrooms Report.
[13] California Educational Code 17074.54.

10. Two-thirds of the county's portable classrooms have a sink, but all students have access to drinking water.

11. The same janitorial cleaning standards are used for both portable and regular classrooms.

12. The HVAC system is operated by maintenance staff at most sites. Maintenance personnel keep records of all HVAC work performed. In one district an HVAC Specialist is responsible for ensuring effective ventilation. The Director of Maintenance and Operations supervises the work. Another district employs an HVAC Maintenance Technician whose primary job responsibility is to repair and service all district HVAC equipment. Teachers can also request training for HVAC systems, according to some districts. One district said that it's custodians have no training in HVAC systems.

13. No local agency tracks student or staff illness in either portable or regular classrooms. Some schools track illness upon complaint about a particular portable. One district said it doesn't track illness because medical privacy laws restrict the ability to track student or teacher health issues.

14. Many teachers use the same portable classroom for several years. Some schools rotate their teachers out of portables.

15. The areas beneath portables are closed or skirted to deter animals from going under the portable classroom. Sometimes this skirt can wick moisture from the soil beneath the portable and cause problems. Areas beneath portables are checked for damage annually or upon the request of a teacher. If there is damage or anything unusual is noted, such as an odor or mildew, the teacher fills out a "request for maintenance" form at which time maintenance is performed.

16. Water damage promotes mold and bacteria growth, which have been linked to possible illnesses. Type I allergy to mold reportedly affects between two and 30 percent of those with allergies. Culture studies have been performed to examine the prevalence and identity of mold contamination in the indoor environment. In one study, cladosporium, penicillium, and alternaria were found to be the predominating airborne fungi present, each being detectable in more than 75% of the structures studied. The study suggestesd that when a level of 700 colony-forming units per cubic meter of indoor air was exceeded, higher incidences of allergic reactions and eye, nose and throat irritation are encountered.[14]

    Portables are checked for water damage at least once a year or upon the request of a staff member. Most schools said maintenance problems in portable classrooms is tracked through district work orders. Some schools or districts said there have been mold, ventilation or poor air quality problems in the past.

[14] Samet and Spengler, Indoor Air Pollution: A Health Perspective.

17. One school took the incentive to have its portable classrooms' air quality tested for $1500 per test. The results concluded that its portable classrooms' air quality was the same as that in regular classrooms.

18. All school districts must provide a written report annually of the pesticides in use on school sites.[15]

    One district reported that any toxic cleaning products, pesticides or fertilizers used are listed in the Material Safety Data Sheets, kept at each site. Parents and staff are notified in writing and the site is posted if any pesticides or fertilizers are used during the school calendar days. No highly toxic cleaners are used in this district's classrooms.

    Another district said it abides by the state regulations regarding pesticide use in schools. The list of toxic products that may and may not be used as well as the posting requirements are covered in these regulations. This district uses pesticides only to abate a known and specific problem, not for general upkeep. In addition, the grounds are fertilized in the summer and spring during school breaks.

    A third school district uses environment-friendly products such as EcoExempt HC (active ingredient: clove oil, purpose: weed control), EcoExempt (active ingredient: rosemary oil, purpose: insect control) and ZP Rodent Bait AG (active ingredient: zinc phosphide, purpose: gopher control).

19. Placement of portable classrooms near parking lots increases the air toxins, due to vehicle exhaust.[16] Local schools and districts said that the location of portable classrooms varies even within a district. Traffic is one of many factors in considering a portable's placement; relatively few are near cars or buses.

Conclusions

1. Portable classrooms may sound temporary, but are a permanent feature on most school campuses.

2. A wide range of serious health and safety conditions exists in portable classrooms.

3. Schools do not know whether portable classrooms are linked to illness because it is not tracked. In addition, no data can be compiled for Workers Compensation claims because illness is not tracked among staff using portable classroom.

4. Portable classrooms that do not have telephones violate state educational codes.

[15] Healthy Schools Act of 2000.
[16] Santa Cruz Sentinel, 17 October 2003.

5. Air quality can be improved by placing portables away from sources of vehicle exhaust.

Recommendations

1. Schools or districts should try to determine whether portable classrooms are causing an increase in illness or absenteeism.

2. Schools should use the U.S. Environmental Protection Agency's Tools for Schools programs for controlling air quality. This is available through the EPA Web site.

3. Schools and districts should inform teachers, staff, parents and the public about the recent study by the state DHS and ARB ("Environmental Health Conditions in California's Portable Classrooms").

4. Schools should ventilate portable classrooms regularly to increase air quality. "Indoor Air Pollution, A Health Perspective" recommends controlling indoor mold contamination by creating an indoor environment unfavorable to mold growth. Potential substrates for mold growth should be removed or kept scrupulously clean. Indoor humidity and accumulation of indoor aeroallergens should be combated with good indoor ventilation. Air conditioning may act to decrease indoor exposure to mold spores from the outside. In addition, local schools should clean HVAC systems according to manufacturer's recommendations.

5. When replacing portable classrooms, schools should request environmentally cleaner portable classrooms.

6. All portable classrooms should have telephones.

7. Schools should place portable classrooms away from streets, parking lots and other traffic areas.

Responses Required

Entity	Findings	Recommendations	Respond Within
Alianza Charter School	2 – 16, 18, 19	1 - 7	90 days (September 30, 2004)
Alternative Family Education-Home School	2 – 16, 18, 19	1 - 7	90 days (September 30, 2004)
Bonny Doon Union School District	2 – 16, 18, 19	1 - 7	90 days (September 30, 2004)
Happy Valley School District	2 – 16, 18, 19	1 - 7	90 days (September 30, 2004)
Linscott Charter School	2 – 16, 18, 19	1 - 7	90 days (September 30, 2004)
Live Oak School District	2 – 16, 18, 19	1 - 7	90 days (September 30, 2004)
Mountain Elementary School District	2 – 16, 18, 19	1 - 7	90 days (September 30, 2004)
New School	2 – 16, 18, 19	1 - 7	90 days (September 30, 2004)
Ocean Alternative Education Center	2 – 16, 18, 19	1 - 7	90 days (September 30, 2004)
Pacific Coast Charter School	2 – 16, 18, 19	1 - 7	90 days (September 30, 2004)
Pacific School	2 – 16, 18, 19	1 - 7	90 days (September 30, 2004)
Pajaro Valley School District	2 – 16, 18, 19	1 - 7	90 days (September 30, 2004)
Renaissance High School	2 – 16, 18, 19	1 - 7	90 days (September 30, 2004)

San Lorenzo Valley Unified School District	2 – 16, 18, 19	1 - 7	90 days (September 30, 2004)
San Lorenzo Valley Unified School District Charter School	2 – 16, 18, 19	1 - 7	90 days (September 30, 2004)
Santa Cruz City School District	2 – 16, 18, 19	1 - 7	90 days (September 30, 2004)
Santa Cruz County Office of Education	All	1 - 7	60 days (August 30, 2004)
Scotts Valley Unified School District	2 – 16, 18, 19	1 - 7	90 days (September 30, 2004)
Soquel Union Elementary School District	2 – 16, 18, 19	1 - 7	90 days (September 30, 2004)
Watsonville Charter School of the Arts	2 – 16, 18, 19	1 - 7	90 days (September 30, 2004)

Appendix

This survey is typical of those sent out for the Grand Jury's survey.

Survey

Questions for maintenance and/or cleaning personnel/staff, teachers, administration and staff:

1. How often are the portable classroom cleaned? [Dust, pollen, and mildew concerns]?

2. How old are the heating, ventilation, and air conditioning systems in these units?

   How often are the portables inspected insuring that EPA indoor air quality is met?

3. Do they meet the ventilation standards in local building codes? What are the standards?

4. Who oversees the system operations and maintenance of the HVAC systems to ensure design ventilation rates are attained?

5. How often are these systems [HVAC] cleaned and maintained? Is routine maintenance of HVAC systems done on an annual basis, or more often?

6. Are the portables routinely checked for water-stained ceiling tiles, water damaged carpets, etc. or does maintenance staff respond only when a teacher/school staff member complains about a problem?

7. How much time is allowed for building materials in a new or remodeled portable to off-gas pollutants before it is occupied?

8. Are the portables cleaned/maintained as frequently as any other school classroom?

9. Are the ventilation ducts cleaned/maintained regularly?

10. What toxic cleaning products/pesticides/fertilizers are used in school environments?

11. Regarding the placement/location of the portables:

    ---What is the unit's proximity to the area where car or school bus exhaust might enter the ventilation intake?

    ---Is the portable raised above ground-level? If so, are the areas of access to the underside of the portable properly screened to discourage pests? Drainage problems?

---Proximity to sprinkler system [water damage/rot/mold/mildew, etc.] ?

12. Is there a concern for teacher safety if the portable[s] are isolated from the main buildings? [There is some documentation of women teachers at risk.]

    If the portable is some distance from the main structure, does the unit have a telephone?

    Alarm/emergency system?

    Does each portable have running water?

    A sink?

    Natural light?

13. How many portables at each site? Number of years each portable at that school?

    History of problems with specific portable. Means of tracking portable's maintenance problems?

    Tracking students or teachers with health problems from these portables?

14. Teachers rotated year to year from the portables?

15. What are portables used for other than as classrooms?

16. Communication and education--Training for staff/faculty on how to properly ventilate [run a/c whenever class is in session as well as one hour prior to class with outside vents open]. Everyone associated with these portable buildings --from the occupants to maintenance should be aware of problems and communicate with each other to work together to prevent and solve problems.

17. We would like to make sure we get statistics that include the number of children in portables and what percentage this represents of total enrollment. Also the number of teachers and staff and what percentage that represents of total staffing as well.

18. Do you track illnesses?

    Number of days lost to illness in portables compared to numbers of days lost in conventional classrooms?

19. Are there any cases of workers' comp for staff in portables? Again, what percentage is this compared to workers' comp cases in conventional rooms?