

ENVIRONMENTAL HEALTH CONDITIONS in CALIFORNIA'S PORTABLE CLASSROOMS

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The Air Resources Board (ARB) and Department of Health Services (DHS) recently completed a comprehensive study of the environmental health conditions in portable (relocatable) classrooms, as required under California legislation (AB 2872, Shelly, 2000). This study investigated classrooms in kindergarten through 12th grade public schools and included a large representative sample: two portable classrooms and one traditional classroom were evaluated at several hundred schools throughout the state. A number of environmental problems were found in classrooms throughout California. This fact sheet briefly summarizes the findings and recommendations of the study. For the full report, please visit <http://www.arb.ca.gov/research/indoor/pcs.pcs.htm>.



Key Findings

The report identifies and addresses a number of environmental problems that were frequently found in classrooms throughout California. These problems were found in both portable (relocatable) and traditional (site-built) classrooms; however, some of the problems were found more frequently in portable classrooms. The primary problems identified in the PCS study include:

◆ **Inadequate ventilation with outdoor air.**

Substandard amounts of outdoor air were measured in classrooms during 40 percent of class hours, and seriously deficient ventilation was found 10 percent of the time. The causes included teachers turning off HVAC (heating, ventilating, and air-conditioning systems) because of excessive noise; closed or blocked outdoor air dampers; off cycling of the HVAC; inadequate HVAC capacity; and other factors.

◆ **Classroom noise too high.** About one-half of the classrooms exceeded 55 decibels, the level used by many communities in the state for their outdoor nuisance regulations, and most exceeded the current "best practices" guideline of 45 decibels. Major noise sources are primarily noisy HVAC equipment, noisy lighting, and noise from nearby outdoor activities.

◆ **Poor thermal comfort.** Temperature and humidity levels were outside the range given by professional standards for thermal comfort in about one-fourth of the classrooms. Causes appeared to be related to improper HVAC system control and/or inadequate capacity.

◆ **Indoor formaldehyde levels.** In 4 percent of the classrooms, air concentrations of formaldehyde exceeded the guideline level for preventing acute eye, nose and throat irritation. Nearly all classrooms exceeded formaldehyde guidelines for preventing long-term health effects, including cancer. These findings are largely due to the widespread use of formaldehyde-containing building materials and furnishings, and inadequate ventilation.

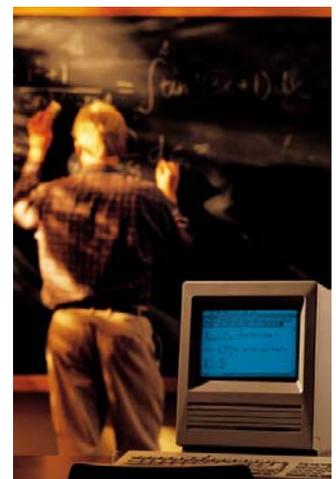
◆ **Moisture problems.** Water stains, excess wall moisture, and other indicators of potential mold were found in about one-third of classrooms. Investigators found visible mold in about 3% of classrooms; and musty odors were reported by 69% of teachers. These conditions are often attributable to inadequate maintenance.



Dirty air filters can reduce airflow.

◆ **Toxic residues in floor dust.** Lead, arsenic, and numerous pesticide residues were measured in classroom floor dust. These residues are a concern because they can be inhaled, ingested, or absorbed through the skin by children, especially very young children who sit on the floor and put their hands in their mouths. The source is generally tracked in dirt from outside, and pesticides applied indoors or near the building.

◆ **Inadequate lighting.** In about one-third of the classrooms, room lighting was below the level given by professional guidelines. Properly installed daylighting can help.



Key Recommendations

Sixteen recommendations are discussed in the report. These can be grouped into four general approaches needed to remedy and prevent the problems found in California public schools:

- Direct and assist schools to comply with State regulations, especially workplace regulations (Cal/OSHA) related to building operation and maintenance;
- Develop and promote “Best Practices” for design, construction, operation, and maintenance of school facilities;
- Improve support (both funding and training) for school facilities and staff;
- Establish needed guidelines and standards for school environmental health that are specifically protective of children.

The recommendations are split between Group 1 (“high priority, high benefit” actions) that can be achieved *in the near term at relatively low cost*, and Group 2, also priority issues, but requiring a *longer timeframe and/or more substantial resources*.

The Group 1 recommendations (“high priority, high benefit” actions) are:

1. Schools, districts, and the state should **ensure that all school buildings meet all relevant state regulations**, especially the Cal/OSHA workplace regulations regarding ventilation, sanitation and water intrusion, and illness and injury prevention.
2. Schools and school districts should **conduct “self-assessments”** of basic health and safety conditions. This approach has been successfully piloted by the Los Angeles Unified School District in their *Facility Self-inspection Program* (included in the report and available on the web).
3. The State should require schools to **develop indoor environmental quality management plans**. The U.S. Environmental Protection Agency’s *IAQ Tools for Schools Program* provides guidance and free kits to accomplish this.
4. The State should establish a policy to **incorporate “Best Practices” into the design, construction, operations, and maintenance of new California schools**, especially the measures developed by the Collaborative for High Performance Schools (CHPS). The CHPS *Best Practices Manuals* provide broad guidance for measures that will improve schools while also saving energy and reducing long-term costs.
5. **State-level review, by the Division of the State Architect, of the designs for new schools should be expanded** to include elements such as ventilation systems and building materials, in addition to current elements such as fire and life-safety provisions.
6. **Classrooms, especially portables, should be sited correctly**, away from busy roadways, and with proper drainage.
7. The State should **implement an interim new classroom requirement for maximum noise levels at 45 decibels, unoccupied**, until a specially convened task force can determine an appropriate level for California schools (see Group 2 recommendations below).



Water leaks in roofs and near HVAC units are common causes of moisture and mold problems.

Group 2 recommendations (*longer timeframe and/or more substantial resources*) specify that:

8. The State and school districts should **assure stable, long-term funding mechanisms and sources** for both construction and preventive maintenance; currently funding fluctuates from year to year, especially for the Deferred Maintenance Program.
9. The State should develop and offer **focused training programs** for school facility managers, custodial staff, and teachers, in cooperation with interested organizations; those closest to the classrooms often are not aware of current “best practices” for operation and maintenance of classrooms. A concerted, ongoing training program could go far to improve conditions in classrooms.
10. **Integrated Pest Management Programs** should be implemented at all schools.
11. **Older portable classrooms should be retired** when they become unserviceable or do not provide an adequate learning environment for children.
12. The State and school districts should develop and require full **new building commissioning procedures**.
13. The State should **improve its school facilities database**, as there are currently no complete databases on the condition, location, or even number, of school buildings.
14. The State should **convene a task force of experts to develop a California indoor noise guideline** or standard for K-12 schools.
15. The State should develop **chemical exposure guidelines** or standards for classrooms that are protective of children and teachers.
16. **Portable classrooms should be re-designed from the ground up**. Several groups are producing new prototypes that use an integrated “whole building” approach; these should be supported through the demonstration phase to evaluate design changes that provide substantive improvements over older portables.



Vehicle traffic near classrooms can lead to exposure to harmful air pollutants.

For more information, go on-line to <http://www.arb.ca.gov/research/indoor/pcs/pcs.htm>. See especially Appendix VI for specific guidance to schools.