

Citizens for A Safe Learning Environment

287 Lacewood Drive, Unit 103, Suite 178

Hallifax, Nova Scotia, B3M 3Y7

457-3002, 861-1851, 443-6237, 885-2395,

am077@chebucto.ns.ca

INDOOR ENVIRONMENT QUALITY AND SCHOOLS

Presentation for the Nova Scotia Department of Education

October 1, 1998

INTRODUCTION

Citizens for A Safe Learning Environment (CASLE) is an information-based, registered, non-profit Provincial organization committed to working hand in hand with parents, government, and school boards to improve the condition of school buildings and the products and practices used within, so as to ensure that school children and school staffs have safe and healthy places in which to spend their days.

In the beginning, CASLE's founders were only working to make our own children's schools safe and accessible to our own environmentally disabled children, but we were surprised and shocked to learn just how unsafe the schools were in general, regarding Indoor Air Quality (IAQ), and that all of the children were at some risk, not only from the more newly recognized Environmental Health concerns, but also from well established and regulated Environmental Health & Safety concerns, like asbestos, moulds, silica, PCBs, pesticides, and more.

We learned there was little knowledge in the school system about children's Health and Safety, and that of consequence, it was a very low priority.

RESPONSIBILITY

Primary responsibility for Environmental Health and Safety lies with the school boards, while primary responsibility on site rests with the Principal. However, many individuals, committees, and departments have roles in the provision of healthy and safe schools. School Boards, Health & Safety Committees, Parents, Administration, Teachers, Principals, Maintenance Staff, the Departments of Education, Health, Environment, Labour, the Teachers Union, and more, all have responsibility for some aspect or another of children's protection.

We found a lack of coordination between them, a lack of knowledge about the particular needs of children as compared to adults, and several other factors, were causing significant gaps to allow children's health and safety to slip through.

We are pleased to note that improvements are now happening at all levels to close those gaps, and we want to thank the Department of Education for gatherings such as this one that are helping to eliminate school children's workplace hazards.

We are learning that a safe, dry, temperate, place with plenty of clean, oxygenated air is as essential to the learning process as are a good curriculum and good teaching.

HISTORICAL PERSPECTIVE

As a society we are always learning. Tuberculosis, Epilepsy, Syphilis, and Lyme Disease were all once thought to be of psychological origin. The recognition that asthma is an organic illness came as recently as the 1970s. Knowledge of a bacterial basis for stomach ulcers is still more recent. People suffering from Environmentally Induced Illnesses, Sick Building Syndrome, and Multiple Chemical Sensitivities have also endured accusations that their illness is not of organic origin. Fortunately, as time passes and more is learned, this too is changing.

New information always takes time to find its way into accepted practice. Solid awareness of health risks from moulds came only in the last 10 years. Harm from common, every day chemical exposures is now entering society's awareness.

Society has known for many years about the hazards of asbestos, silica, and lead, for example, and yet in the school system protection for the children has been haphazard and inconsistent.

Long before school programs are put at risk from budget constraints, corners are cut on building maintenance. School maintenance had been a low priority for 25 years or more, but this too is changing. We have begun to recognize that poorly maintained buildings can have very negative impacts on the health and well being of building occupants.

Researchers for the Cutter Corporation assert that schools are particularly susceptible to Indoor Environment Quality (IAQ) problems:

CHARACTERISTICS SPECIFIC TO SCHOOLS:

- (1) **Cheap Construction.** We are learning from the schools built in the 50 s and 60s that cheap construction is actually expensive in the long run.
- (2) **Additional Space:** Making additions often works against the original building design and disrupts building function.
- (3) **Energy Conservation Measures:** Quick fixes tried in the past to conserve energy have caused such things as reduced ventilation and increased indoor pollution.
- (4) **Occupant Density:** Schools house approximately four times as many occupants per square foot as do office buildings - and please keep in mind children's vulnerable bodies.
- (5) **Portable buildings:** portable classrooms age relatively quickly, frequently develop leaks and often have inadequate ventilation. They tend to be made from materials such as particle boards and other of the more toxic building materials.
- (6) **Multiple Systems:** Many schools have several different ventilation systems installed at various times and are in various states of disrepair, (WHEN MAKING ADDITIONS ADJUST AND INTEGRATE EXISTING SYSTEMS)
- (7) **Pollutant Sources:** Classroom materials, art and science supplies, industrial arts areas, and gymnasiums all present particular pollutant problems not found in office buildings.
- (8) **Tight budget:** Fiscal cutbacks lead to reduced maintenance.
- (9) **Difficult political climates:** The system is cumbersome and complex, and many decisions involve small-p politics. Often there is a lack of adequate information about IAQ concerns. There are also agendas which may not include safe buildings as a priority.

THESE ISSUES MAKE SCHOOLS PARTICULARLY SUSCEPTIBLE TO IAQ PROBLEMS AND LESS ABLE THAN OTHER ORGANIZATIONS TO DEAL WITH THEM." (The Cutter Corporation)

Because of the factors mentioned, from board to board, even school to school there are differences in awareness of the issues, availability of information, and in the levels of commitment.

All of this has an impact on school children's health and ability to learn.

Please see the information Package for:

- effects of building environments on health.
- Total Load theory of health and the environment
- Impact of IAQ on health - children's vulnerability
- Impact of IAQ on cognition/learning ability
- Sources of IA Pollution
- VOCs & Particulates/Impacts on Health (fragrance chemicals, pesticides, particulate, mould, combustion)

PRODUCTS, PRACTICES, AND THE CONDITION OF BUILDINGS

School IAQ problems can be placed in three categories: Products, Practices, and the Condition of the Building. Older schools need problems identified and remedial work properly done. For new schools, the focus goes to prevention of potential harm through careful planning.

1) the Products category includes everything from the building materials and floor waxes right through to the teacher's aftershave and children's felt markers.

Practices can include everything from the questionable practice of turning off air delivery systems during off hours to the Safe Work Practices used by construction companies hired to do school renovations.

Safe Work Practices and Standards for exposures to workplace hazards are set for healthy 175 lb male workers. As important as these standards are, WHIMIS control and other standards may not be adequate for protection of children in schools. Safe Work Practices for schools need to reflect children's vulnerability.

In our written presentation you will find examples of recent incidents involving potentially harmful products, practices, and conditions in Nova Scotian schools.

TRAINING:

Training for all involved is essential. "That's the way we've always done it" needs to be replaced by "We do it this way now."

For example, in some boards custodial and maintenance workers get 40 or more hours of training before they begin, and are given regular upgrading. In others, new workers get little more than the keys to the school.

CASLE sees custodians as key people in the delivery of safe school environments. They are in an on-site position to know their building well and be the first to recognize and prevent problems.

The Third Category:

(3) The Condition of Buildings refers to the issue of: Lighting, heating, ventilation, acoustics, leaks, physical security, life safety codes, mould, lead, PCBs, radon, electromagnetic fields, and more.

EXAMPLES:

Lead

Paints made prior to the mid '70's may contain LEAD, a very toxic substance, especially to children. Some of these paints have been found in use as late as LAST YEAR where old stocks were being used up before purchase of new paint!

Also, when scraping, sanding, or renovating walls in schools it is wise to assume there is lead paint present, and take precautions. There are inexpensive tests available, but layers of paint may hide lead well below the surface.

Mould

Mould overgrowth is a common problem in Nova Scotia Schools, and there are serious health concerns surrounding this. Allergic reactions depend on the susceptibility of the individual. Once one becomes sensitive, very low exposure levels can cause symptoms. For sensitive individuals these can be severe.

See the Information Package for more on Moulds.

Canadian Schoolhouse in the Red

According to a survey by Honeywell, called Canadian Schoolhouse in the Red, "As many as 800,000 Canadian students may have difficulty learning because they are taught in aging and poorly built schools. 13 per cent of Atlantic Canada's schools were said to be inadequate. Canadian school boards have put off more than \$1 billion in maintenance, but could save about \$300 million A YEAR in operating expenses if they improved and upgraded their schools." (Canadian Schoolhouse in the Red, 1993)

The World Health Organization estimates close to 30% of our school buildings are suffering from "sick school syndrome" The trouble is, "sick school" actually means "sick people", and improvements cost money.

17
Nova Scotia's Minister of Education has pledged to conduct full assessment of all Provincial Schools once the new schools have been built. CASLE asks that school boards pay particular attention to ensuring the building evaluations are thorough and the upgrades are complete so that all of our Province's school children are provided with healthy schools.

Consequences:

Students in "inadequate installations have an overall grade 5.5% below those in "adequate" installations

Students in "inadequate installations have an overall grade 10.9% below those in "excellent" installations

(M. Edwards, Georgetown University, Washington, 1991)

STEPS FOR CORRECTING BUILDING-RELATED IAQ PROBLEMS

(1) Correct identification of the problem by experts knowledgeable about the complex and interrelating factors of building remediation.

AIR QUALITY TESTING CAUTION: Air quality testing is a tool for identifying IAQ problems, but it is not an exact science. Decisions from testing results need to be made by experts in test interpretation and building remediation. See the sheet on mould for more testing information.

(2) Well-designed and far-sighted solutions from experts can prevent serious and expensive mistakes. IAQ problems tend to be complex, and "bandaid" solutions often have long term costs.

(3) Choose low-emission products.

(4) Use appropriate isolation techniques. This includes:

(a) Safe Work Practices when products have unavoidable toxins, and/or

(b) SCHEDULING of work to off-hours and vacations and

(c) Flush-Out procedures or allowing sufficient time and ventilation for off-gassing before occupants re-enter the space.

Ventilation and SOURCE CONTROL are important to improved Indoor Environment Quality:

SOURCE CONTROL:

Examples:

In your packages is a sheet entitled, Less Expensive Ways to Improve Indoor Air Quality. Ventilation and/or isolation of photocopiers and laminators, Scent-Free Policies, and no-carpet policies are also helpful.

Also see the CMHCs book Building Materials for the Environmentally Hypersensitive for information on choosing less toxic building products.

• Avoid oil-based paints and finishes. Painting even with the less toxic kinds should not be done with children unprotected from the fumes. Isolation, and flush-out techniques, can put rooms back into use often within a few days.

A local Doctor stated at a board committee meeting that he is "tired of his patients winding up in hospital for two or three days just because someone decided to paint the school." In Window caulking, roof tarring, floor stripping and waxing, gym floor varnishing, and many more maintenance and custodial procedures need to be altered to prevent exposures to children and staff.

SCHOOL RENOVATIONS

There is an article in your packages on renovations and also suggested "flush out" procedures.

We ask School Boards to require all companies planning to do work in schools to pass Certification Courses in Safe School Construction and Repair. We have been informed that the costs of doing business did not increase when a similar requirement was put in place for companies seeking to work on government buildings. (ie: The NS Construction Safety Association courses can be altered to include children's Health and Safety.)

A few thoughts:

*Whenever any intervention is done at a school, an explicit and automatic question should be asked, 'what effect will this have on the children?' * (Dr. Jeff Scott, N.S. Provincial Medical Officer of Health)

*What is the cost of doing this? What is the cost of not doing this? * (Dr. Gerald Ross, past president American Academy of Environmental Medicine)

Avoidance of Exposure is the First Line of Defense.

BUILDING HEALTHY NEW SCHOOLS FROM THE GROUND UP

Many of the issues are the same for older schools as for the building of new schools. Some are specific to new schools. I'd like to illustrate some with Examples of problems with some new buildings in Nova Scotia:

* In a recently built school, timing was not seriously considered. (1) The gym floor was finished after students had begun using the school. Also, (2) all the books and supplies had been moved in before the building process was finished.

Off-gasing chemicals from new building materials can be absorbed into porous papers and furniture to gas off later.

In the school I just described, many students had to be kept home from school because of nosebleeds, fatigue, asthma, and other health problems directly attributed to their having been put into the school before the new building materials had been thoroughly gassed off.

A recent study of carpet emissions, found that the carpet installed before completion of finish work emitted many times more the amount and kinds of chemical pollutants than had been measured originally in the newly installed carpets. The new carpets had been further contaminated by the chemicals from the construction process. The new "superschool" in Kings county contains no carpets and builders followed many of the recommendations outlined here.

* In another provincial school the ventilation system was designed to shut down when it was out of balance, and turn back on after the balance was restored. Unfortunately, every time the school doors opened the system would imbalance and it was almost constantly in shut-down mode, so the classrooms were without adequate fresh air.

* A new school has been built in the middle of an apple orchard. It is a beautiful setting, but orchards are sprayed many times yearly with toxic pesticides, antifungals, and more. Will it be possible to protect the children from exposure from the sprays or their residues?

* A local doctor hired a company to build an environmentally safe medical office. The company had on staff a design engineer who had trained in the US for such projects. Planning included details of less toxic building materials, layout, method, etc

When construction began the design engineer was moved to another project and the one who took over changed some of the technical plans and substituted more toxic building materials and was proud to have brought the project in way under budget and with a good profit for the company. When the staff and patients reported illness the changes were discovered, and the company was required to tear the site apart and rebuild at the company's expense. Fortunately the contract had been well written.

How can we ensure situations like these do not happen with our new schools?

Control of activities from start to end is important.

Safe buildings start with the Calls for Tender and contracts with clearly specified environmental health requirements, and selection of fully qualified designers and contractors.

Then, (1) who will be watching to ensure that the carefully made plans are adhered to? And (2) who is responsible if things go wrong?

See our Information package for topic of cost effectiveness and Safe Building Design (Site selection, ventilation, flooring, lighting)

We often hear concerns that building safer buildings will be too costly. CASLE speaks with an engineering consultant in Austin Texas, Mary Oetzel, who specializes in building environmentally safe schools. When asked what she might like to be sure is heard, she said, "The most important message I could send is this: Anyone who says it is going to cost more to do it right, is wrong. Healthy schools save in the long run."

In our package is an article by M. Oetzel: RIGHT FROM THE START: BUILDING A HEALTHY SCHOOL.

A few words on Timing and Source Control for New Buildings:

- (1) Properly store and protect building materials from water damage and other contamination during construction.
- (2) As with renovations, ensure adequate time is provided for off-gassing materials before the students and staff begin use of the building. (We understand that in Sweden new schools are off-gassed for 6 months before students enter. Also some US states require off-gassing periods after school renovations.) The need for these flush-out periods can be reduced by planning the more toxic activities to be done as early in the building process as possible, and by choosing least toxic building materials possible in the first place.

The Designers and Builders hand the buildings over to School Boards to maintain and operate. Please be sure that you are handed more than the keys to the building:

- (1) Request an "owner's Manual" of operation, and maintenance instructions for all systems and equipment, and
- (2) detailed supplier information for replacement parts.
- (3) maintain Log Books of all maintenance and repairs over the years.
- (4) Train the maintenance/custodial staff in proper building function.
- (5) Maintain the Use-Integrity of the building.

USE-INTEGRITY IS IMPORTANT:

SCHOOLS ARE DESIGNED WITH PARTICULAR FUNCTIONS IN MIND, TO HOUSE CERTAIN NUMBERS OF OCCUPANTS, AND WITH WELL CHOSEN REPLACEABLE PARTS.

1. IT IS NOT WISE TO USE ROOMS AND AREAS FOR FUNCTIONS FOR WHICH THEY WERE NOT DESIGNED. (FOR EXAMPLE, STORAGE ROOMS SHOULD NOT BE USED AS CLASSROOMS.)
2. AN OVERCROWDED BUILDING IS NOT A HEALTHY BUILDING.
3. SUCH THINGS AS RADIATOR OR AIR FILTERS AND LIGHTBULBS SHOULD BE REPLACED BY THE SAME KINDS AS WERE ORIGINALLY USED UNLESS NEW TECHNOLOGY PRODUCES SUPERIOR ONES.

IT IS OFTEN TEMPTING TO SAVE MONEY BY BUYING POORER QUALITY REPLACEMENTS, and pushing the limits of Design Intent BUT THIS IS FALSE ECONOMY, DEFEATS THE DESIGN INTEGRITY OF THE BUILDING, and can actually lead to harm to school occupants.

Overall, CASLE's main points are the importance of:

1. Avoiding short-sighted economics in school repair, school maintenance, and school construction. Making sure to do it right in the long run costs less.
2. Exceeding all safety standards because we are dealing with children.
3. Including up-to-date Environmental Health and Safety in all aspects of building management. (For new buildings, in all stages of the planning and process: from the call for tender to the training courses and the Owner's Manual.)

RESOURCES:

There is much information available from The Cutter Corporation, The New York Regents Report, the US EPA, NS Department of Labour's IAQ Regulations, The Texas Department of Health's Guidelines for IAQ in Public Schools, and many more sources.

DALTECH is offering courses in School Indoor Air Quality this year. Please consider sending key staff to these courses.

What other institution serves virtually every citizen daily for upwards of 12 of their formative years? Healthy, productive citizens make for a strong and productive Province. The work on improvements has already begun. Thank you to Mr. Keddy and the Facilities Planning Division for all you are doing to provide healthier schools for the children of our Province. Also special thanks to the Departments of Labour and Environment for ongoing efforts, and to Public Works for planning safe new schools. All of us here today have a role to play.

Thank You
CASLE

Appendix

Details That Can Make A Difference when Building New Schools:

1. Choose low-emission products.
2. Use water-based products whenever possible.
3. Use no particle board or pressed boards. Use Low-emission plywood. Exterior grade plywood tends to be safest. Seal all surfaces.
4. Avoid materials that have been treated with pesticides, such as some fabrics for curtains and furniture.
5. Eliminate products that contain formaldehyde as much as possible.
6. Minimize use of adhesives. Use alternatives.
7. Do not use asphalt-based products indoors.
8. M. Oetzel suggests ceiling tiles of either mineral fibreboard or vinyl-faced gypsum, and hold-down clips to minimize particulate exposure from up-and-down movement of tiles.
9. Some pros and cons of Whiteboards and Chalkboards: Chalk is a contaminant which can aggravate respiratory ailments. The finer particles can float in the breathable airspace for days before settling. Some experts advise use of whiteboards, but these can be easily ruined by improper felt markers. Perhaps chalk boards with ventilation systems could be explored. Boards aren't generally used as much as they once were. Perhaps one whiteboard and one chalk board per room could be considered. Their cost difference is virtually nil now.
10. Playgrounds: Pressure treated wood is a significant health hazard and should not be on school grounds.
11. Roofs: Flat roofs in N.S. weather eventually leak, and the tar used for repairs is toxic. Metal roofs seem to frequently leak and it is apparently harder to find and repair these leaks. Peaked roofs with new high-tech, long-life surfaces may be best.
12. Flooring: See the enclosed information including Mary Oetzel's study re: long term cost effectiveness of terrazzo flooring.
13. Carpets: a complex health issue. No carpets in schools please.
14. Specific lighting is needed for maximum health, behaviour, and learning.

15. Low-e windows: The CMHC researchers are not convinced they are healthy for children. Plants in the windows die from lack of proper light.
16. Please no classrooms without windows. Even skylights are not enough.
17. Do not use fibreglass-lined ducts.
18. Install air grilles and radiators that are easy to clean.
19. See article by M. Oetzel re: Concrete mixes and sealing.
20. In case of unexpected emergencies the school office should have an HVAC shut off switch.
21. Requirements for an environmentally healthy design and construction must be written in the Calls for Tender.
22. When building new schools it is essential to plan for possible future overcrowding situations.
23. Site selection can involve seasonal factors. Even wind direction is an important factor to consider.
24. Construction should be completed in a proper order to avoid contamination of materials, furnishings etc.
25. Utilize a flush-out/off-gas period before the new building is occupied. If least toxic materials and methods were used this period can be kept to a minimum.
26. Each school should have a "Users Manual" for the new building, including log books for recording maintenance and repairs, supplier information, operation and maintenance instructions for all systems and equipment, and engineering details of the heating, ventilation and air-conditioning systems.
27. Avoid short-sighted economics in school construction which, in the long run, may cost more in terms of rectifying environmental quality inadequacies.
28. Exceed all safety standards because we are dealing with children. Safe buildings start with good planning.
29. With increasing numbers of teachers and children suffering from Environmentally Induced Illnesses, there is a need for ECO classrooms for environmentally disabled children and staff. Consider building one in every school.
30. And don't forget Recycling facilities for paper, bottles, plastic (Reduce fire hazard and pest/microbial hazard of storage on site)