5783

Building with Clean materials and products: Where do we stand?

Many indoor air quality problems can be prevented during design. While the importance of correct design of ventilation systems has long been recognized, selection of materials and products must now receive more attention.

The issue has been identified as a major problem in many large office and commercial buildings. But the same issues are a concern in homes. In fact, it may be more of a concern in homes, as we spend more time there. We are also discovering that more of us are vulnerable to problems due to pollutants in the environment.

Just think about the last time you went home with a headache after breathing the fumes from some solvent or adhesive. That stinky stuff isn't very healthy, but too often we don't have many alternatives. Those fumes may be strong when you apply them, but they also linger at lower concentrations, sometimes for long periods after the occupants have moved in. None of this contributes to healthy indoor air.

But how can one make sure they build in good indoor air quality? One way is to use materials and products with low emissions of substances that can cause health or comfort problems. Over the past several years, research and development of product testing procedures and exposure prediction models have produced useful tools for evaluating the suitability of building materials, furnishings, and other products used in buildings. It is important to avoid sources with emissions that are too great to be diluted and exhausted by ventilation, or removed by air cleaning devices.

The best approach for evaluating indoor materials and products is to test their emission rates and predict pollutant concentration in the building where they are to be used. Emission testing and prediction of occupant exposures has recently become a key step in the design of some major office building projects.

To help avoid such problems in its new and renovated buildings, the US-EPA has begun to emission-test several products and is considering requiring an emissions rate testing report for the five major organic compounds emitted and for any specified compounds at three "ages" of the product. Manufacturers or suppliers will be required to provide a Material Safety Data Sheet for the chemicals used in the manufacture of each product.

Emissions rate data will be required from manufacturers or suppliers of coatings (paints, varnishes, waxes); flooring or wall covering materials made of plastics, fibbers, or fabrics; adhesives (e.g. for floor or wall coverings), furniture or furnishing with substantial amounts of pressed wood or fabrics; non-metallic materials used in the ductwork of the ventilation system; office machines; supplies (e.g. coated papers); and maintenance materials (e.g floor waxes, restroom odorizers).

As part of its "Healthy Building" program for its new office buildings, Washington state requires various design and operational features to achieve good indoor air quality.

One of the design considerations is selection of materials and furnishings that meet emissions criteria. Requirements include large-chamber testing of emissions from workstation set-ups. Testing covers a 6 week period to obtain data on emission rate changes.

Several large building projects in the U.S. are using the following approach to specifying materials and products in their building design requirements.

Contract General Conditions call for: *Materials shall be designed, manufactured, handled, installed and maintained in a manner that will produce the least harmful effects on occupants of the building.....suppliers shall submit a list of all chemicals used in the manufacture of the product (including a breakdown of the contents by weight or volume); a description of any procedures used by the manufacturer to minimize the emissions of VOCs from it product(s); a description of all emission testing performed; and a listing of all chemicals in the product that considered carcinogens by the U.S. EPA or the State of California.*

Specific materials for which the general conditions are amplified include carpets and carpet adhesives; vinyl flooring; caulks, sealants, glazing compounds, joint fillers; paints; insulation; workstation panels.

Whether the emissions from any source will lead to "acceptable" indoor concentrations and occupant exposures will depend on a number of factors, including:

- emission rates;

- the toxicity or irritation potential of substances emitted;
- physical relationships between the source, the persons present, and the space they occupy; and
- the sensitivity of the occupants.

The complexity of these factors makes acceptability an essentially situation-specific issue.

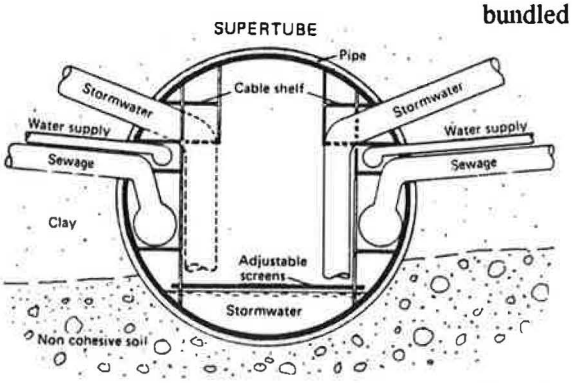
Emission rate testing and exposure modelling of certain materials and products has become a significant step in the design stage. Such efforts, with appropriate attention to ventilation system design and operation, aesthetic and ergonomic factors, and building maintenance, are almost certain to reduce the occupant complaints that characterize "sick buildings". But the ability to design buildings with materials that maintain good indoor air quality is hampered by the lack of data on emissions and clear, predictable cause-effect relationships between exposure to pollutants and health or comfort effects.

Just think how long it took to establish the cause-effect of tobacco smoke - and you can see and smell that stuff. With some of the chemical pollutants, the concentrations are smaller and not as obvious.

Emission factors are not yet widely available from manufacturers, suppliers, or building designer. As owners and designers of large building projects require testing, a data base will be developed. In time owners or designers of small building projects will have access to this data also, or at least to products that have met the requirements of large projects.

Extracted from Material from a technical paper by W. Gene Tucker, (Air and Energy Engineering Research Laboratory, U.S. Environmental Protection Agency, Research Triangle Park, NC) presented at the Indoor Air Quality '90 conference held in Toronto., in 1990.

The Supertube: Alternate Site Servicing



Subdivision servicing is a messy job, with at least 2 and as many as 7 services provided underground. Too often each is supplied separately, in its own trench and at different times. There are lots of chances for one hook-up to damage previously installed services. Often, the street will be repaved and finished before all services are hooked up, so that more patching and fixing has to be done each time a service is brought in.

Sound familiar?

In the far north, where permafrost conditions call for it, services are bundled into above ground service structures (known as *utilidors*). In the south, were we can dig, it seems that every utility jealously guards their own pipes and wires. Combining utilities into common trenches are not allowed.

I've often wondered why services aren't bundled together, which is why I was interested in seeing a report on Swedish building research which describes the Supertube project.

The Supertube is a large diameter culvert enclosing water supply and sewage pipes as well as cables. It represents a pioneering technology which provides an alternative to conventional culvert laying methods - with an accessible multi-service culvert.

It is intended to help make development on sites with poor ground conditions possible at a reasonable cost.

The Supertube consists of plastic and concrete pipes approximately two meters in diameter. Water supply pipes and sewage pipes are drawn from the tube into buildings. It also can accommodate electricity and telecommunications lines which are easily accessible for inspection and repairs. Storm water is drained off at the bottom of the tube.

The Swedish Council for Building Research is providing financial support for a trial of the Supertube concept in Stockholm. It is meant to illustrate how combining the accessible multi-service culverts in an area with poor soil conditions can offer cost reductions in new building developments.

Sir,

In reference to Sebastian Moffat's suggestions about crawlspaces, (SOLPLAN REVIEW No 40):

All the practices advocated are already in the Building Code if one looks at the intent and not the disjointed manner in which it is presented (e.g. sections 9.14, 9.16, and 9.18). It also allows key decisions to be made arbitrarily on site, when phrases such as "unless ground water levels" or "where it can be shown to be unnecessary" are used. It's not always clear where the water table is especially if construction takes place in the dry season.

To me it seems to be a problem of tying the intent and practice together into code language, rather than relying on practice and individual experience.

I would like to see drains dealt with clearly (with or without traps) from the lowest point in the crawlspace to the outside. Perhaps a simple drain to the drainage layer under the crawl space skim coat may be enough.

Hot water tank reliefs may be drained to the outside, but water shut-off valves are often in the crawl space, hard to access. It's hard to tell how important this may be, or what the life span of plumbing is, but it should be dealt with.

Builders who build better than code minimum and install a good vapour barrier with a well finished skim coat may be inadvertently building swimming pools in the event of plumbing failures.

David Riley,
Circa Homes Ltd., White Rock, B.C.