Indoor air a product for concern

The notion that "conditioned" indoor air should be considered a product and therefore be subject to legal standards has huge implications for building owners and managers. **Ronald Wood** discusses this issue and reports on some research into solutions.

The National Inquiry into Urban Air Pollution in Australian Terms of Reference do not address indoor air quality. However, A National State of Environment Report – Indoor Air Quality, has been prepared by the CSIRO. Many indoor air pollutants have received little investigation in Australia, with only limited studies of office environments.

The air we breathe indoors is often taken for granted because it is "conditioned". The perception of air quality is influenced by smell and, to a lesser extent, by sight. This can be misleading, as these senses are not always able to detect harmful pollutants, especially in trace amounts.

Our lungs are our most important point of contact with the outside world. We breathe in an estimated 15,000 litres of air each day, ap-

proximately six to ten litres every minute, according to the American Lung Association.

While the protection of the ambient environment is usually the obligation of governments, the management of indoor environments is left primarily to building owners or managers. People occupy a building with the understanding that the environment in which they work is safe.

A healthy building is one that does not adversely affect the health of its occupants or the larger environment. Indoor air quality is a major indoor environmental issue, among many, that must addressed to avoid adverse impacts on occupants' health and well-being.

INDOOR AIR AS A PRODUCT

Conditioned air, that is, ambient air or recycled indoor air, can be considered a "product" when it is "delivered" to the consumer through an HVAC system, after it has been modified or otherwise filtered.

This proposition, put forward at the Healthy Buildings '95 International Conference in Milan, that indoor air should be legally defined as a product, and therefore subject to the same legal standards as other products in commerce, is predicated on the fact that when ambient air (a natural resource) is taken, conditioned (an altering process) and redistributed into a closed environment, the strictures of product liability law will apply to this indoor air.

Legal precedent in product liability case law indicates the legal liability of providers of water and electricity as products. Both are naturally occurring resources that are affected by human activity, and delivered to consumers.

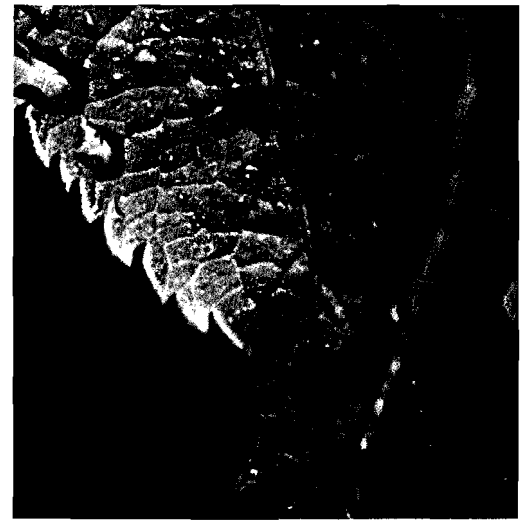
When these commodities are poorly, inadequately or negligently prepared, or are deemed unreasonably dangerous, the injured plaintiff will be afforded recourse through products liability law. It is suggested that the same should apply to air "produced" by HVAC systems.

While it has been established that ambient air is within the definition of "natural resource", there are many other aspects of this proposal that involve further legal definition and clarification.

HEALTH EFFECTS OF INDOOR AIR POLLUTION

A single pollutant, although it may have toxic potential, is not usually the major health concern. It is the combination and total quality of pollutants that may be damaging human health.

Healthy plants in the office may be the equivalent of canaries in the coal mine.



Our bodies have many ways of detoxifying air pollutants, but reduction of sources of air pollution reduces stress on the body's defences. The plant leaf, like the human lung, can function only when it is able to exchange gases with the surrounding air.

As a consequence, the leaf, like the lung, is an organ that is exceedingly susceptible to air pollution.

Plants share many of these ways of detoxifying air pollutants, producing a vast array of detoxifying enzymes, many of which are biochemically identical to human enzymes.

Researchers at the University of Technology, Sydney are evaluating indoor plant varieties such as Kentia palm, Spathiphyllum and Ficus benjamina for their ability to reduce or remove volatile chemicals including benzene and n-hexane. These chemicals are found in paints, plastics, room deodorisers, adhesives, cleaning compounds and personal care products, as well as many other applications.

All three of the species tested in sealed chambers were found to remove the individual VOC's at concentrations equal to, and two to five times higher than those recommended by Worksafe Australia for Time-Weighted Average exposure standard (TWA), over periods ranging from 48 hours (Kentia palm) to five days (Spathiphyllum, Ficus).

The results demonstrate clearly the metabolic ability of plants to reduce concentrations of volatile pollutants, and hence improve indoor air quality.

An outstanding feature of the response of plants to many of the man-made pollutants in the air, is the variable adjustment of species to acute or constant exposure. Airborne chemicals are absorbed by leaves and broken down by plant respiration into carbon dioxide and water, normal products which building occupants also exhale.

Ronald Wood is a Research Associate, department of Environmental Biology and Horticulture: University of Technology, Sydney ∎