IAQ ENVIRONMENTAL SITE ASSESSMENT AUDITING SYSTEMS/TOOLS for EARLY REMEDY OF POOR IAQ in HOMES

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Abstract: The majority of built structures (homes) in the USA and Canada are adversely affected by indoor air quality (IAQ) issues but occupants are not aware of those effects until they become significantly ill and specific research is conducted. The affected occupant is poorly informed by the media and web based marketing methods to determine the most prudent approach to better their specific health issues. A small industry of IAQ investigators utilize a visual only or visual and sampling protocols to assess the condition of homes to determine adverse environmental conditions. Suppliers and service agents prescribe equipment and methods to resolve occupant concerns. This paper will review the present IAQ industry products and services for the early identification and remedy of poor IAQ in homes, draw conclusions, and make recommendations towards the provision of better IAQ related services to occupants of homes.

1. Introduction

Over 97%[1] of North American residences fall outside recommended ranges for good IAQ in a home with chemical alerts occurring in 70% of all tests conducted. Studies show a high percentage of homes have at least one hidden, unsuspected indoor environmental issue that will potentially adversely affect the health of the occupants over time. Mould, lead, asbestos, chemicals, all from poor initial product selection at time of construction, improper ventilation and air filtration, or lack of care of habitat that lead to human sickness can cause serious and measurable impacts on the family and society as a whole.

Persons in industrial nations spend more than 90% of their time indoors[2] with more than half of that time spent in home environments. Yet even the most basic indoor environmental issues barely register with occupants until they or their children become sick to the point of impairment – either physically, socially, or psychologically. When they become adversely affected, patients are slowly progressed through the existing medical system until the affected person is proven physiologically sound or not. Only then does the patient's building environment seem to get considered or priorized.

2. IAQ and the IAQ industry

IAQ has become a buzz word for product and service based businesses to sell their services to sensitive or concerned occupants (now consumers). IAQ developed legs through the 90's as home became more tightly constructed and occupants began to suspect their new found illnesses might be from their new homes. Interested parties and researchers began to document occupant based illnesses, were able to draw comparisons between chemicals and adverse conditions in homes and medical illness and the IAQ support industry came into existence.

[1] Air advise Inc. data collection 3/1/2004-12/31/2006 IAQA conference proceedings Oct/2007
[2] US EPA Report to congress on IAQ EPA 400-1-89-001C. 1989

IAQ research and services span commercial, industrial, and residential sectors. In the beginning, research was focussed on large developments and large commercial environments as well as research from large disasters (legionnaire's disease; crib deaths; etc).

This report focuses on poor IAQ in homes.

3. Poor IAQ in homes

IAQ, the indoor air quality of buildings is a specific subset of IEQ, the much broader term for indoor environmental quality now being used in industry. This paper focuses on IAQ, the effects of "bad" air including hazards such as: mould; asbestos; lead; radon; carbon monoxide and carbon dioxide; common allergens; asthma triggers; household liquid and solid chemicals and volatile organic compounds that off gas into the air; all prom poor material choices and poor ventilation and air filtration. The broader subject of IEQ and sound; light; building orientation; environmental pollution is not addressed.

Most homes are affected by at least one hazard with chemical alerts occurring in 70% of all tests conducted[3].

4. Visual Assessment Protocols

In order to validate concerns with IAQ in a home, one requires scientific means and methods and assessment tools and systems to separate fact from fiction; truth from perceived truth. Many crises have developed in large buildings or complexes from a misnamed malady – personal sickness improperly named as mould induced has vacated buildings as fast as a fire alarm would.

Organizations such as the EPA, Health Canada, and residentially CMHC and the US housing authority began to recognize building related illness (BRI) or more aptly noted sick building syndrome (SBS), conducted research and developed guidelines on the recognition of health issues relating to poor IAQ in homes and buildings. From that assessment protocols in the form of check lists were developed.

Assessment protocols can be broken into industry/ Government based and residential based. Residential protocols are generally being developed through government based think tanks, research, and Government departments.

Testing is a second order assessment tool beyond visual when issues of concern require more stringent review. Testing confirms environment – surface and air and can validate the presence and source of contamination.

4.1 Industry/ Government based Assessment Protocols

Industry and Government assessment protocols pertain to their own bias or focus. Narrowly defined IAQ protocols are used by government to address illegal activities in homes. Corporately defined IAQ protocols are based on the corporation's direction or perspective.

The CMHC website states that only visual assessments as a first step are necessary for IEQ determinations in a residence. Testing is excluded in the assessment requirements. CMHC developed a program in the mid-90's called the "Residential Indoor Air Quality Investigator Program" that introduced the issues surrounding IEQ in homes to professionals – builders, architects, engineers and other

[3] Air advise Inc. data collection 3/1/2004-12/31/2006 IAQA conference proceedings Oct/2007

residential specialists and provided a general overview program for the assessment of indoor environments and solutions. A protocol for inspection and assessment formed the basis for the work.

The EPA took that further with the idea of IEQ site assessment for the public good. One such program is outlined in HUD's *Healthy Homes – Assessing Your Indoor Environment* which introduces a program in New York state called the "Cooperative Extension Office" where outreach educators respond to resident IEQ concerns by visiting the home, conducting a visual assessment (based on a check list) with the home owner, advise them of hazards, both health and safety, and making specific recommendations to correct those denoted issues.

Testing protocols tend to be found in an industrial context. The workplace has been the ground for environmental regulation of literally hundreds of substances and it is the assessment protocols within these regulations (occupational health and safety) that one turns to in order to determine a baseline for substance levels in homes. Since the home environment is not regulated, a Professional is required to assess the applicability and critical levels required for safety concerns in the home.

In Canada, CCA 82 guidelines have been adopted by municipalities in bylaws pertaining to the clean up of homes from the effects of marijuana grow operations but the guideline is much broader and generically was written for projects under construction and mould related issues.

ASHRAE in the USA recently developed a IAQ assessment and prescription protocol which will be voluntary until the need for Government regulation is applied.

4.2. Independent site assessment systems

With no formal IAQ investigative regulation in North America, for profit businesses have developed their own protocols for assessment of IAQ in homes. HVAC contractors use a "quality air" protocol that is defined by equipment suppliers in which a home is assessed for IAQ and varying degrees of equipment sophistication is proposed to increase the IAQ in the home. Carpet cleaners and whole home cleaners use IAQ buzz words and different types of off the shelf "IAQ safe" chemicals to promote their businesses.

IAQ assessment checklists can be found on the web. They are simple and carry no intrinsic expertise; but can be considered forming the basic elements of IAQ investigation and focus.

A small group of government or certificate body educated building investigators base their investigations on their training and a guideline or develop their own site assessment system to provide personalized third party reports and recommendations.

5. Assessment Equipment and tools

Environmental consultants utilize expensive onsite testing equipment to determine particulate levels; gases, carbon dioxide specifically; VOC, formaldehyde specifically; non-viable moulds.

Testing agents take bulk and air samples for mould; dust; mites

Simple, economical testing of carbon monoxide; temperature; humidity can be done with equipment from a local building supplied store.

Building inspectors utilize more economical means to obtain real time particulate, VOC, temp, humidity reading for general assessment.

6. IAQ products through Sales and Marketing

Households and health affected individuals are direct marketed through flyers, TV, paper, and radio media, and web based advertising with sometimes wildly hyped equipment to better the IAQ in the home. Suppliers have enriched their marketing and advertizing with IAQ specific lingo.

Remediation and carpet cleaning contractors and home care providers have connected in a big way in recent years with IAQ to provide themselves a marketing edge under the banner "IAQ professionals". Like most professionals, those demonstrating the necessary care and attention a customer deserves, deserve the opportunity to offer unfettered advise within the context of their profession; but all too often fire and flood remediators expand into mould remediation as a profit centre first and gain the expertise over time and then perhaps the customer care expertise required of this emerging industry. A study[4] indicates that well over 50% of IAQ distressed home owner calls come after a remediation contractor has paid a cursory visit to the home, offered their visual only opinions, and quoted a service solution based on serious "mould" issues. Where the consultant has gained a service contract and subsequently assessed the site, the remediator's premise for the work was overblown to significantly overblown over 90% of the time with none of the circumstances related to occupant health in a specific way.

Product suppliers include: Air purification – room and whole house; portable and fixed; low VOC consumer products; non-lead products; non-chemical, biodegradable cleaners. Products are sold in stores, by mail, and over the internet. As the marketplace for IAQ products is not regulated[5], fantastic claims can and are made. Chemical cleaners are now "mould killers", etc. Some good has come from a grass roots development of environmentally concerned activists which has spilled into the consumer market place. Previously marginally available biodegradable and chemical free cleaners, CFC free aerosols, are now readily available in stores. But right beside these are chemically enhanced, VOC laced "deodorants" and cleaners. Buyer beware is the active term with products purporting to be "earth friendly" and "IAQ specific".

Product based service providers sell a service based on a particular product. There are "air care" specialists that will only use manufacturer specific equipment such as ozone generators for cleaning; or heating (HVAC) contractors that provide IAQ based assessment screening but sell and only install one brand of purification/ ventilation system.

As well, market forces have prevailed in rebranding contemporary services such as heating and ventilation and duct cleaning companies, for example, into environmental "pure air" or "air care" IAQ specific contractors. Vast numbers of product suppliers are enticing these firms with quick profits to sell their IAQ products under the banner of HVAC "air care" services. Technical and marketing software programs have been developed for furnace installation companies to upsell base services to include indoor air quality products and services. Product first; customer benefit last.

7. Limitations

An exhaustive study of programs and initiatives has not yet been tabulated to form a basis for scientific extension to the subject. A random sampling of web-based information has provided a flavour of present IEQ/IAQ conditions.

[4] In-house study of customer calls (Jan-July 2010)

[5] Except for ozone generators in California which are now in the process of being regulated and some labelling laws in North America.

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8. References – publications

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9. References – websites

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- IAQ Resources Canada www.iaqresourcescanada.com