THE NON-TOXIC HOUSE

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Making your home and work environment pollutant-free

LOUISE SAMWAYS

green press

Acknowledgements

With thanks to my husband for his continuing patience in typing my manuscripts and to my children for putting up with a distracted mother!

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Author's note

THIS HANDBOOK has been written in response to readers of my first book 'The Chemical Connection' (to be re-released 1991 by McCulloch Publishing/Green Press) who wanted more details on how they could create a safer personal environment free of modern day chemicals and the problems they can cause.

These modern chemicals, particularly those derived from petrochemicals, are insidious in that they can now be found in virtually all household furnishings and surfaces, in clothes and bedding, toiletries and cleaners, food and water. They crop up where you least expect to find them, e.g. formaldehyde in teabags and mattresses!

Our world of course is made up of chemicals but what we are concerned about here are synthetic man-made chemicals and natural chemicals used at concentrations which our bodies were never designed to experience.

The problem is now so serious that American researchers have suggested that indoor air pollution alone could rank among the top ten causes of death! Apart from the physical burden, these chemicals can cause subtle but profound changes in behaviour and mood affecting how we feel about ourselves and each other. But this is a problem with solutions.

It has been extremely heartening to see the response of ordinary people to environmental issues generally and how this grassroots power is now affecting professionals, industry and governments. It is with great pleasure that in this book I share what I have learned on how to protect

ourselves and our environment, and how individuals can minimise the effects of chemicals on themselves and their families.

Louise Samways 1991

Introduction

MY CLINICAL experience as a psychologist over the last twelve years as well as recent research has shown that our homes can be the reason for a whole range of physical and psychological symptoms. Professionals from a wide range of disciplines are becoming involved in the issue of 'sick building syndrome' which is now recognised as a potential killer wherever people live in modern housing.

Research by the E.P.A. in America has found that the indoor air of the average home has up to five times more chemical pollution than a typical industrial area. Concentrations of some carcinogenic and mutagenic substances were found to be 100 times greater indoors than outdoors! Even more worrying is that children , breathing the same air as adults, absorb about six times more of these chemicals and have a much greater vulnerability to chemicals because their immune and central nervous systems are still developing. We can no longer assume that our homes are a safe haven from the world.

Chemical pollution in the home is particularly insidious as we are now learning that chemicals can affect people at much lower levels of exposure than previously suspected. Toxic levels of exposure that occur in industry usually give obvious acute physical symptoms soon after exposure causing observable physical damage. But it is now apparent that at very low concentrations these chemicals can cause changes in the *way* different body systems work together as the body tries to cope and adapt

to the chemical — hence the symptoms can be very subtle physical and emotional functional changes rather than obvious physical symptoms.

This may explain why increasing numbers of people are complaining to health professionals that they 'feel unwell', 'ache all over', 'feel like they are getting the flu - all the time!', 'feel spaced out', are tearful or moody and are suffering a multitude of subclinical physical symptoms such as headaches, digestive disturbances and so on. These symptoms are often dismissed as neuroses, a virus or stress. But we must ask ourselves whether the stress is emotional or physical. We can no longer ignore the onslaught of environmental pollutants on our bodies and our minds. It is ludicrous to think that pollution can eliminate whole animal species but have no effect on us physically and mentally.

Our behaviour is determined by a complex interaction between many systems in the body aiming for a constant state of equilibrium. If one system is 'stressed' others try to compensate so the body may suffer a great deal of physical stress before symptoms become apparent.

The cocktail of chemicals in the average home affects all of us to some degree — it is not a matter of *who* is sensitive but *how* sensitive each person is to these chemicals.

SYMPTOMS

Behavioural

The first symptoms will be changes in behaviour or minor physical changes.

You could become depressed, tired, irritable or confused. Sleep pattern and dreams, memory and concentration could be affected as could tolerance to frustration and mood generally. One of the most worrying symptoms is increased aggression in children and adults making responses to even minor frustration unpredictable and in severe cases quite dangerous. One young girl with pronounced chemical sensitivities attacked her younger siblings repeatedly causing serious injuries until

the problem was properly diagnosed as being primarily due to a sensitivity to formaldehyde - an extremely common carcinogenic chemical widespread in most modern homes.

Sensitivities can also increase overactivity and give a 'hyped up' feeling or alternatively lower the level of arousal so you feel half drugged, dazed and 'dopey'. Much notice is usually taken of overactive adults and children as they are so difficult to live with or teach but the underactive child tends to be ignored or 'picked on'. They become increasingly passive and timid, growing up to be shy introverted adults who never seem quite 'with it'. The effects on concentration and memory can cause serious learning difficulties and educational retardation.

These psychological symptoms are often the first sign

Physical

Sensitivities can also cause a multitude of physical symptoms ranging from digestive problems, rashes and headaches through to serious allergies, hallucinations, asthma and arthritis. Many people with unexplained physical and psychological symptoms which have been blamed on 'stress' find that chemical sensitivity is really the problem. For example a man who had been told that his repeated giddy spells, panic attacks and 'tingling' fingers were due to 'stress' discovered they were actually being caused by wearing polyester clothing.

Emotional

Chemical sensitivities can affect mood and emotions and alter anyone's view of the world. Relationships can become distorted causing over reactions to situations and bad communication. Often those showing these symptoms are called 'touchy','prickly' or defensive. As children and adults they often have very poor social skills and consequently few friends. Often they have disastrous relationships with their parents and siblings and may become scapegoats for other problems within the family.

Many couples I've seen contemplating divorce (from each other or their children!) have found a chemical 'clean-up' in their lives can have a profound effect on their ability to work out their problems without expensive counselling or the extreme measure of divorce.
Parents who have sensitivities themselves or who have children with sensitivities can very easily find themselves with the screaming 'heeby-jeebies' trying to cope and can be at real risk of abusing their children.

DIAGNOSIS

It is essential that if there are significant sensitivities they are diagnosed accurately and as soon as possible. Unfortunately a whole range of health professionals have hopped on the bandwagon and there is now a problem of overdiagnosis as well as misdiagnosis. If you suspect a serious sensitivity problem then question the health professional you are proposing to see as to their qualifications and expertise in the area of chemical sensitivity and ask about the reliability of any testing methods they may use. Because many tests commonly used are far from reliable if chemical sensitivity is suspected it is much more sensible to minimise overall chemical exposure particularly in your own home. Testing which results in large lists of 'passed' or 'failed' chemicals can be extremely misleading and miss the point that *all* chemical exposure should be reduced by everyone.

RANGE OF CHEMICALS

It is not just the obvious chemicals like flyspray and oven cleaner which may affect us, but an enormous range of petro and other chemical products and medications. These have crept into our homes and become an accepted part of modern living.

Since the Second World War there have been dramatic developments in industrial chemistry and particularly in

the development of all sorts of byproducts from petrol refining. There are now over five thousand new chemicals being added to our environment each year and over 60,000 chemicals in commercial production.

The question is - do we really need them? Amazingly there has been almost no research into how these chemicals react with each other to affect the human body. The research that has been done has usually only looked at chemicals individually and rarely even considers the possible effects on behaviour.

As consumers and parents we have been indoctrinated by manufacturers. Their marketing strategies have led to a dramatic change in the way we clean our homes and our bodies. Manufacturers of household cleaners suggest that our homes need to be as clean as hospitals - but unless you are going to perform surgery on your kitchen floor you do not need hospital strength cleaners! We've also been convinced by all sorts of manufacturers that 'white is right'. The only way to achieve pure white in anything from toilet paper, babies nappies and tampons is to use very strong bleaches (even white flour is bleached). It is not only the environment that is affected by bleaches and their waste products but people too! A preliminary survey in New Zealand has suggested an alarming association between cot death and the use of chemical cleaning solutions for baby clothes. The chemical residues on the clothes are vaporised by the baby's warm body to envelop the baby in a chemical vapour particularly while sleeping in relatively still air.

Technology has also often completely changed the products we use to build, paint and furnish our homes and even the clothes we wear. It is quite extraordinary the way in which governments have failed to regulate these products and have allowed them to creep into our homes without extensive research as to their safety particularly when they are combined together and heated in the home. Everyday examples include detergent mixed with hot chlorinated tap water producing a cloud of carcinogenic chloroform and the microwaving of breast milk which changes its structure to produce substances that

can cause brain damage in babies. It is up to manufacturers to prove these products are safe physically and behaviourally it is not up to consumers to have to prove they are unsafe! It is only recently that drug interactions and the way they can interact to produce dangerous substances with certain foods has been considered. As consumers we have been brainwashed into thinking that a bacterially sterile home means a healthy home. In fact a home that is bacterially sterile will probably be chemically filthy and a distinct health hazard!

One of the biggest causes of health problems in the modern home is formaldehyde, a carcinogenic chemical which if dissolved in water (and our bodies are eighty percent water!) makes formalin which is a preservative used to preserve dead animals (and human bodies) for scientific study. Formaldehyde is found as a finish on non-iron and synthetic clothing and furnishings (causing many people to feel light headed or 'buzzy' when shopping for clothes), in toiletries such as soaps, shampoo, deodorants, nail polishes, hair setting lotions etc. It is also found in tea-bags and tissues and in most household cleaners. It 'gases off' from non water-resistant chipboards, some types of foam insulation and foams used for padding in upholstery.

Even so called 'natural' substances can cause symptoms. Moulds are often a serious problem even in new homes particularly in the tropics but also in colder climates where wet conditions are combined with home heating and poor ventilation. Moulds can cause very serious physical health problems particularly for asthmatics and can also cause serious psychological symptoms varying from severe depression and mood changes and disturbances in appetite to hallucinations and sleep problems.

REDUCING CHEMICALS IN THE HOME

Fortunately unlike many other environmental problems pollution in the home is something we as individuals and concerned parents can definitely do something about.

This book shows in detail how chemical exposure can be drastically reduced in the ordinary home. You can control what chemicals you use and allow into your home.

Although the list of natural and synthetic chemicals brought into, ingested and used around the home is daunting, satisfactory alternatives are available. Using these alternatives and generally 'cleaning up' the home chemically can have a dramatic effect on symptoms. One mother brought her daughter to see me because of problems with her concentration and general overactivity. She also mentioned that both she and her husband took medication for sleep problems, felt 'tired all the time' and thought that perhaps I could look at their diet. Although a few suggestions to their diet were perhaps warranted the biggest factor was that the husband worked for a manufacturer of household and industrial cleaners and they regularly used every conceivable type of spray, polish, deodoriser, carpet shampoo etc. available. After switching to petro-chemical free alternatives and generally cleaning up the house chemically including steam cleaning the carpets with *steam only* to get rid of chemical residues the family found they all had more energy than they'd had for years, could throw away the sleeping pills and even their dog's chronic skin problem cleared up immediately!

Apart from obvious chemicals like pesticides and those in cleaners, toiletries and cosmetics some of the main causes of problems in the home are water, dusts, cigarette smoke, clothing and bedding, heating and cooling systems. (It should be stressed that the main problem in the home where there is serious environmental illness may be highly individual and due to a number of inter-relating factors that need to be assessed by an expert on indoor air).

The *Non-Toxic House* gives a simple but comprehensive guide for homemakers to make their homes not just environmentally friendly but *people* friendly as well. As consumers and parents we cannot afford to assume that what is available for our homes and prescribed for our bodies is necessarily safe.

That both behavioural and physical symptoms can be caused by chemical pollution in our homes is an insidious warning sign that the human body like the wider environment is just not coping with the chemical onslaught.

The chemical pollution in your home can be reduced dramatically — *you can do something about it.* Satisfactory precautions and alternatives are available. It is up to each one of us for our own and our children's sake to choose to use them.

Louise Samways, 1991

PART A THE HOUSE

1 The site

SITING OF houses is extremely important. Before buying land or a house and land package find out what the land was used for before subdivision. If you can't get good information from the council ask neighbours or elderly residents who've lived in the area for many years.

Some housing estates are actually landfilled or drained swamps and wetlands prone to flooding, subsiding and generally poor drainage. You could be as unlucky as one of my patients who picked a block that used to be the site of a dam. Low lying land is a particular problem near busy roads or freeways as car exhausts tend to be heavier than air and settle on low lying land.

One new house I visited was built on very low poorly drained land and every wall in the house inside and outside was covered in mould.

Mould can cause very serious physical and behavioural symptoms including asthma, headaches, night terrors, hallucinations, aggression and extreme mood changes. The child who lived in the house mentioned was constantly being hospitalised for asthma and had serious depression and aggressive behaviour. The mould problems were due to both the site and structural damage to the slab floor. The mother was forced to allow the child to live with relatives as they could not sell the house. Her asthma and behaviour problems disappeared within two weeks.

Make sure that the land (or land in the vicinity) had not been used by a hazardous industry or as a store-place for chemicals or chemical wastes. As the residents of a

northern Melbourne suburb found out, you cannot assume that the councils would not approve subdivision on such sites. In that case homes were built on the site of a lead battery recycling plant and the council knew about it! Lead even in trace amounts only can cause severe neurological damage, brain damage and death. Its effects are irreversible. Once absorbed by the body it is extremely difficult to remove.

If the land was agricultural land find out if it was condemned due to accumulation of herbicides and pesticides. This can be a particular problem with land that was previously used for market gardening, flower growing, orchards or vineyards.

If you are unsure or suspect contamination have a number of samples from around the site tested before you buy. Contact the Australian Government Analytical Labs, 11 William Street, Melbourne, Ph: (03) 617 0220 for information about testing of soil, dusts or water.

Make sure land on steep hill sites or in dense bush receives sufficient sun *all* year. Many sites are in permanent shadow during winter. Insufficient light promotes mould growth and makes a house cold, damp and very costly to heat. A lack of natural light can also affect your health causing physical and behavioural symptoms (See section on Light).

You should also avoid being too near a busy road or freeway.

DAMPNESS

Look at the vegetation on the block. Mosses and lichens suggest damp areas. Shrubs indigenous to wet areas rather than tall trees in the area can also suggest permanent dampness and poor drainage.

A good time to inspect and buy land is in the winter or tropical wet season.

DRAINAGE

Make sure land slopes away from the house with a fall of at least four centimetres in three metres. Put in drainage pipes and gutters if necessary.

ELECTROMAGNETIC RADIATION

Avoid land that is near high voltage transmission lines or near electricity substations. Research overseas shows that even soil structure and productivity can be affected by E.M.R. changes to earthworm activity in the soil.

People have developed insidious illnesses, such as leukaemia and brain tumours.

Over 300 metres away from the power lines the effects are negligible. (Also see E.M.R. sources inside the house).

GENERAL LOCATION

Consider the general location of the site. Are there hazardous industries operating or planned to operate nearby? Are householders able to use incinerators and where are they located? Incinerators can cause appalling pollution in otherwise ideal locations. In Melbourne 45% of the smoke and haze is caused by domestic fires. So stop using your incinerator! Compost your vegetable matter, recycle your glass, plastic and paper and you will be surprised how much you can reduce your overall household waste.

RADON

This is a colourless, odourless gas produced by the radioactive decay of natural uranium in plants and soils. As it filters up through the soil it seeps into homes. Radon particularly affects the lungs and in America and England is the second biggest cause of lung cancer after smoking.

High levels of radon are found where the ground is high in uranium e.g. shales, granite and phosphate rocks. It is not thought to be a significant problem in Australia as geologically Australia is so old. In Europe, U.K. and U.S.A., however, it is a serious health hazard.

Radon exposure even in highly contaminated areas can be minimised by having a well ventilated sub-floor space and well sealed floors. (You don't find slabs on ground construction except in Australia!)

2 Building structure and design

AIR CIRCULATION AND VENTILATION

IT IS most important that good air circulation is allowed around the outside of the house and that the garage, if not actually separate from the house, is down wind of opening windows. Many garages attached to houses are positioned so that when windows (especially top hung windows) are open car fumes are sucked into the house. Similarly make sure wall furnaces, gas heaters and hot water services are not where gas fumes will be drawn into the house through open windows or wall vents. Try to arrange for the flow of air through a house to be toward the road — i.e. air flowing in the back where car exhaust pollutants are least and out of the front. Good ventilation is essential inside the house. As fewer people now spend time at home during the day it becomes even more important to have ways of passively ventilating the home while you are away. Otherwise indoor air pollutants can accumulate with no way of escaping. Many homes are effectively sealed for the whole of winter! Passive air vents should be to the outside air not into the roof or wall space where chemical dust may be collected and drawn into the house itself. In areas of high outside pollution levels, passive vents need to be able to be closed off, particularly on high outside pollution days. Similarly,

rangehoods over stoves and exhaust fans in bathrooms should carry polluted air out of the house entirely not into roof spaces.

Design the house so that air flow inside the house is not restricted by blind dog-leg passageways.

Windows provide much better ventilation if sliding, double-hung or casement. Top hung windows severely restrict air movement.

If mould is a serious problem in a house and you feel ventilation and light are adequate then check for dampness in and around the house. Check the ground around the outside walls of the house, the subfloor (if not contaminated with sprays), check under all carpets (particularly edges and corners), check other floor coverings (sheet vinyl, vinyl tiles, cork etc. for lifting edges or corners) and check the insides of cupboards especially at floor level.

Look for water or damp patches (damp areas in a house usually smell), pay particular attention to areas where plumbing fixtures are situated in the house i.e. under sinks and troughs, walls and floor around shower recesses, basins, baths, toilets etc.

Damp or wet areas in the house may be caused by leaking pipes (hot or cold water pipes, soil or stormwater drains, under house, under concrete, in walls or ceiling or outside in garden), leaking shower recesses (very common), leaking roof (water drips through ceiling or runs down inside of walls), leaks around windows (faulty flashings, rotten wood etc.), watering the walls of the house instead of the garden, earth outside the house being too high (over the dampcourse, above the concrete slab). Ensure that all ground water flows *away* from the house when it rains. This is especially important in heavy soils where houses have been set into hills.

The water service pipes in the house may be checked fairly easily. Turn off all the hot and cold taps and *ensure that no taps are dripping* even out in the garden. Ensure that the toilet cisterns are not overflowing. Read the water meter and then don't use any water for twenty-four hours. Read the water meter again to see how many litres

of water have leaked out. Hopefully none!

If you suspect that you might have any of the above problems then seek professional advice from a reputable and suitable tradesperson.

CEILINGS AND WALLS

The simplest and cheapest materials are often the best. Painted stone, brick or natural gypsum plaster board or old fashioned fibrous plaster are the most inert and dust free. Use natural paints. (See Paints and Stains). Beware of plasterboard made from phosphogypsum which may contain formaldehyde and high levels of radon.

When sealing floors or painting, vacate the house if at all possible or at least seal off the area being worked on from the rest of the house. Insulation tape or similar can be used to seal off doors and windows very effectively. (Check first to make sure tape does not pull off paint etc.) Strategically placed fans can be used to force air away from living areas or to draw fresh air in from outside. In wet weather close up the area being painted and put some heat on until completely dry. Open up and ventilate the area very well before moving back in.

Avoid painting if you are pregnant.

If using the non-toxic paints and stains available (See Paints and Stains) you probably will not need to use a mask unless you have a particular sensitivity. If needed masks are available from the Allergy Aid Centre (see Resource section at back of book) C.I.G. outlets and some plumbers supplies.

LIGHT

Site the house to maximum advantage on the block and look for designs that encourage the use of natural light and those which use passive heating and cooling. Designing your own home can be lots of fun but in the long run it can be much more cost effective and advisable to show

your plan to an architect whose work you like to make suggestions and to inspect the site. There are a number of builders and design firms specialising in energy and light efficient housing which consider sun angles throughout the year.

Choose trees and shrubs appropriate to the climate and position them around the house to modify climatic conditions — e.g. in cool districts deciduous trees to the north provide shade in summer but allow plenty of light and good ventilation around the house in winter. In the hot areas it would be better to have evergreen trees shading the house to cool it.

Australian natives are beautiful trees but in cold climates choose the small varieties with white trunks and light canopy to provide filtered light even in winter.

The importance of natural daylight has only just become apparent. Natural light is crucial to the functioning of the pineal gland and neurotransmitter production in the brain. Insufficient light of the right type can cause serious depression and disturbances in circadian rhythms. It can also cause disturbances in immune function with increases in susceptibility to infections. Available light can be improved dramatically even in old houses by carefully positioned skylights, taller (rather than wider) windows and painting walls ceilings and window frames in light colours. A white painted window frame admits 30% more light than a dark painted frame!

Plenty of light also discourages mould growth.

MATERIALS

There is a general misconception that if a material or substance is naturally occurring then it is also safe. Unfortunately when we take natural materials out of their usual context and use them to build houses this is not necessarily so. For instance pine and cedar are beautiful timbers but if you make a box (house) out of them and then put yourself inside and seal it, the effects can be disastrous. Just as camphor wood chests were

made to store linen because the camphor coming out of the timber killed silverfish and moths so pine and particularly cedar contain natural resins which can be highly toxic.

With many natural materials there is also the problem of rather unnatural chemicals that may be used to preserve them. One of these, penta-chloro-phenol or PCP has been banned in many European countries and in America but is still used freely in Australia as a fungicide in paints and timbers.

There is also the problem of what paints and finishes you use on materials. One patient and her young son became extremely ill when they moved into their completely pine timber lined home. The way the timber had been used was extremely creative and quite beautiful but either the PCP impregnated in the timber at the mill or the resins in the wood itself created a terrible health problem for the family.

Even without professional advice they realised it was the unsealed wood causing problems and quickly set out to seal it — but not liking the colour of the finish they diluted it with turps. In total it took 100 litres of turps to complete the job as well as the wood stain. The family's health became much worse. This illustrates another point which is that total surface areas in homes on walls, ceilings and floors can run into thousands of square metres. Whatever you build or finish these surfaces with can 'gas off' extremely large amounts of chemicals.

Choose materials very carefully. In general, the greater the smell given off by a material or finish the more it is gassing off.

FLOORS

Slate, cork, hard ceramics, quarry tiles, parquetry or hard wood sealed with high gloss polyurethane (low gloss polyurethanes are softer and break down more easily) are usually acceptable although people with significant chemical sensitivity would do better to avoid all urethanes

and use beeswax instead. Beeswax also has anti-static properties making the atmosphere of rooms generally more comfortable. Avoid mixing polishes and waxes with turps as turpene sensitivity is very common.

To soften the appearance of hard floors use cotton or wool rugs which can be easily aired outside and washed.

Carpets harbour chemical dusts as well as dust mite. These days they may also contain formaldehydes, phenols in glues, moth proofing chemicals and chemical soiling inhibitors. Carpets are a worse problem if underfloor heating is used as the heat causes these chemicals to vaporise.

If you must have carpet then use the old felt type underlay (still available), do not put it on heated floors and buy a pure wool carpet which has not been treated with soiling inhibitors. There are carpets available (contact the Allergy Aid Centre Melbourne) which do not use the modern petrochemical based glues or treatments.

PAINTS AND STAINS

There are now a number of natural paints and woodstains available that give beautiful finishes and do not contain petrochemicals or synthetic fungicides.

- *Paints* are available from: Bio Products, 25 Aldgate Terrace, Bridgewater, S.A.
- *Stains* are available from: Grimes and Sons., 1/30 Peel Street, Eltham, Vic. 3095

PESTICIDE SPRAYING

Many Australian councils have insisted in the past on subfloors being sprayed with very dangerous pesticides for termites before building inspections were passed. Fortunately many are now realising this is often not only unnecessary but dangerous.

Concrete stumps, metal ant cappings and localised treatments of ant's nests themselves can be just as

effective. Well ventilated, dry conditions discourage ants. Inspect underfloor areas every six months for signs of termites and if present treat the nest itself.

Depending on soil type some of these sprays can stay in the soil for 30 years or more. Flat clay soils tend to retain the chemicals longest but if this is restricted with no overspray under a good concrete slab it is unlikely to be a problem. Spraying can cause problems on sloping sandy soils as rain can leach the chemicals down hill into the soil surrounding the house. For gardeners and young children this can be a real hazard.

If a house has been sprayed, paving immediately around the house and having fixed garden beds that require little attention can be a good precaution. If serious overspraying has occurred and tests reveal significant contamination some residues can be burnt off the surface of paths and top soil — but wear a proper mask and protective clothing. If serious contamination has occurred you may need to actually replace the soil.

Note: If your house is raised above the ground and the subfloor has been sprayed then under no circumstances allow children to play in the subfloor area. Warn tradespeople who may have to go under the house so that they can take appropriate precautions. For serious contamination problems contact the Total Environment Centre, Sydney for advice (see Resource section).

3 Inside the building

CIGARETTE SMOKE

THE BIGGEST single air pollutant in many homes is cigarette smoke. Cigarette smoke is particularly insidious as it adheres to furnishings, painted surfaces, glass and carpets. It not only increases the incidence of asthma and tonsillitis in children but recent evidence suggests it can actually interfere with the D.N.A. (genetic material) of unborn children making them more susceptible to cancers. Ionizers can be of limited use in taking cigarette smoke out of the air and depositing it on surfaces. If you simply can't stop smoking use one very well ventilated room only (away from children) to smoke in or only smoke outside.

CLOTHING AND BEDDING

Since warm bodies heat the fabrics used in clothing and bedding, chemical finishes or residues can be vaporised from this surface and envelop the wearer or sleeper. If you doubt this then notice the smell coming from garments when you iron them. One of the most common chemicals added is formaldehyde (a known carcinogen).

Chemicals are added to fabrics in dying, weaving and to give special non-iron or flame retardant finishes. Strong pesticides can be added to mothproof woollen garments or are used in growing cotton and linen.

Far fewer chemicals tend to be used on natural fibres like cotton, silk and wool (unless specially treated as mentioned above). The chemicals on natural fibres can be largely neutralised and removed by adding half a cup of bicarb. soda to the first rinse cycle. To remove traces of previous laundry detergents rinse with half a cup of borax and half a cup of white vinegar.

Special care should be taken to wash new baby's and children's clothes before they are worn. Try as far as possible to use untreated cotton or quilted cotton. (Although quilted cotton may be padded with synthetic fibre, the fibre filling used is in the raw unwoven state and is therefore reasonably inert. Similarly even people who cannot tolerate woven polyester which is heavily treated with chemicals can usually tolerate raw polyester fibre which is used in pillows, doonas and sleeping bags.)

If using wool, wash very well before use to remove as much mothproofing as possible. If clothes are well ventilated and not stored when soiled then moths are rarely a problem. If storing woollens undisturbed for any length of time see 'Moth Control' in the Household Pest section.

Use cotton sheets (not the non-iron variety) and cotton underlays over mattresses. If dustmite is a problem use raw polyester fibre filled pillows and doonas.

When washing cotton clothes and linen stretch and smooth into shape while wet on the line. Hang cotton clothing on plastic clothes hangers to dry. When dry, a quick fold and taking the complete garment on its hanger off the line will eliminate nearly all ironing.

Avoid waterbeds as the heater causes the plastic liner to 'gas off' continuously enveloping the sleeper in a chemical vapour all night every night.

Electric blankets create electromagnetic fields very close to the body. The effects of these fields appear to be cumulative. Long term insidious health problems are now being recognised overseas (see later section on Electromagnetic Radiation).

For those with special sensitivities beds are available from the Allergy Aid Centre which are completely non synthetic.

COOKING

Since cooking food necessitates using a source of heat and often creates high humidity it is very important that the cooking area is well ventilated to remove bi-products (e.g. gas fumes, water vapour, cooking smells). Kitchen areas that are poorly ventilated can become very unpleasant to work in. Install a fan over the stove ducted to the outside of the building.

Electricity is the cleanest source of fuel in the home in terms of biproducts and is the best alternative for particularly chemically sensitive people. Microwave ovens really are an unknown as only minimal research has really been done as to the effects on people and food long term. After being assured they were perfectly safe we now find that care must be taken to check them for 'leaks'. Also contrary to early assurances that they have no detrimental effect on food we are now told that milk for babies should not be heated in microwave ovens as changes can occur which produce substances that cause neurological damage. Frankly I think that this is one appliance that we can easily do without. Gas stoves produce carbon dioxide, carbon monoxide and nitrogen dioxide as well as other harmful gases.

If you must use gas then make sure that there are no leaks and that the gas burns as efficiently as possible. There should be no 'gas' smell.

Wood can be a very inefficient fuel for cooking so make sure that if you do use wood that it is of high quality. *Never burn offcuts of building materials* as they can contain extremely toxic chemicals.

DUST

Many people do not realise that in the modern home much of the dust is now chemical dust shed from the synthetic materials used to build, decorate and furnish the home. Because dust particles are very fine they usually pass straight through the filters on vacuum

cleaners and accumulate in the air to irritate eyes, noses and particularly the lungs.

For this reason dust with a soft moistened cloth rather than flicking a feather duster around. Ducted vacuum systems are excellent as all the material is taken outside the house.

To minimise chemical dusts don't use fabrics, furnishings, paints and flooring made from petrochemical products so that chemical dusts are minimised.

DOMESTIC PETS

A pet is one of the best general physical and mental therapies there is for both children and adults! Unfortunately they can also cause a number of physical problems especially for asthmatics or those people who tend to have allergies.

To minimise the effects of animal dander (any dust, dead skin, hair etc. from the animal's skin or fur) make sure that if dogs and cats come inside they have their own basket and bedding which can be washed regularly. Put some freshly crushed pennyroyal or eau de cologne mint under the bedding to repel fleas and brush the pet's fur regularly — outside!

Make sure your pet is properly housetrained and keep it to hard floor areas of the home. It is virtually impossible to stop a build up of dander in carpets or soft upholstered furniture.

If you have severe allergies but would love a pet, try a chihuahua. My son who has severe allergies very much wanted a puppy (but one that wouldn't grow up!). A wonderful vet friend appeared one day with a chihuahua puppy which are known to be virtually non-allergenic. Despite my initial reservations 'Joe' has turned into the most wonderful pet if not a rather unorthodox chihuahua who tackles horses, cows and geese with a frightening over confidence for his size. A chihuahua would be perfect for flat dwellers as you don't need any trees — Joe is very particular about which blade of grass he lifts his

leg on! Never use flea collars on animals. They are almost always unnecessary in a well cared for animal and the chemicals used in them can be a real hazard for people (especially children). If fleas must be treated use an oral remedy available in some supermarkets or from your vet. (See Pest Control — Fleas).

ELECTROMAGNETIC RADIATION

There is increasing and rather frightening research from overseas which suggests that one of the most insidious forms of environmental pollution may turn out to be electromagnetic field radiation from electrical equipment and high voltage transmission lines.

More worrying is that the effects of this radiation appear to be cumulative i.e. exposures add up over years to cause problems.

When one considers that man has evolved in the natural electromagnetic field of the earth, moon and sun and that the electrical properties of an organism determine whether it is alive or dead (hence the use of ECG's and EEG's to measure electrical impulses from the brain and heart to determine death) it is rather extraordinary that for decades 'experts' have made the massive assumption that introducing artificial electromagnetic fields (EMF's) into our environment has no effect on human beings.

In fact we now know that man has the ability to sense changes in electromagnetic fields. Birds use them for migration, sharks use them to detect their prey, even oysters use them to determine when they open and shut. In humans it appears that we detect changes in electromagnetic fields via the pineal gland at the base of the brain. This gland plays a crucial role in the appropriate production of neurotransmitters. Neurotransmitters are chemical messengers controlling sleep, mood, memory and other 'mind' function as well as circadian rhythm. Circadian rhythms in turn determine hormone secretion, digestive enzyme production and other general

metabolism functions. Changes in circadian rhythm can cause psychiatric illness, changes in performance and disturbances in the sleep/wake cycle.

Magnetic fields have been shown to quite definitely affect cell division and enzyme activity in cells. They also affect the endogenous opiate system and endorphin production. The endogenous opiate system is a chemical system of the body which is involved in a wide range of functions such as pain control, mood, concentration and attention. It also plays a crucial role in the communication between the immune system and the brain. Therefore when its functioning is disturbed, changes in behaviour and immune functioning can be expected.

This explains the pattern of symptoms in people exposed to EMF's and how changes in our environmental electromagnetic field exposure have the potential to cause insidious changes in both our bodies and our minds. Even more worrying is that research has shown direct effects on the production of serotonin and dopamine (neurotransmitters) which continued even after exposure to EMF's was stopped.

Research has now shown quite clearly that there are both immediate behavioural changes occurring in people exposed to these fields as well as the development of long term health problems such as various cancers, and alterations in immune function such as multiple chemical and food sensitivities. This occurs especially in children.

Initially the most common symptoms are behavioural such as sleepiness and uncontrollable yawning, mood changes (particularly depression), tearfulness 'fuzzy head' or 'zombie' feeling, irrational fears, general restlessness, difficulty concentrating and problems with memory. Later, mild to severe physical symptoms may occur. These could include unusual 'sensations inside the head', headaches, eye pain, sensitivity to heat and cold, trembling, vertigo, hypersensitive sense of smell, changes in respiration and heart rate, numbness and muscle weakness, nausea, ear pain, tinnitus, convulsions,

digestive disturbance, chest pain, blocked sinuses, supersensitive hearing, changes in appetite, blurred vision and slurred speech.

Long term there is an increased incidence of many types of cancer such as leukaemia and brain tumours in those chronically exposed to EMF's. Children appear to be even more susceptible. One study showed that children whose mothers used electric blankets during pregnancy had higher risks of brain tumours (an increase of 250%) and leukaemia (an increase of 70%). Experiments with rats showed that exposure *in utero* could have effects which do not show up until they are adults.

A contemporary European case history demonstrates the potential effects of EMF's.

Two of four quadruplet boys were suffering developmental delays compared to the other two until it was discovered a strong magnetic field was passing through their bunk beds. When the beds were moved the boys' development caught up with their brothers. Analysts at the United States Environmental Protection Authority have classified EMF's as 'possible human carcinogens' which puts them in the same class as PCB's, DDT and formaldehyde. In Sweden research has shown that EMF exposure from VDU's is leaching mercury from the amalgam of people's teeth and causing health problems. They have also found that VDU exposure appears to induce electric currents between the fillings of the teeth producing bizarre symptoms. One of the most common symptoms being a tingling, burning sensation on the skin of the hands and face which later becomes a painful red rash. Others have found a drastic increase in their sensitivity to ultraviolet light from the VDU's and have been able to reduce symptoms by using 15+ sun screen while working with VDU's. One has to wonder if this may be another factor in the increased incidence of skin cancers. As UV light also has an effect on neurotransmitter production via the pineal gland any increase in sensitivity to UV light may have important consequences for the functioning of the central nervous system and the immune system.

For many years it has been known that sterility and birth deformities are increased in animals grazing under high voltage power lines. Even the productivity of soil has been altered due to changes EMF's have caused in earth worm activity.

From studies in England it appears people vary greatly in their sensitivity to EMF's. There appears to be strong association between exposure to chemicals and increased sensitivity to EMF's. Also many of the very sensitive patients have the ability to send electrical equipment haywire, especially remote controls for videos and TV sets.

From reading the literature it would appear that our present standards for EMF exposure are a joke. For instance, the general population standard is a total exposure of 1000 milligauss over twenty-four hours and not more than 10,000 milligauss for two hours a day. But the research showing increased incidence of cancer was acquired at only 1.5-3 milligaus! No long term research into behavioural and physical effects appears to have ever been done in order to determine these standards. One can't help suspecting that they were dressed up more for the convenience of industry and power distribution than the safety of people.

Hopefully this is not a problem that means doing away with electricity!

The primary problem and greatest danger is from chronic exposure due to the fields created by power distribution itself that is the wires themselves. This has to be tackled by the appropriate authorities and industry in a variety of ways — no housing in easements along high voltage power lines, extending the no human zone either side of these power lines to at least 300 and preferably 500 metres, redesigning of the spacing of the conductors, shielding appliances and equipment appropriately, redesigning appliances and how houses are wired, looking at induced currents resulting from wiring and plumbing. It can be done, people just need to hassle authorities to do it! And before all the wires are stuck underground, out of sight, out of mind, perhaps we should investigate

whether it creates other problems.

On a personal level, it makes sense to work out how much electrical equipment and general appliances you really need. Consider the electrical equipment our homes are now filled with wiring, T.V., VDU's, radio, video, microwave ovens, stoves, refrigerators, freezers, dishwashers, hair dryers, clothes dryers, fans, computers, mobile phones. It makes sense to perhaps start saying to ourselves how many of these things do we actually NEED as opposed to WANT! Before purchasing (and paying for the power to run it) any more equipment ask yourself whether you can do without it. I was stunned to visit an office where even the stapler was electric! If something breaks down does it really have to be replaced?

Reducing usage is not only good for the EMF environment we live in but also for the ozone layer.

If using a VDU, select models where the screen can be placed further away from the keyboard so that you are not less than 80cm from the front and other people are not less than 120cm from the side or back of your screen. (This also means that open plan office spaces may need to be replanned.)

For those who suspect they may have unreasonable exposure to EMF's at home or at work a service is available through EMRase Electromagnetic Consultants (see Resource section at back of book). They can measure your exposure very accurately over a period of between a few hours to many days using an extremely sensitive instrument small and light enough for even children to wear. This personal dosimeter collects the information which is then transferred to a computer for analysis. A comprehensive report is provided with the results showing the sources of exposures and how they can be reduced. EMRase have also developed ways of effectively shielding electromagnetic radiation and their service is available throughout Australia.

The actual sources of high exposure can be quite different to those initially expected. For instance John, a young man who ran a business from home suspected that

his major exposure would be coming from a variety of electrical equipment he used daily but intermittently. However the dosimeter he wore for a day showed that while some of this equipment caused occasional high exposure levels, by far the biggest contribution to the high readings came from the electrical power lines running outside his second floor office. When working in his room, his readings were high, even when all the equipment was switched off.

The results also showed that John was being exposed in a typical day to a level of EMF greater than that known to cause cancer 57 percent of the time.

Jane who worked in an office beside an electron microscope laboratory spent most of her time at her computer or photocopying. Her highest exposure occurred when she was photocopying. On the day recorded, 39 per cent of her time was spent being exposed to EMF's higher than the level known to cause cancer.

These cases illustrate how the most significant exposures can be unexpected. I strongly suggest that anyone who suspects they are being affected by EMF's first establish if this is so and what are the real sources of exposure by getting an independent assessment using appropriate equipment.

FOOD STORAGE

For the sake of a healthy environment and healthy people consider carefully when you shop the amount and type of packaging in which you buy food and then store it at home.

Take your own bags to the supermarket and the fruit shop. Do your apples and pears actually need to go in plastic bags?

Deliberately avoid foods (especially fatty foods) packaged in plastics or on foam trays. Apart from the risk of contamination of the food there is the problem of disposing of the packaging in the wider environment.

Where possible choose fresh foods or if this is not possible those packaged in cellophane, glass or cans which apart from being more inert when in contact with the food are also recyclable.

At home store food in glass or ceramic. Plastic cling wrap and aluminium foil are totally unnecessary if a little thought is used. Use the sealed glass jar and tightly lidded tins for storage. Pack school lunches in grease-proof paper or cellophane bags.

Store foods in appropriate section of fridges. Manufacturers design fridges with meat, dairy and vegetable crispers in the most appropriate temperature zone.

Certain precautions need to be taken to ensure that fridges and freezers continue to work efficiently and don't cost you any more to run than they need. Ensure that door seals are intact and that fridges and freezers are regularly defrosted. Make sure that auto-defrost models are working correctly. Every few months pull the fridge or freezer out from the wall (unplug it first) and vacuum the condenser coils at the back and the floor underneath.

In some areas gas fridges and freezers must be used. Check these are working efficiently with no residual 'gas' smell. If necessary vent to the outside. One patient who had extreme chemical sensitivity, which seemed surprising since she lived in the pristine air of an island in the middle of Bass Strait, found her problem to be the gas from the fridge and freezer.

SOFT FURNISHINGS

When you are on a chair your body heats up both the fabric and whatever has been used for the padding. If you find yourself yawning constantly at work or in certain chairs it may well be vaporising foam padding or soiling inhibitors in the fabric.

Sun shining through windows onto synthetic linings and fabrics can also cause vaporisation resulting in high levels of rubber or other synthetic vapours in the room.

For upholstered furniture use cotton or wool (leather

is treated with many chemicals including formaldehyde) for covers and raw cotton, wool or raw polyester fibre for padding.

For windows use shutters, wooden blinds, cotton, silk or wool. To improve insulation use double glazing.

HEATING AND COOLING

The need to heat and cool a house even in extreme climatic conditions can be *dramatically* reduced by good design and use of materials. If you are going to build contact the building companies specialising in this type of housing for a home that is cheap to run and a joy to live in.

In old cold houses these firms can still be worth consulting for ideas on renovations and suitable insulating materials. Ceiling insulation alone can have a dramatic effect on the comfort of a home - warmer in winter and cooler in summer as well as reducing the costs of heating and cooling.

Electric

This is the cleanest type of heating for the average home in terms of combustion byproducts, however it tends to be very expensive to run. Off-peak types of electric heating such as electric floor heating in the concrete slab or heat-banks are still moderately expensive to run.

Older type heat-banks contained asbestos which should be professionally removed.

Heated floor slabs

Wires in electrically heated slabs create electromagnetic fields which you will be exposed to whenever the heat is on.

Any heated slab, electric or hot water, will heat up floor coverings so that they 'gas off' into the room. Ideally heated slabs should only be used with ceramic tiles, quarry tiles, slate or some other hard flooring. Also soft

coverings such as carpet, cork and soft cushioned vinyls will insulate the floor and make it harder for the heat to get into the room. Instead you may end up heating the ground under the house.

Unvented gas and kerosene heaters

These heaters are usually portable and therefore unvented to the outside. Hence all the products of combustion pour into the room. There have been many cases of carbon monoxide poisoning with these heaters and it is best not to use them under any circumstances - particularly around children. In America there are 200 deaths a year associated with these heaters.

Gas and oil heating

Realistically in Australia natural gas is probably the cheapest fuel if it is available. However the same comments apply to heaters using L.P.G. and oil.

Room heaters should be properly installed, ensuring that the flues are taken outside the building and away from any windows, wall vents etc. Flues should be checked regularly to ensure they are not damaged, rusted through etc. Old metal flues should be replaced with stainless steel when required.

Most domestic outside furnaces and hot water units do not now have external flues and great care must be taken to ensure that the flue gases are not carried inside by prevailing winds through doors, windows, wall vents etc. (This is a very common problem).

Ducted systems

Make sure ducted heating and cooling systems are well made and maintained. Dusts, debri and water in ducts can cause growths of moulds, other fungi and bacteria which will be circulated throughout the house.

If you work at home, use toxic materials or are a smoker then make sure you have adequate ventilation so that the pollutants are taken outside and are not circulated around through the ducting.

Ducted systems can be either gas, oil or electric. Usually the air is heated directly in a heat exchanger to a high temperature which takes most of the moisture out of the air. This problem is reduced in more elaborate systems which use the fuel to heat water and the water to heat the air at a much lower temperature.

Circulated water

This system uses a furnace (gas, oil, wood, electric) to heat water which is then circulated around the house through a network of pipes which are connected to panel or skirting radiators in the various rooms. This system provides a pleasant heat but is fairly expensive to install. Also the radiators themselves can take up a significant amount of wall space.

Hot water can also be used to directly heat a concrete slab. (See heated floor slabs).

Wood fires and wood stoves

Open fireplaces are extremely inefficient and poor chimney design can result in a lot of combustion products being forced back into the house.

If *good* quality wood is used in the new "Triple Burn" heaters (the wood and gases are burnt much more efficiently) the problems can be minimal. However the chimney or flue *must work properly* without downdraughts and be well clear of any openings (windows, vents etc.) so that the combustion products do not end up in the house.

Low humidity

Artificial heating of the home can lead to unpleasantly low humidity. This is particularly a problem if there is synthetic flooring as static electricity tends to build up making the home most uncomfortable.

Humidity can be checked with an ordinary weather thermometer. Placing it inside in a draught free location for five minutes and record the temperature. Moisten a very small piece of cotton gauze with water and wrap around the thermometer bulb (no more than two layers

thick). Wait ten minutes and record the temperature. Ideally the drop should be about five degrees centigrade.

To increase humidity place a bowl of water or a fish tank in rooms.

Cooling

Air conditioners can be a real hazard if they are not maintained properly. Unless you live in the tropics and just can't function without them try to avoid using them at all costs.

Again good design and insulation can eliminate the need for any active cooling.

On very hot days close curtains and windows early in the morning. Use fans to move still stifling air. At night open up windows, doors and curtains. Use fans to draw cooler air from outside by placing the fan in a doorway facing *inwards*.

If you have an air conditioner make sure it is appropriate in size and design for what you expect it to do and clean the filters regularly.

WATER

Unfortunately tap water is by no means pure. In America the E.P.A. has identified seven hundred pollutants in drinking water and at least twenty of these are known carcinogens. In Australia surveys have found that at least half of the water in metropolitan Melbourne does not meet World Health Organisation standards. More alarming still is research that suggests there is greater absorbtion of pollutants through the skin in washing and bathing than by actual drinking. Considering our bodies are about eighty percent water it is easy to see why water 'sensitivity' is such a common and serious problem.

To keep water bacterially safe it is necessary in large distribution networks to add a variety of antibacterial agents e.g. chlorine. I for one don't want it taken out if it means an increase in gastroenteritis and typhoid fever. However the same cannot be said for fluoride. The

current scientific opinion is that any good that it might have on a person's teeth (recent studies have suggested that it might not help anyway) is far outweighed by the toxic effects on the rest of the body. Many countries (not Australia) have now stopped adding fluoride to the water. While improved distribution and storage can reduce the number of chemicals needed, they are still necessary to some degree. The best solution is to either filter the tap water or to catch your own rainwater and filter that. Even rainwater needs filtering before use as storage containers and the catchment material (gutters, roofs etc) can add contaminants as well as algae growth-.There are basically three ways of purifying water:

Distillation

This produces the 'purest' water, is very expensive and only necessary for extremely chemically sensitive people. It works on the principle of boiling and evaporating the water (preferably in glass) and then cooling it again for collection. This leaves impurities behind so that only pure water vapour is collected.

Reverse osmosis

This is also very expensive and can use enormous quantities of water to achieve a small amount of filtered water. These are installed under the sink and have three stages — a pre-filter to remove solids, a semi-permeable membrane that lets water through but not pollutants and a carbon filter to remove organic chemicals.

Activated charcoal

This can be permanently connected under the sink (to supply kitchen tap only) or in the main supply to the house. Portable filters are also available which fit on the tap, or sit on the bench. The water is usually filtered through a screen to remove large solids and then activated carbon granules. They slowly 'clog up' with use depending on how much water you use and how dirty it is. (A patient suffering migraine headaches from tapwater always knew when the filter needed changing because his migraines would come back).

In practice I find the portable Mayrei Silver or the 'Mineral Pot' are sufficient for most people's needs.

A wide range of filters are available from the Allergy Aid Centre or some health food stores or plumbers suppliers. Local stores should be able to recommend tradesmen for those models that need to be 'plumbed in'.

CHILDREN'S PLAY MATERIALS AND TOYS

Choose these carefully. Avoid synthetics and smelly plastics. Very hard plastics with no odour (e.g. Lego) are quite safe. Be *very* careful with paints, glues and play-dough.

Wooden toys are also good but it can be very difficult to find completely non-toxic paints, especially if the toys will end up being chewed in little mouths! Some imported toys from Asia use quite toxic paints.

Below are some cheap, safe homemade versions. Avoid commercial versions of these materials as the ingredients are not usually listed, besides its much cheaper and easy to make them at home.

Playdough

In a saucepan place:
1/2 cup salt
1 cup plain white flour
2 tablespoons cream of tartar
Stir and then add:
1 cup of water
1 tablespoon vegetable oil
Food colouring to make desired colour.

Cook over medium heat *stirring all the time* until the dough is pliable (about 4 mins.) and store in an airtight container.

Paste

In a saucepan blend together 6 tablespoons of water with 1/2 cup cold water to make a smooth paste.

Stir in 2 cups of boiling water and continue stirring as you boil on the stove until clear (about 60 secs). Add more

boiling water if necessary to get right consistency.

Stir in 2 drops of eucalyptus oil and allow to cool before using.

Bubble pipe mixture

Young children should be supervised closely when playing with bubble pipes as they are inclined to breathe in the mixture rather than blowing bubbles out.

Mix together:

2 tablespoons of Puren dishwashing liquid
(or 1 tablespoon laundry soap solution)
1/2 cup glycerine
1 cup warm water

Finger Paints

You will need:

12 cups of cornflour
Eucalyptus oil
1 cup of grated soap
8 cups water
4 hot water dyes of desired colours
4 containers

Mix together cornflour with 1 cup of cold water until a smooth paste.

Boil 7 cups of water in a saucepan and then stir in cornflour mixture slowly.

Continue to stir as you add 1 cup of grated plain soap and a few drops of eucalyptus oil.

Take off stove when soap is melted and well mixed.

In four separate containers dissolve a teaspoon of each dye with a teaspoon of cold water. Mix in 4 teaspoons of very hot water with each colour.

Stir in some cornflour and soap mixture with each colour until completely mixed. Cool before use.

PART B
CLEANERS, TOILETRIES & PEST CONTROL