

Down to *Earth* Solutions



Welcome to the Winter 2001 edition of our newsletter. We're keeping you up-to-date on what's happening in our firm, contamination issues, new processes and technologies and the latest legislation.

Agriculture and soil sustainability workshops



Lucy Vincent, Soil Scientist with Environmental & Earth Sciences, demonstrates the method of testing a soil sample to land owners at one of the recent natural resource workshops.

As part of its commitment to sustainability and the agricultural industry, Environmental & Earth Sciences Pty Ltd is undertaking natural resource workshops for farmers across NSW and Victoria.

The first of these days was held in coordination with the Snowy River Interstate Landcare Group and focussed on soil properties and management within the Lower Monaro Region. A property near Delegate, NSW was used for the morning session and the afternoon session was conducted on a property near Bombala, NSW.



The specially packaged soil pH test kit made available free of charge by Environmental & Earth Sciences for the workshops.

Topics discussed included availability of soil laboratory testing, what soil laboratory testing results mean, soil properties including pH, organic matter and structure, farm management practises, soil quality and soil health. The discussions were held in conjunction with workshop activities.

Complimentary field pH kits were provided to all who attended to ensure that knowledge and skills gained during the workshops could be implemented by farmers on their own properties.

Environmental & Earth Sciences Pty Ltd currently offers a soil-based service for farmers that includes laboratory analysis of samples selectively taken from paddocks and an explanation on what the results mean in terms of paddock management.

Future information days focussing on local issues, including soil, groundwater and pasture requirements, are planned for other regions such as Orange/Bathurst, Wagga Wagga and Scone.

For further information regarding these field days, including interest in attending future workshops and holding a workshop within your area, or for information regarding our farm service, contact Lucy Vincent on (02) 9922 1777 or (02) 6260 3302.



Lucy points out details in a soil test at the natural resources workshops.

Profile – Stuart Brisbane



Stuart Brisbane one of the longest serving employees of Environmental & Earth Sciences, coming from working as a research assistant

with the CSIRO in Canberra late in 1992. He is a Senior Soil Scientist and branch manager of our Orange regional office. Having gained his B Sc (Soil Science) in 1992, Stuart is currently completing a thesis in soil physics for his Master of Science degree.

He is a member of the Australian Soil Science Society Incorporated (ASSSI) and has particular expertise in the application of soil characterisation, soil chemistry, physics and methodology to contamination investigation and remediation of soil and groundwater regimes.

Since 1992 Stuart has been involved in planning, managing and implementing assessment and remediation studies for a large number and wide variety of projects from monitoring bore drilling at the former gas works site in Wagga Wagga, through to project managing former market garden site environmental investigations and EPA communication for smaller clients, property developers, private landowners etc., primarily for locations in Western Sydney.

In 1997 Stuart left the firm to work as a research scientist for NSW Agriculture at Cowra and rejoined the firm as Manager of Orange office in 1999. Since then he has provided advisory services to farmers for production, contamination reports for subdivisions, septic evaluation, monitoring studies for mines and councils.

Stuart can be contacted on phone/fax: 61 2 6365 8618 or e-mail fiftybuc@netwit.net.au

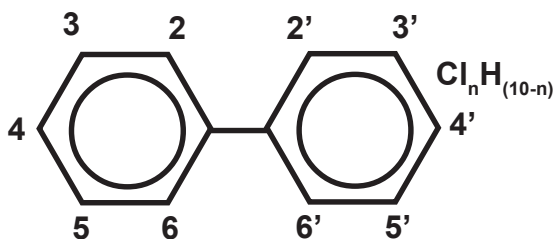
The long lived PCB



PCBs may still be found in transformers and electrical capacitors as used in transformer farms.

Polychlorinated Biphenyls (PCB) are a group of widely used industrial chemicals whose high stability made them industrially useful, unfortunately, however this has also contributed to long term deleterious environmental health effects.

PCBs are a category, or family, of man made chemical compounds formed by the addition of *chlorine* (C_{12}) to *biphenyl* ($C_{12}H_{10}$), which is a dual ring structure comprising two 6-carbon benzene rings linked by a single carbon-carbon bond (C-C bond). The nature of an "aromatic" (benzene) ring allows a single attachment to each carbon, which means there are 10 possible positions for



Polychlorinated Biphenyl (PCB)

chlorine substitution. Species with a single substituent are called "Monochlorobiphenyl", two chlorine substituents are called "Dichlorobiphenyl" and so on up to "Decachlorobiphenyl".

Physically PCBs are a clear, colourless to yellow-green, mobile, oily to viscous liquid, or sticky to hard resin, or white crystalline solids depending on the degree of chlorination. PCBs have a specific gravity of 1.18 to 1.8, are

insoluble in water and are resistant to chemical and biological degradation. Once released into the environment, PCBs will slowly move through soil and groundwater until encountering an impervious layer such as bedrock where the substance will become concentrated. However, as this migration can take quite a while there is potential for PCBs to enter the food chain and become an environmental health risk.

Health risks

The health risks associated with PCBs is the result of their solubility in fats and oils, which means they can become concentrated in living organisms. The primary health hazard is due to the chlorination and the benzene rings which gives a very stable lipid soluble configuration. The major biochemical effect of PCBs is the induction of microsomal enzymes into the liver, the primary exposure route for humans usually being by skin contact/absorption. PCBs have been demonstrated to cause a wide variety of adverse health affects in animals including cancer and affects on the immune, reproductive, nervous and endocrine systems.

PCBs were used as dielectric fluids in transformers and capacitors. Prior to 1972 they were also used in heat transfer systems, gas-transmission turbines, carbonless reproducing paper, adhesives, as plasticiser in epoxy paints, fluorescent light ballasts, wax extenders, coolants, de-dusting agents, pesticide extenders, surface treatment and coatings, sealants and caulking material.

PCBs have been commercially available since the 1930s and were imported into Australia from the mid 1950s. Production peaked in the 1960s and early 1970s. The use of PCBs became regulated in 1976 and their manufacture and sale was discontinued in the USA and Australia in 1979. In

1985 the Environmentally Hazardous Chemicals Act issued by the Commonwealth EPA became the national PCB management plan, followed by the implementation of the Polychlorinated Biphenyls Chemical Control Order 1997 (PCB CCO) by the NSW EPA.

The PCB CCO 1997 outlines guideline limits for PCBs within NSW, based on the definition of scheduled and non-scheduled material. Scheduled PCB material contains 50 grams or more of PCBs at concentrations which equate to levels of 50 mg/kg or more. Non-scheduled PCB materials are PCBs at concentrations of between 50 mg/kg and 2 mg/kg. Under the PCB CCO, disposal of non-scheduled PCB solid waste to landfill is allowed, however scheduled solid and liquid PCB waste must either be stored on site, at an EPA approved depot, or destroyed using an EPA approved method such as dechlorination or burning. Recent studies into environmental methods to break down PCBs have shown the plant "Deadly Nightshade" infected with certain bacterial parasites has the ability to absorb PCBs from the soil and detoxify the contaminant. These studies are yet to be proven on a large scale.

Sources of PCBs

The most common source of PCB contamination in Australia is from electrical transformers. Urban expansion and industrial relocation in major cities around Australia have rendered many old electrical substations redundant. The decommissioning of these sites requires extensive environmental investigation and high disposal costs for transformer oil if found to be contaminated with PCBs. Another common source of PCBs is electrical capacitors found in fluorescent lights built prior to 1979. In good condition these capacitors are harmless, however disposal or storage of the capacitors at the end of their useful life can be very costly.

In December 2000 a United Nations meeting of 122 nations in Johannesburg agreed on a treaty to ban 12 of the worlds most toxic chemicals, known as persistent organic pollutants (POPs). Within this list of 12 chemicals were Polychlorinated Biphenyls (PCBs). The conference concluded that it would not be able to eliminate PCBs until 2025, almost 50 years after their manufacture was banned.

Environmental auditing



Industry is becoming increasingly aware of its environmental responsibilities, whether in associated with: due diligence for compliance or to reduce potential environmental liabilities reducing the use of raw products and resources; reducing emissions and impact on green house gas accumulation or the release of CFCs which impact the ozone layer; assessing the potential impact of industry on the ecology of the region – whether discharges (dust, water and others), potential spills, meeting licence requirements and similar considerations; reducing the production of waste where possible and reusing wastes or finding another industry in which the waste may be a useful resource; or increasing the environmental awareness of staff and management and providing training where required.

Environmental auditing can be used as a tool to measure environmental risk; to assess environmental opportunities; as a management tool to assess areas in which environmental facets of the industry, company, facility and/or site can be improved; to check compliance with discharge licences, conditions of operation and industry standards; or even for due diligence purposes before the sale or purchase of a company, site or business operation.

Environmental & Earth Sciences has completed many facility and hazardous materials audits for compliance purposes in NSW, Victoria, WA and Auckland, NZ. We have also completed numerous contamination audits, landfill audits and due diligence audits for a range of companies all over Australia and New Zealand. This includes companies in the mining, development and construction, energy and manufacturing industries. Among the many considerations these audits take into account are discharges, licence and DA conditions, waste disposal, waste minimisation, risk assessment, potential liability issues, operating conditions, environmental ecological factors (sensitive environments such as wetlands, areas of historical significance, flora/fauna etc), contamination issues and acid sulfate soil (sulfide rich) environments.

To date, two of our staff members from our Sydney and Melbourne offices

have attended the environmental audit workshop run by the Centre for Professional Development (CPD). This series of courses is the only comprehensive environmental auditor training program approved by the Register of Certified Auditors in Australia.

The courses are aimed at providing professionals involved in the environmental side of industry information and training in: the relevant environmental legislation and government requirements; nature of non-compliance, criminal negligence and due diligence; the changing environmental principles and community values affecting industry; the nature of an environmental audit, definitions, types and so on; overview of EMS – ISO14000 series; environmental audit protocols; how to commission and conduct an audit; how to draft audit findings and propose recommendations; and how to identify examples of poor environmental practices.

Armed with this information and training, individuals are able to use these new skills to gain experience in environmental auditing and go through the qualification and certification process to become accredited environmental auditors.

Philip Mulvey, Principal of Environmental & Earth Sciences, is an accredited EPA auditor for contaminated

land in NSW, Victoria, SA, ACT and NT and a registered signatory in Queensland. Stewart Black, Manager for Victoria, is a certified Senior Environmental Auditor with the Quality Society of Australasia Register of Certified Auditors. General Manager Tracey Bauer, is currently completing the final stages of qualification and certification to become an accredited Environmental Auditor.

Please ring our Sydney or Melbourne offices if you require an Environmental Audit for your facility, site or potential site to be purchased.

Important Act changes

The Victorian Environment Protection Act 1970 has been recently amended (assented 8 May 2001). The amendments are included in the Environment Protection (Liveable Neighbourhoods) Act 2001.

In part, the purpose of the Act is to make new provisions for environmental audits. In response to the new provisions the Victorian Environment Protection Authority (EPA) has issued new guidelines that provide detailed guidance for the conduct of environmental audits and issue of Certificates and Statements of Environmental Audit.

The evolution of the environmental audit system has grown significantly since 1989 and the new guidelines reflect this evolution and the need for increased clarity in several areas.

Upon the release of the guidelines the environmental industry raised some concerns about Clause 10.6 that relates to the involvement of environmental auditors in field investigations. The EPA received several representations and held discussions with various stakeholders, resulting in the EPA announcing at a seminar held on 27 June 2001 that Clause 10.6 was to be replaced with the relevant paragraph/s in the 1992 Auditor Guidelines for an interim period.

During the interim period EPA will release an amended Clause 10.6 for comment.

Cleanup standards for petroleum contamination

An article was recently published in the *Soil & Sediment Contamination – An International Journal*, Volume 10, Issue 2, 2001, on the *Survey of States' 2000 Cleanup Standards for Petroleum Contamination* (Kistecki P T, Calabrese E and Simmons K).

The article indicates that a survey carried out in 1985 across the 50 states of the United States of America, found that 22 of the states reported to have established levels of clean up for petroleum contaminated soils, five of which considered these levels formal, however only one of which had a formal numerical clean up standard. The remaining 18 of the 22 states considered the levels informal, although some of them were considering establishing formal levels of clean up. A follow-up survey in 1987 indicated that between and within the states a myriad of different cleanup standards were developing.

In 1988 the US EPA Office of Underground Storage Tanks issued the final rules for regulating underground storage tanks, however there was still confusion among the states as to policies, rules and regulations relating to the clean up of petroleum contaminated soils. In 1990 the Association for the Environmental Health of Soils (AEHS) began conducting state by state surveys to determine clean up standards for petroleum contaminated soils – providing reference information for the regulatory community.

The article presents a compilation of state data for petroleum clean up standards compiled by the AEHS in 2000. It is interesting to note that many of the states were changing their regulatory programs to Risk Based Corrective Action (RBCA) approaches, with the result that the data from different states is often less standardised.

In Australia, the ANZECC/ NHMRC (1992) – *Australian and New Zealand Guidelines for the Assessment*

and Management of Contaminated Sites guideline was developed to provide a framework for the proper assessment and management of contaminated sites.

These guidelines have since been complimented by new publications in both countries in some cases related to individual contaminant sources (timber treatment chemicals, petroleum contamination, pesticides and the like).

The New Zealand (MFE (1999) – *Guidelines for Assessing and Managing Petroleum Hydrocarbon Contaminated Sites in New Zealand*) guidelines take a risk-based approach to the assessment and management of petroleum hydrocarbon contaminated sites. The risk-based process is flexible and allows for the establishment of clean up criteria which are more appropriately tailored to site specific conditions and hazards. This in turn leads to more cost-effective solutions while ensuring that the resources are targeted where they will be most beneficial.

In Australia the recent NEPC (1999) – *National Environment Protection Measure* has been released which provides some guidance on health based investigation levels for petroleum contamination in soils and in groundwater, and also presents guidelines on health risk assessment and risk based assessment for groundwater contamination.

The next edition of "Solutions" will explore the


merits for and against 'risk based' approaches to setting clean up standards for petroleum contaminated sites.

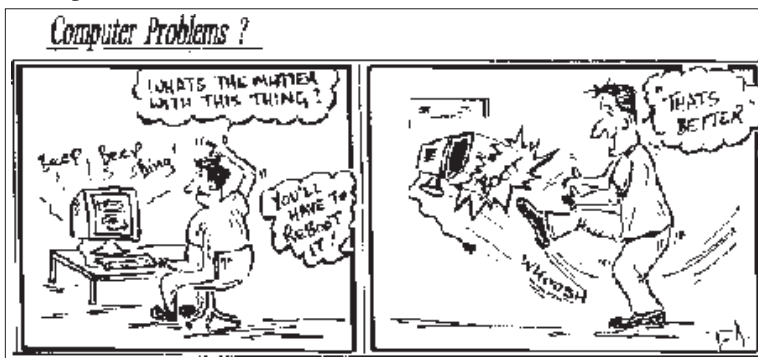
Exciting changes to internet site

Recent changes and additions to www.groundscience.com, Environmental & Earth Sciences' internet site make it an even more valuable resource for soil scientists everywhere.

Opening pages have been cleaned up and optimized for faster loading and simpler navigating to the particular sections.

Several new seminar papers have been added, including a complete slide show about Acid Sulfate Soil. Readers will find a visit rewarding as well as

learning how to get the  on a huge range of environmental issues. Of course, if you have any suggestions on how to improve the site to make it more useful to yourself and others, or you just have something nice to say to us, please use the feedback button on the site.



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