CRC CARE

Remediator

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Success with acid sulfate soils at Cairns

The CRC's project in partnership with the Qld Government at East Trinity, near Cairns, Qld, is the world's most successful demonstration of the remediation of a large area of acid sulfate soils using lime-assisted tidal treatment and re-flooding. This work is pioneering technologies with application at many sites around the world where coastal and marsh areas have been drained for development, turning them acid.

Located across a tidal inlet less than one kilometre from the Cairns central business district, the East Trinity site was originally a 700 ha area of estuarine floodplain and mangroves. Previously subject to regular tidal flooding, the area was drained and levelled in the 1970s, with over 27 km of drains dug and a large earth bund constructed to prevent tidal inundation.

However, instead of rain leaching out the salt and creating ideal land for sugar cane, the lowering of the water table exposed pyrite-rich soils to oxygen generating massive quantities of acid. In the first 25 years following this land development, an estimated 72,000 tonnes of sulfuric acid was released into Trinity Inlet, along with iron, aluminium and other metals. Episodic fish kills and the death of mangrove forests resulted.

Initial estimates were that the cost of conventional liming of the soil would exceed $300 million, which was impossibly expensive. A far cheaper approach was developed by the research team involving the Queensland Department of Natural Resources and Water, Southern Cross University and CRC CARE. The strategy involved re-flooding with tidal seawater and augmentation by lime. Beginning in 2001, the remediation program was mainly funded by the Queensland state government.

A critical factor in the success of this treatment has been to ensure a regular wetting of the soil profile by seawater to a consistent height across the site, and minimising the amount of soil allowed to dry and oxidise further. Hydrated liming of incoming or receding tidal waters was also part of the strategy to neutralise the acidity.

Different areas had different degrees of soil acidity, with some pH's as low as 2.5. However, where tidal inundation was regular, treatment over several years was highly effective and raised the pH of water draining from the site to 6 and higher over large areas. This was despite acidic drainage persisting in the upper parts of the site. At the same time, fish and crustacea have returned to previously sterile creeks. In addition, invading melaleuca stands that had established on the acidic soils are now being colonised by mangroves. *(continued on p.2)*

View from Cairns of the East Trinity site, located across a tidal inlet less than 1km from the Cairns CBD.

The Director's Chair

Professor Ravi Naidu
Managing Director

Since the last industry bulletin compiled and posted to the CRC website late last year, the CRC has had an intense period of industry negotiations, patent development, research collaboration, training and staff consolidation.

As I was able to note in preparing our latest annual report, the CRC has so far attained 29 of its 66 milestones, lodged two provisional patents - with more to come - developed clean-up tools and technology which can help industry and government save millions of dollars, achieved a number of significant scientific advances and published 70 scientific journal articles in 2007-08 alone. We have trained or are currently training 40 PhD students and over 400 people from industry.

At the same time we have been negotiating arrangements with new organisations wishing to join the CRC, and I am pleased to report that BHP Billiton iron ore division and James Cook University will become full partners from 2008-09. In the meantime we have appointed a full-time coordinator for the Australian Remediation Industry Cluster (ARIC) (see item on page 12). Much of the operational groundwork for ARIC is now complete, and a strategy for its implementation and service delivery is under development.

Strong interest in the CRC's research capacity continues to be expressed by organisations in India and the USA during recent discussions about collaboration. That followed a meeting in China in July with our China-CARE Consortium organised by HLM Asia Pty Ltd to review our five research projects there.

New patents lodged in recent months include the Anionic Surfactant Test Kit to detect toxic fire fighting foam residues in the environment, and a novel electrode for detecting lead and cadmium contamination of groundwater using voltammetry.

The success of the CRC-run industry forum on residual liability earlier in the year was followed by two CRC training workshops, the first in foam residues, and the second on asbestos in soil. A total of 80 people attended this training.

The CRC continues to build its activity and capacity in communications, with exhibits at SETAC 2008 in Sydney and for National Science Week in Adelaide. As well as media releases on contamination issues during 2008, the CRC appointed a publications officer in August to help build and manage a strong technical publications program as part of its overall information delivery strategy.

The CRC will be busy in the months ahead preparing for a formal review by the Australian Government's CRC Program. We will be equally busy with plans for the 2009 CleanUp Conference, which will consist of the 5th International Workshop on Chemical Bioavailability (24-25 September 2009) and the 3rd International Contaminated Site Remediation Conference (27-30 September 2009), both to be held in Adelaide (see **www.crccare.com/news/downloads/Clean-Up-09-Flyer.pdf**).

Watch this space!

Ravi Naidu

Professor Ravi Naidu, Managing Director

(continued from p.1)

Many other locations in the world are facing exactly the same acid sulfate problems on reclaimed or drying land, especially those with marine sediments. This successful Australian approach provides hope for remediation of severely degraded areas elsewhere. It also offers Cairns a special opportunity to capitalise on a major environmental achievement with eco-tourism potential, as well as preserve an extraordinary natural backdrop to the city's southern skyline of healthy mangroves and mountain forest.

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Breakthrough in water safety

Dr Erica Ji and Dr Zuliang Chen test their new ultra-sensitive electrode for detecting lead and cadmium in water.

As the nation's water resources run low, a new technology for detecting toxic heavy metals in water has opened the way for safer use of surface and groundwater and recycling. In an important development for water safety, Dr Erica Ji and Dr Zuliang Chen (CRC CARE and the University of South Australia) have developed an ultra-sensitive technique for detecting the toxic metals lead and cadmium in water.

This technology, for which CRC CARE has filed a provisional patent application, selectively seeks out lead or/and cadmium ions present in aqueous phase. The electrode provides lower detection limits as well as higher selectivity for lead and cadmium ions.

Dr Chen reports that the new electrodes have been tested in the lab, and shown to have very high sensitivity. This development provides a much more efficient way of detecting and tracking contamination.

According to co-researcher Dr Erica Ji, one of the advantages of a chemical-based system like this is that it is very quick, providing results in a few minutes. This compares to several days waiting for a lab analysis, and offers the possibility of a real-time early warning system to report when toxins have entered a water supply.

However, more research is needed to ensure their special coatings are robust enough for continuing use in the field.

Commenting on the development to the press, CRC CARE Managing Director Professor Ravi Naidu said that as Australia's water supplies become increasingly stretched, the pressure to use all our resources, including groundwater and recycled water, will rise inexorably.

'As it does, water safety from chemical contamination, both natural and man-made, will become an even bigger issue than it is now. We know from the terrible example of arsenic poisoning in Bangladesh and India that a polluted water supply can potentially affect tens of millions of people – and we must use the best technologies to ensure such things never occur here,' he said.

'Some water resources are polluted by naturally occurring heavy metals or from mining, but our city effluent is also contaminated by discharge from factories and industrial activities which can make it unsuitable for recycling.

'This technology offers the water industry a very promising way to test for, and potentially exclude, certain natural and industrial pollutants from drinking water supplies.'

Prof. Naidu said that the originality of the research had been confirmed in the filing of a provisional patent for the technology, the second that the Adelaide-based CRC CARE has filed this year.

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Manufactured soil update

The bulk of topsoil for commercial landscaping and home gardening in Australia is 'manufactured' or 'artificial' soil and its main component is composted municipal green waste. Various other materials are added to this, including organic manures as well as inorganic materials (e.g. fly ash, sand and subsoil). The ingredients and ratios at which they are used vary with individual contractors, are commercially sensitive and have been determined by trial and error. Inorganic components usually make up less than 10% of the final volume.

The manufacture of such 'soils' combines the use of wastes from municipalities and industry to produce a marketable product with widespread application, and is therefore of interest to the CRC. Dr Oxana Belyaeva (CRC CARE, based at the University of Queensland) has been working on the project for the last six months. Her research is aimed at determining the optimum ratios at which various wastes can be mixed and composted.

Dr Belyaeva is also aiming to increase the content of inorganic waste components in the products (since natural topsoil contains over 90% inorganic material). Initially, she has been co-composting various ratios of municipal green waste (produced by most cities) with coal fly ash (a product of coal-fired power generation) with encouraging results.

As part of her research Dr Belyaeva has been investigating the chemical, physical and microbial properties of the manufactured soils and their sustainability for growing plants. Future research will involve the use of additional waste materials with the aim of producing a consistent and stabilised product.

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Fuel leaks from sites such as old service stations are one of the most widespread forms of contamination.

Bugs that beat cancer

CRC CARE Remediation program leader Professor Megh Mallavarapu has made an important discovery that could help to save lives as well as clean up Australia's urban environment.

In the course of his research into groundwater contaminated by petroleum and oil spills, Prof. Mallavarapu has identified a number of indigenous soil bacteria that appear highly resistant to BTEX – the deadly volatile organic compounds benzene, toluene, ethyl-benzene and xylene.

Of these, benzene is a known carcinogen, and the other three have serious effects on the central nervous system. Besides polluting water and soil because they are volatile, these chemicals can sometimes emerge from the ground as vapours, being inhaled by people living and working in the vicinity. Together BTEX form one of the commonest and most hazardous forms of pollution affecting Australian cities and regional areas. But Prof. Mallavarapu's bugs chew them up for breakfast, rendering them completely harmless.

'Fuel leaks are one of the most widespread forms of contamination in Australia and elsewhere,' Prof. Mallavarapu explains. 'Sites of old service stations, fuel farms, garages, workshops, gasometers, oil spills, dry cleaners and factories which used or processed hydrocarbons are literally everywhere that has been closely settled for the past century or so.

'Storage tanks and fuel dumps leaked. There were accidents and spills – and people often just poured hydrocarbons out on the ground or down the drain, not knowing, as we do today, how dangerous their constituent compounds can be.'

Bacteria which can tolerate BTEX have been identified in other parts of the world, but these are the first from Australia to show a specific preference for dining on these hazardous wastes. The microbes devour the carbon in the BTEX molecules, breaking the rest down into simple and harmless constituents of carbon dioxide and water: 'You just add the bacteria to contaminated water – and they go straight to work.'

In cases of serious contamination, the bugs' activity can be enhanced by pumping in air or adding nutrients.

However Prof. Mallavarapu has taken the work an important stride further, isolating and sequencing the actual genes in the bacteria which degrade BTEX. Knowing what genes to look for will help in widening the search for more kinds of soil organisms which have a preference for dining on toxins, or identifying strains which do so even more efficiently. This will help expand the suite of organisms available to deal with pollution under different soil and climate conditions, or with differing mixes of contaminants.

Testing involves monitoring the bugs and seeing whether or not their population grows or shrinks as the seasons and conditions change, or in response to the addition of nutrients such as nitrogen and phosphorus.

'We have proved that this technology works in the laboratory. We know the bugs can be used to detect and break down BTEX efficiently. We now want to take them to the next stage and develop the technology for practical application in industry or any urban setting. We are possibly two years from having a commercialisable product.'

Widespread use of the technology to clean up a century's worth of contamination from oil spills could make an appreciable contribution to lowering one of the major identified cancer risks facing people who live and work in cities and long-settled areas.

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Detecting toxic residues from AFFF

The Anionic Surfactant Test Kit, soon to commence testing by people working in the field.

Anionic surfactants are a group of specialty chemicals used in detergents. One particular class of surfactants, fluorinated surfactants, has unique properties that make them especially effective in fire-fighting applications, especially against hydrocarbon fuel fires.

Fluorinated surfactants used in fire-fighting applications are often referred to collectively as AFFF (aqueous film-forming foam), and were first developed in the 1960s by the US Naval Research Laboratory.

Unfortunately, fluorinated surfactant compounds such as perfluorooctanyl sulfonate (PFOS) and perfluorooctanoic acid (PFOA) are highly persistent both in humans and in the environment. They are now globally distributed, persistent and bio-accumulate. It is known that these chemicals are toxic to various soil organisms, and that once in water can enter the food chain. It is suspected that these chemicals may be carcinogenic.

Although the fire-fighting foams which use PFOS (a content of about 1% in AFFF) are being gradually phased out and replaced with new fire-retardant chemicals, they are still in widespread use around the world.

A safer alternative to MBAS assay

A standard technique currently used to estimate the concentration of anionic surfactants (including AFFF) in water is the methylene blue active substances (MBAS) assay. It is a laboratory-based extraction where the anionic surfactant binds with a cationic dye. One of the key concerns of the MBAS assay is the use of chloroform, another suspected carcinogen, as the extraction solvent.

CRC CARE's new field test kit avoids the use of chloroform for the detection of anionic surfactants. The kit determines the level of contamination at sites where PFOS and related compounds have been used, and as a preliminary screening tool will reduce sampling costs. As environmental agencies around the world come to grips with the extent of AFFF contamination, this safe new Australian test kit should attract substantial international interest.

Next steps

CRC CARE is about to commence extensive hands-on testing of the kit by people currently working in the field, which will provide feedback regarding its practicality, cost and extent of application. A full market assessment for the product is also underway.

Commercialisation interest

Positive results from the market assessment and the in-field testing will lead to full commercialisation. Parties interested in the commercialisation of this kit should contact CRC CARE General Manager, Maggie Dowling.

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People Profile: Nanthi Bolan

Professor Nanthi Bolan

Professor Nanthi Bolan, Leader of CRC CARE's Prevention Technologies Program, was appointed Dean of Graduate Studies at the University of South Australia (UniSA) in July this year. Arriving at UniSA in March 2007, Nanthi was previously the Professor of Soil Science and Director of Postgraduate Studies at New Zealand's Massey University.

'I came to UniSA because it had a critical mass of scientists working in environmental research,' Prof. Bolan says. 'It was an opportunity for me to provide leadership and mentor early career scientists, which I enjoy.'

Despite his new position as Dean, Prof. Bolan remains an active researcher in CRC CARE projects and at the Centre for Environmental Risk Assessment and Remediation.

Prof. Bolan completed his PhD at the University of Western Australia in 1983, and has published more than 200 papers. He has been awarded the M.L. Leamy Award by the New Zealand Soil Science Society in recognition of his contribution to the discipline and the Massey Medal for Postgraduate Supervision.

Using sunlight to clean air

Most Australians are blithely unaware of the lungfuls of pollution they suck down every minute of the 97% of their time they spend indoors – at home, work or in the car.

Rising incidences of lung disease and asthma in the general population tell a different story however: indoor air pollution is as bad, if not worse, than the brown smog that hangs over most cities.

CRC CARE researchers (from Curtin University of Technology) Dr Shaobin Wang, Professors Ming Ang and Moses Tadé are using a revolutionary form of nanotechnology to tackle this universal plague: their elegant idea is to use sunlight to cleanse air.

Photocatalytic oxidation (PCO), as the technique is known, uses a nanosized photocatalyst which is triggered by light to break down airborne contaminants at room temperature, making the air safe for people to breathe. This works well using ultraviolet light, but their aim is instead to use ordinary sunlight, so developing an air filter that will not need any other form of energy to work.

The team is modifying titanium dioxide particles using other substances so it will perform as a photocatalyst under natural light conditions, and cause volatile pollutants to break down.

'The light provides the energy which is absorbed by the photocatalyst. When airborne volatile organic chemicals contact it, it causes their molecules to decompose into CO_2 and water,' Dr Wang explains.

Although the work is still in the early stages of identifying the best combination of nanoparticles to do the job, the CRC CARE researchers are confident it will work. Best of all, they say, the air filter will be capable of being retrofitted into an existing airconditioning or air delivery duct – silently and efficiently cleansing the air as it circulates in the building.

According to a CSIRO report, indoor air quality is attracting public attention due to its impact on health, which is estimated to cost Australia about $12 billion annually.

Air toxics consist mainly of volatile organic compounds (VOCs). These gas-like pollutants can leak from sources such as paints, glues, coatings, pesticides, carpets, plastics, cleaning fluids and office equipment.

Long-term exposure to VOCs causes sick building syndrome, in which the building's occupants experience rising levels of eye, nose and throat irritation, headache, allergic reactions, breathing difficulties, nausea, nosebleeds, vomiting, fatigue and dizziness.

'These new technologies have the potential to significantly reduce indoor air toxic levels in both homes and commercial buildings,' Prof. Ang adds.

The research team anticipates significant progress toward the development of a prototype within two years.

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Molecular structure displays of VOCS (Volatile Organic Compounds), along with POPs (Persistant Organic Pollutants), proved popular with school students at National Science Week's Science Alive! exhibition held in Adelaide during August.

Social, Legal, Policy, Economics

Dr Roel Plant

New program leader

CRC CARE has recently appointed Dr Roel Plant, Research Director at the Institute for Sustainable Futures, University of Technology, Sydney, as the new leader of Program 4: Social, Legal, Policy and Economic Issues.

Dr Plant was educated in the Netherlands, where he obtained a MSc in Physical Geography (Utrecht University) and a PhD in Agricultural and Environmental Sciences (Wageningen UR). After his PhD research, Dr Plant was employed by the Netherlands Organisation for Applied Scientific Research (TNO), where he worked on decision-support systems for environmental management, including land contamination and remediation.

In 2002, Dr Plant relocated to Australia to join the CSIRO, where he was involved in Australia's first Ecosystem Services project and the Water for a Healthy Country National Research Flagship. Dr Plant's current research at the Institute for Sustainable Futures focuses on integrated perspectives on natural resources and ecosystems, drawing from environmental science, ecological economics, and social science.

In leading CRC CARE's Program 4, Dr Plant's challenges will be to consolidate the understanding of the social, legal and economic drivers associated with environmental contamination and remediation as delivered by Program 4, and to secure the adoption of legal, community-based and economic approaches to site contamination issues by regulatory agencies, policy makers, site managers, site owners and the community.

In so doing, the best possible outcomes for society as a whole, evidenced by a high level of public acceptance and confidence in the solutions offered by the CRC CARE, will be a key guiding principle.

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Snapshot of progress in Program 4 projects

The Social, Legal, Policy and Economic Issues Program has two main research areas:

1. Community perceptions and acceptance of risk associated with contaminated sites

Three projects began in 2007-08 in this area:

- development of draft guidelines for community consultation in regard to site assessment and remediation
- a survey of community attitudes to the retention of contamination on-site
- a review of risk assessment methodologies in relation to on-site retention, with a view to clarifying associated technical practices.

2. Legal and policy frameworks for addressing site contamination in Australia and the Asia-Pacific region

Two projects in this area have now been largely completed. They are:

- a detailed survey of the legal and policy frameworks relating to site contamination in Australia and in selected jurisdictions in North America and Europe
- a project to review regulatory approaches, both in Australia and overseas, to the on-site retention of contaminants.

In addition, new work was approved on follow-up projects to review law and policy in the Asia-Pacific region and to prepare guidelines for site contamination legislation.

PhD student Tanya Caceres

Some of Ms Caceres' artwork, which was recently on display at Mawson Lakes.

Not your average student

Tanya Caceres is not your average PhD student. The Ecuadorian has proved to be a master at publishing research papers – eight papers from three years of research.

Submitting eight research papers during PhD research is very rare said her supervisor Professor Megh Mallavarapu.

'The average number of publications for a PhD student is about four research articles in high impact journals,' he said.

'I think it is good for my career to publish and it is good to disseminate information about the research work you are doing,' said Ms Caceres.

'I did not set out to write a certain number of articles but I just wrote where there was an opportunity.'

Publishing these research papers has also helped Ms Caceres improve her English.

'As I am not a native English speaker I wanted to persist with my writing and I really wanted to publish my research,' she said.

Once her thesis is submitted next month Ms Caceres would like to take a short rest before pursuing her goal of finding work as a scientific research and lecturing.

'I look forward to going home for a short rest as I miss the people, the mountains and Ecuadorian food, which I cannot find in Australia. I will then pursue various opportunities which come my way,' she said.

Scientific expertise is not the only skill PhD student Tanya Caceres will take back to Ecuador.

Ms Caceres – who is completing her thesis after about three years of research on bioavailability of organophosphates in soil, with a particular focus on fenamiphos and related compounds such as isofenphos and coumaphos – will be leaving for her South American home next month with some artistic skills.

'I have enjoyed Australia very much, especially nature. The animals and plants are very rare and great,' she said.

'While here I discovered my new hobby of water-colour painting. I have been doing it for eight months and I find it relaxing.'

Inaugural Chairman's Award

The inaugural Chairman's Award for best CRC CARE student was a joint award, with Fang Han and Tanya Caceres taking the prize. The winners received a framed certificate and cheque for $250 at the Communicate08 staff conference at The Stamford Grand Hotel, Glenelg, in South Australia.

Fang Han's PhD study is about development of novel nanocatalysts and their application in wastewater remediation. Tanya Caceres is studying the environmental fate of pesticides, and their toxicity and bioavailability in long-term contaminated soils which contain the organophosphate fenamiphos.

Tanya Caceres and Fang Han were presented with their awards by CRC CARE Chairman Professor Paul Perkins and Managing Director Professor Ravi Naidu, at the CRC's Communicate08 conference in Adelaide (l-r: Prof. Perkins, Tanya Caceres, Fang Han and Prof. Naidu).

Dr Kwon Rae Kim

First thesis completed

CRC CARE's first PhD thesis completion investigated soil-plant root interaction and metal uptake. Dr Kwon Rae Kim's results showed that plant roots exposed to heavy metal contaminated soils exude organic compounds in the soil, such as organic acids, and change soil pH.

The thesis, titled 'Geochemical processes controlling metal dynamics in the rhizosphere: implications to phytoremediation of metal contaminated soils', focused on the concept of plant-assisted remediation known as phytoremediation.

'The plant-induced changes in the soil control metal uptake by plants as they increase the available metal forms in the soil-root interface,' Dr Kim said.

'There was a strongly significant relationship between heavy metal concentrations, such as cadmium (Cd), lead (Pb), and zinc (Zn) in soil pore water and soil pH.'

It was discovered that plant roots induced changes in both soil pH and dissolved organic carbon (DOC) which influences heavy metal speciation and bioavailability and controls metal uptake by plants.

One study indicated that the Indian Mustard (*Brassica juncea*) plant exuded much higher organic acids (OA) when exposed to elevated concentrations of lead.

Metal uptake by plants is determined by the combination of heavy metals in the soil and the pH and concentration of DOCs and OAs released by plant roots.

Phytoremediation is an environmentally friendly technology gaining social acceptance to clean up contaminated soils as it is using natural plant functions, Dr Kim said.

'This technology is cost-effective, environmentally friendly, and does not disrupt the ecosystem surrounding the soil. It is considered an alternative technology to the conventional engineering-based remediation methods,' he said.

However, the efficiency of the system does have limitations, said Dr Kim.

'Low metal availability in soils is one limitation. Another is that heavy metals in soils exist in different forms, and some of these cannot be taken up by plants,' he said.

'To complicate things further, the plant roots themselves can affect the form of metalloid found in the soil.'

Looking to the future, Dr Kim hopes to complete his three-year post-doctorate studies with Professor Nanthi Bolan at the end of 2010 and will then look at opportunities to use his skills.

'My wife and I have also just welcomed our baby girl into this world, who arrived three months early. We named her Min-Chae, which means peaceful life,' he said.

The CRC CARE student conference was held on 1 May following the Communicate08 staff conference at The Stamford Grand Hotel, Glenelg, Adelaide. All PhD students presented their work, either as a paper or a poster.

Fire fighting foams contain toxic, persistent fluorinated surfactant compounds.

A process of hand raking can be used to provide a measure of asbestos fibre release from soil.

Fire-fighting foam workshop

Over the past three years, researchers from CRC CARE have been investigating the environmental toxicity and persistence of aqueous film-forming foam (AFFF), and the new alternative products now available, to help with the management and cleanup of contaminated sites (see item on page 5).

The findings of this work, including the chemical and physical properties of AFFF and its toxicity in aquatic and terrestrial environments, were presented at an AFFF workshop in Adelaide in June to consultants, land owners and regulators.

Presentations by CRC CARE staff were supported by case study examples. Brooke Moore from ENSR USA provided an overview of what triggered investigation into AFFF toxicity in the US, and outlined current policy developments in US regulatory authorities. As part of discussions, participants reviewed the limitation of having no existing Ecological Investigation Levels (EILs) and Health Investigation Levels (HILs) for AFFF in Australia. It is expected that CRC CARE will take up this challenge and work with partners towards the development of Australian-based EILs and HILs for AFFF that are underpinned by scientific investigation.

The AFFF field test kit developed by CRC CARE was demonstrated at the workshop.

'Asbestos in soil' workshop

CRC CARE held a one day workshop in August in Sydney on asbestos in soil. With 60 participants from across Australia, the workshop presented the latest developments in asbestos research and policy in Australia and the US.

A key presentation by Arnold Den from the US EPA concerned their new Framework for Evaluating Asbestos Sites. This included the US EPA's move towards Activity Based Sampling (ABS) for determining the level of asbestos contamination at a particular site. Arnold outlined the hand raking and air sampling process used to provide a measure of fibre release from the soil.

This move towards ABS by the US EPA highlighted the relevance of the 0.001% weight/weight asbestos figure for contamination in the soil that is commonly used in Australia. The majority of participants agreed that this figure was too generic and is not conducive to a risk-based approach for assessing asbestos-contaminated sites.

Participants also agreed that, within Australia, public perception and fear of asbestos was driving a very conservative approach to management and remediation of asbestos-contaminated sites. Participants generally agreed that the public perception that 'one fibre of asbestos can kill' was due to a lack of clear, science-backed, communication.

It was highlighted that as a result of historical asbestos use, including the use of asbestos-contaminated building materials, there are now asbestos fibres in the air we breathe. Assuming the Australian population has potentially been exposed in a manner similar to Europeans and Americans, Australian cities may have ambient levels of 10-100 asbestos fibres per cubic metre of air.

As an outcome of the workshop CRC CARE will work with its regulatory and industry participants to investigate where it can support asbestos-related policy and research to address some of the current gaps, and support a risk-based approach for the assessment of asbestos-contaminated sites.

Acid sulfate soils

CRC CARE and the Centre for Acid Sulfate Soil Research at Southern Cross University, are holding a short course on the identification, assessment and management of acid sulfate soils. This short course is designed to equip professional officers charged with the management of these soils with the knowledge and skills to develop and administer plans of management in accordance with NSW legislative requirements.

The course will be run 11-13 November 2008 at Lismore, NSW. See **http://www.crccare.com/education/training/index.html** for more information.

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News and Events

Media Mix

CRC CARE has issued seven media releases so far this year with the following titles:

- Breakthrough in water safety (11/9/08)
- Cleaning up fire foam's toxic legacy (4/8/08)
- Bugs that eat cancer-causers (3/8/08)
- Avoiding toxic garden vegies (1/4/08)
- Toxic liabilities: wasting time, wasting money (25/2/08)
- Arsenic eating bugs promise a cleaner future (21/2/08)
- World facing arsenic poisoning calamity (18/2/08)

These generated fifteen radio interviews and over 37 metropolitan and regional newspaper/ trade magazine articles. Major urban papers carrying CRC stories included the Weekend Australian, Canberra Times, Adelaide Advertiser, Sunday Telegraph, Hobart Mercury and the Perth Sunday Times. Magazines and weeklies with CRC CARE features included Waste Management and Environment, New Scientist, ECOS, Australian Horticulture, Countryman and Queensland Country Life. Major regional papers included the Sunday Territorian, the North Queensland Register, the Townsville Bulletin and the Border Mail.

The media were keen to cover contamination issues, such as the possibility that vegetable patches in new urban developments could be located on sites contaminated by past rural or industrial land uses, or that some microorganisms were able to clean up contamination. Trade magazines were more interested in potential products generated from research work.

Jack Ng recorded interviews with Channel 10, the ABC and 2UE on 8 September providing expert comment on the finding that many rural schools have unacceptable levels of lead in the drinking water from water tanks.

Apart from technical publications in the pipeline, the CRC has a range of new research developments pending IP processing that will attract strong interest when the CRC can tell their stories.

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Events

CRC CARE took part in the 5th World Congress of Environmental Toxicology and Chemistry (SETAC) in Sydney in August, featuring the CRC's prototype test kit for contamination from fire-fighting foam. A team from the CRC also manned a CRC display on indoor air pollution at the National Science Week weekend exhibition in August in Adelaide, featuring volatile organic compounds (VOCs) and persistent organic pollutants (POPs) that we breathe in our homes and offices.

CRC CARE featured ARIC (see p.12) and an AFFF prototype test kit (see p.5) at the SETAC congress in Sydney in August.

Upcoming events

Seminar by Legalwise Seminars:

Acquisition, Disposal and Leasing of Contaminated Land (Sydney) **12 Nov 2008**
(for more information go to **www.legalwiseseminars.com.au**)

2009 CleanUp conference:

5th International Workshop on Chemical Bioavailability (Adelaide) **24-25 Sept 2009**
3rd International Contaminated Site Remediation Conference (Adelaide) **27-30 Sept 2009**

The ARIC Vision

Leigh Walters

ARIC
Australian Remediation Industry Cluster

The Australian Remediation Industry Cluster (ARIC) is addressing a range of important issues to help facilitate the development of the Australian remediation industry.

With the strength and expertise of participants in CRC CARE supporting it, ARIC will play an important role in helping to develop the remediation industry in Australia and its expansion into overseas markets.

The key issues at this stage for ARIC include:

- Providing a mechanism for organisations to develop a common position on contamination issues that are economically, socially and environmentally challenging.
- Liaising with government and advocating policies, actions and solutions on important contamination issues.
- Establishing networks both nationally and internationally to facilitate better understanding of products, services and opportunities for collaboration.
- Improving information flow within the remediation industry.

Due to my later than expected appointment the establishment of ARIC has been delayed but is now back on track and gaining momentum.

A lot of very good ideas have been generated in the formation period which will now be tested with industry and government in an industry consultation phase. As the initial consultation phase concludes the remaining support systems will be put into place and ARIC will become fully active in delivering a range of services.

ARIC's final form will reflect the priorities for the remediation industry based on the needs of organisations wanting to address contamination problems.

Membership for ARIC is currently free so if you are interested in this exciting new venture you are encouraged to submit a membership form. These can be found at **www.crccare.com/aric**.

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