

# Aussie answer to toxic fire-fighting chemicals

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Australian scientists have come up with the solution to a world-wide pollution problem – how to mop up the toxic residues left after the use of special foams to fight fires.

The revolutionary technology, developed by researchers at the CRC for Contamination Assessment and Remediation of the Environment (CRC CARE) and the University of South Australia, uses a modified clay to soak up potential cancer-causing substances in the foam used by fire fighters, defence facilities and airports worldwide to suppress fires.

The invention, known as matCARE, has been announced as a finalist in the 2014 The Australian Innovation Challenge.

"These foams, which are used universally, employ perfluorochemicals or PFCs, to smother the blaze," explains CRC CARE managing director Professor Ravi Naidu. "Unfortunately some of these PFCs have been linked to bladder and liver cancer, endocrine disruption, and developmental and reproductive disorders, including infant deaths. They are potentially lethal to wild and farm animals.

"When they have been used to fight or to prevent a fire – for example when there is a big fuel leak – the surrounding area and its groundwater can be contaminated by long-lasting toxins, posing a risk to humans and the environment."

CRC CARE was asked by the Department of Defence to help clean up Royal Australian Air Force sites in Edinburgh (SA), Pearce (WA) and

Townsville (Qld), where years of foam use, mainly in fire-fighter training, had caused substantial PFC contamination.

"The levels of PFCs were as high as 30,000 ppb had been detected. However treatment with matCARE has so far resulted in the clean-up of over a million litres of water," Prof. Naidu says.

"We designed a special clay mineral that was capable of immobilising the toxic PFCs from soil and groundwater, and a mobile remediation plant to go with it. With the help of Defence, we were able to provide several spectacularly successful field demonstrations of the use of this approach to clean up an area contaminated by aqueous fire-fighting foams (AFFF)."

Prof. Naidu says both the national and global markets for the product are huge.

"Australia has 450 civilian and military airports, and nearly all of these have used fire-fighting foams in training or in real emergencies and are therefore contaminated sites. We are currently working with Airservices Australia to determine the feasibility of treating AFFF-contaminated wastewater at various airports around the country.

The technology also has valuable application in cases where foams have been used to treat highway or rail spills, at fuel dumps and refineries, and at fire brigade training sites.

"Beyond Australia, the scale of this problem, and thus the market for CRC CARE's innovation, is very large. It is highly probable that PFCs are significant contaminants at thousands of the world's 49,000 airports.

This means that as governments continue to tighten their environmental regulations, there will be a growing need to assess and remediate PFC

contamination worldwide."

However its uses are not confined to industrial sites – millions of homes around the world now contain furnishings, carpets, computers and cookware that have been treated with PFCs. "Given the PFC exposure in our day-to-day lives CRC CARE's research into treatment and remediation is uncovering important information that will help minimise the use of and risks posed by these chemicals in future," he says.

Prof. Naidu adds that one of the most attractive features of matCARE is the abundance and cheapness of the raw clay materials used. These can also be treated and reused.

To further enhance its efficiency, CRC CARE has developed an Anionic Surfactant Test Kit (astkCARE) which provides a sensitive, rapid and reliable test for the presence of fire-fighting foams in water and is currently working on a portable biosensor which can provide an instant reading of PFC contamination levels in soil or groundwater.

Provided by CRC CARE

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