



AS FEATURED IN **RESOURCE IN FOCUS**  
MAY 2013

# CLEAN-UP TIME

STAR WATER SOLUTIONS

Australia





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*The commercialisation of academic research can often prove particularly useful, and Star Water Solutions is a good example. This company began by looking at the ten year drought around Australia and the need to clean up and re-use water – urban, mining or industrial – and to protect waterways on industrial sites so they could be of more use.*

**S**tar Water Solutions focused on the use of recovered resources to achieve these aims, based on some early research out of the US.

As Chris Rochfort, Chief Executive of Star Water Solutions, explains, “Over that ten-year period, we got involved in a lot of pilot projects with municipalities dealing with stormwater and also in mining applications – coal mines, quarries – especially to rehabilitate sites.” Once a site is professionally rehabilitated, it becomes much easier to manage the water supply because there is no erosion, surface runoff or sedimentation.

What came out of these research projects was commercialised as a series of products and systems for waste and resource recovery. Star primarily aims to clean water to meet the needs of increased future consumption rather than to reduce consumption per se, and among the tools in its product range is the reactive filter media approach. This differs from reverse osmosis and other cleaning methods in the way it works. In contrast to traditional methods such as sand filtration, these filters allow for a number of chemical reactions to take place and do the cleaning of the water – breaking down hydrocarbons, for example; or on a minerals site, absorbing metals into the filters via cationic exchange. ►

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### Erosion Control

Enviro-media is a specifically engineered infiltration medium that uses selected organic matter or a blend of selected organic matter and minerals such as sand and soil that are used to physically, biologically and chemically treat contaminated air, soil and water. Treatment and purification is achieved by physically filtering sediments and contaminants, chemically binding contaminants to organic matter and biologically degrading contaminants.

Many large building and construction projects such as freeway developments require measures to be implemented to control erosion and sediment run-off. The M2 Motorway in northern Sydney passes through a number of ecologically sensitive bushland areas and has numerous embankments, escarpments, gardens and steep sloping sites. With three traffic lanes each way and substantial paved surfaces, the potential for large volumes of surface run-off to cause erosion of sensitive areas is a major environmental concern.

Although drainage systems are in place, there are a number of areas that could face potential erosion problems. A trial, which also included Abigroup's tollway management company – Tollaust Pty Ltd – was established with the Roads and Traffic Authority on the M2 Motorway south of the Pennant Hills Rd exit. The trial tested Star's Safe Sox, an innovative new product providing superior performance by slowing runoff velocity and filtering contaminants in order to prevent sediment and polluted water from causing downstream environmental damage in and around median strip garden beds. The purpose of the trial was to compare the performance of these products with conventionally used products such as sandbags.

Operational staff indicate that Safe Sox are more durable, easier to handle and potentially longer lasting than sandbags (which degrade relatively quickly). The degrading sandbags are in fact threatening the very same waterways that they are intended to protect. Dean Sullivan, Landscape Supervisor for Tollaust Pty Ltd, reported: “So far, the new products containing recycled organics are performing better than previously used methods. We believe this may lead to long term cost savings and reduce the risk of contaminating adjacent waterways.” The trial was also expected to demonstrate that these recycled organic content products have a superior permeability rate than conventional products.







- ▶ Chris explains that the reactive filter media is adept at handling high volumes and small to medium flow rates. Only in applications with very high flow rates would reverse osmosis be the better option, he believes. This design is also long-lasting and minimises the need for maintenance.

"We can design the systems to last years or even decades," he says. "We have storm-water applications in and around Sydney, for example, that have been in place since before the Olympics without needing to be changed." True, those deal with relatively low pollution levels, but even in more dirty conditions, "when we design a filter we can provide the client with an indication of its lifespan and when it is likely to need changing."

Star designs tailor-made filters "based on optimising the components to treat whatever is the problem in a particular application." So if there is, for example, a high amount of iron coming into the system, a specific application can target that iron and treat it accordingly while still dealing with the other pollutants. "That is important in a regulatory sense, because there is a lot of pressure these days on emissions from sites."

There is talk in some US states of requiring certification for such systems, but Chris says Star would easily be approved based on the ten years of science that went into the systems' development. An Australian company, Star Water Solutions (based in north Sydney with an office in Melbourne) has installations throughout the nation in a wide variety of applications including landscaping, road and transport, mining and excavation, residential development, agriculture and horticulture.

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Although the mining and resources industry has not yet been a major customer for reactive filter media, it has made good use of another related technology – reactive filter amendment. This process physically, chemically and biologically treats pollutants while promoting healthier plant growth, which in turn provides additional treatment benefits. Amendment is typically added to existing soils, applied as a fibrous material.

Chris says that Star's systems, in conjunction with other water cleaning technologies, have a bright future around the coal seam gas industry, where "a treatment train ap- ▶



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► proach including our filters might usefully be used. The same is true of conventional coal mining applications. We are very good at removing metals from solutions in minerals applications and there are a lot of urban infrastructural installations and uses too." Star has supplied filters to Boeing in California and to a wide variety of other industrial clients.

The company has also developed a new technology to deal with pathogens. The uses are many and varied and Chris cites the example of a mine site village with a septic tank. Outflows from those septic tanks could have a negative impact on nearby waterways and, he says, "we can remove pathogens in such situations."

Star is close to finalising full automation of its design system using computer modelling tools for use in mine site applications to match water flows and treatments in an optimum fashion. This can help with the installation of appropriate filtration at the design stage of an entire site, while the company can also pre-test a client's effluents in the laboratory to ensure a perfect match between pollutants and filters.

Chris himself is a horticulturalist who has carried out a great deal of research into the use of reactive filter media including a lengthy and exhaustive programme involving the University of NSW, the NSW EPA, Melbourne University (CESAR) and University of Technology, Sydney. He is also founder of the Centre for Organic & Resource Enterprises (CORE) – a dedicated marketing and research network for participants in the resource recovery, organic and clean-tech sectors. CORE plays an active role in advocacy, networking, and research and development as well as marketing via programmes, events and promotional campaigns. Members of the CORE network get access to resource recovery solutions, environmental programmes, awareness programmes, trade missions, latest sector trends and government co-funded programmes.

"We worked with four universities to develop the product," Chris explains. "We are very product-driven and we have the design system to design the products that are then sold on to the various

market sectors." Star Water Solutions has manufacturing agreements with a number of manufacturers around Australia so that products and systems can be produced locally for customers. Star also works in a number of markets overseas, such as Canada and the US, and uses the same principle of local supply. The manufacturing is deliberately kept low-tech but "there is a lot of science behind that low-tech" in terms of the chemistry involved. Products are also extremely low in energy consumption; most of the filters rely on infiltration, for which the driver is gravity, and can be installed in remote locations where there may be no power supply to drive reverse osmosis and other types of treatment that require mechanical treatment.

The company's costs, says Chris, are competitive with other systems on the market. This affordability combined with its leading edge technologies, breadth of experience, and global distribution network have ensured that the company has certainly been making a splash in the industry. ■



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