



Underground fuel storage tanks and contaminated soil before site bioremediation.



Forced aeration static pile composting of pentachlorophenol contaminated soil at Flinders Bioremediation's dedicated facility at Maslin Beach, SA.

## Bioremediation a serious business in SA

By John Satterley

**P**olycyclic aromatic hydrocarbons (PAHs) are common soil contaminants at old gasworks and are considered hazardous to human health. Current chemical and thermal treatments are costly and capital intensive. Composting for many soil contaminants offers a cheaper alternative, but traditionally PAHs have proven extremely difficult to break down using composting. The PAH structures are too large for most common soil bugs to digest efficiently.

The South Australian and Commonwealth governments have provided \$175,000 for research by Flinders Bioremediation p/l (a wholly owned subsidiary of Flinders University) to investigate the use of fungal/bacterial mixtures to remove PAHs from contaminated soil using a modified composting method. Put simply, the challenge is finding the best microorganisms for the job.

Flinders Bioremediation was formed in 1999 to provide consulting and contract research services in the emerging area of environmental biotechnology. The company now has two main divisions - bioremediation and organic waste management. Services include contaminated site assessment, recommendations on treatment options for contaminated sites, advice on regulatory issues and design of composting and remediation processes.

The full-time staff of four work from offices at the university and have access to laboratory space and specialised analytical equipment. Pilot-scale bioremediation and composting studies are carried out at a dedicated bioremediation facility at Maslin Beach south of Adelaide. Up to 10,000 tonnes of contaminated soil can be treated there at any one time:

The 0.8ha plant is part of the Southern Waste Depot landfill site and is operated by FB in partnership with Lucas Earthmovers p/l. The depot has an EPA-approved leachate drainage system and an engineered landfill and is the only facility in South Australia currently licensed to receive low-level contaminated soil.

"Soil bioremediation and organic waste composting both involve dealing with bugs in their natural environment," says general manager Dr Richard Stewart. "We see ourselves as the scientific experts, and aim to complement the activities of engineering companies and consultants in the environmental industry."

"One of our specialist services involves doing lab and pilot-scale feasibility trials to test which bioremediation or composting methods are most likely to succeed. This significantly reduces the technical and financial risk of large-scale remediation for the client."

Currently clients are drawn by word of mouth, through the EPA or through industry bodies. A past big-ticket job was to design, test and implement a composting process to treat 4,000t of soil from a disused wood treatment site at Port Adelaide. The soil was heavily contaminated with pentachlorophenol (up to 600 ppm). It was excavated and successfully treated at Maslin Beach over 12 months, within projected timeframes and under budget.

FB can potentially remediate between 1t and 5,000t of contaminated soil in a three-month to 24-month period, and has dealt with contaminants such as diesel, oil, petrol, PAHs, pentachlorophenol, polychlorinated biphenyls and heavy metals. "We offer both on-site and off-site services to cater for those jobs where it is economically important for the land owner or developer to remove the soil from the contaminated site," says Dr Stewart.

The state government recently announced a "zero waste" levy which applies to any waste going to landfill. The levy is designed to divert organic waste (including green waste and hydrocarbon contaminated soil) from landfill because this type of waste can contribute to groundwater contamination and the production of harmful greenhouse gases.

"We are well positioned to help industry divert organic waste from landfill by finding alternative markets such as compost," says Dr Stewart. "Also we can significantly reduce the cost of disposing contaminated soil to landfill by reducing the category of contamination to low-level contaminated soil, waste fill or even clean fill using bioremediation treatments."