# Rehabilitating the final void

A study centred on seven open-cut coal mines in Queensland's Bowen Basin will help mining companies develop strategies to reduce the long-term impacts of their activities on the environment.

The study – part of CSIRO's Minesite Rehabilitation Research Program – is funded by BHP Australia Coal, and managed by Rust PPK Pty Ltd. Scientists from three CSIRO divisions are involved.

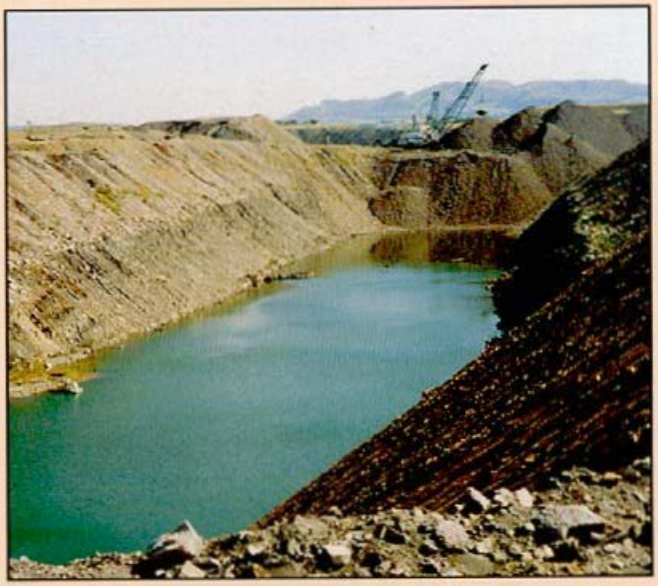
Of particular concern at the end of open cut mining operations is the water that could accumulate in what is known as the final void: the site of the last excavation. In some instances these holes will be several kilometres in length, about 50 metres wide and 150 m deep, and may become permanent features of the landscape. The floor and lower walls of the void are relatively impermeable, so large amounts of water may accumulate.

Rainwater will flow over the surface of, and percolate through, the piles of mine waste (spoil heaps) beside the void, dissolving and transporting salts and trace elements into the void. This leaching process could adversely affect on the suitability of the water for other uses. Both the quality of the water in the void, and its total volume, are of concern.

One research team, led by Dr David Jones from the Division of Coal and Energy Technology, is studying the quality (chemical composition) of the 'void' water. Samples from existing voids have been taken over several months to measure salt content and identify specific elements which may reach elevated concentrations.

The water quality is important, because stock may gain access to the water or wildlife may use the sites as refuges. As the voids are flushed infrequently, if at all, concentrations of salt, particularly sulfates, or specific trace elements, may become unacceptably high.

Once the main contaminants are identified, researchers will try to identify the specific rock strata that are the main potential sources of these contaminants. To do this, rock samples from boreholes in the undisturbed highwall are being tested to determine their mineral content and leachability. If particular rock strata can be identified as a source of contaminants, then, in current mining operations, overburden incorporating these strata can be managed in such a way as to control their future effect on water quality.



**Studies of the quality and volume of water entering 'the final void' after open-cut mining will contribute to the development of minesite-rehabilitation strategies.**

Division of Water Resources scientists, led by Dr Lloyd Townley, are assessing the quantity of water in the voids. They will model the way surface and groundwater flows into the voids. Knowledge of water volumes is particularly important, as excessive rainfall can cause the void to overflow, or cause a spoil to slip into the void, possibly displacing water in a surge over surrounding land.

To complement these studies of water volumes and quality, Dr Youzhi Wei and Dr Yu Sheng from the Division of Exploration and Mining will be modelling the tendency of the void walls to collapse. This is called geotechnical stability and is an important consideration for possible future beneficial uses of voids.

The ultimate aim of this research is to help companies determine rehabilitation strategies and to meet the requirements of the Queensland Department of Minerals and Energy for post-mining landforms to be maintenance-free.

*Contact: Dr Tony Milnes, CSIRO Minesite Rehabilitation Research Program, Private Bag 2, Glen Osmond, SA 5064, (08) 303 8501, fax (08) 303 8551, email: tony.milnes@adl.soils.csiro.au.*