Could the oceans sink our warming blues?

After five years of surveying the Southern Ocean, Australian scientists have begun mapping regions where carbon dioxide is absorbed from the atmosphere and stored in the ocean's depths.

Dr Bronte Tilbrook of CSIRO Marine Research says the Southern Ocean is important in understanding the ocean's capacity to absorb carbon dioxide because it is one of the few locations where surface waters are dense enough to sink into the deep sea.

'The surface waters absorb fossil fuel carbon dioxide from the atmosphere and by sinking into the deep sea they effectively pump carbon dioxide out of the atmosphere,' Tilbrook says. 'Without this ocean absorption, the build-up of carbon dioxide in the atmosphere would be much more rapid.

'Our work aims to determine how much carbon dioxide is absorbed and how that might change if the Earth's climate changes in the future. Australia has a special interest in the Southern Ocean, not only because it is our backyard, but because it is important in the Earth's climate system and the global carbon cycle.'

The ocean's capacity to absorb carbon dioxide is immense and this has led to suggestions that carbon dioxide generated by industry might be directly injected into the deep ocean, rather than released to the atmosphere. The CSIRO research will help assess whether the concept of direct injection is feasible or science fiction.

'Carbon doesn't disappear. It can only go back into the ocean, into plants and forests, into the atmosphere, or be put back deep underground,' Tilbrook says. 'This is one of the few options available to reduce emissions of carbon dioxide and the work will help evaluate the success of such a strategy.'

Tilbrook is studying ocean measurements taken by scientists from CSIRO and the Antarctic Cooperative Research Centre aboard the Australian icebreaker Aurora Australis. Central to the research are records of the state of the ocean surface where currents, temperatures and the marine ecosystem influence the rate of gaseous exchange between the ocean and atmosphere.

The study, part of CSIRO's Climate Change Research Program, is funded by the Federal Department of Environment Sport and Territories. Measurements have been collected as part of the World Ocean Circulation Experiment and the Joint Global Ocean Flux Study, international projects aimed at understanding ocean circulation and the movement of carbon through the ocean.

Contact: Frances Sugden, CSIRO Marine Research, (03) 6232 5478, fax (03) 6232 5123, email: Frances.Sugden@ml.csiro.au.

Craig Macauley

Railyard asbestos study yields deep solution

Until the mid 1980s, Adelaide's Islington Railyard served as a dump site for rail workshop wastes, including blue asbestos from dismantled lagging and locomotives. The Federal Ministry of Transport, responsible for remediating the 12-hectare site, asked CSIRO's Division of Building, Construction and Engineering to assess the contamination and devise a cost-effective 'clean-up' strategy.

Leader of the CSIRO study, Steve Brown, began by studying the site's history to find where the waste was most likely located and how deep it was buried. Hundreds of soil, waste, air and sub-surface water samples were then taken to evaluate the quantity and significance of contamination.

During the study, Brown developed a simple method for assessing microscopic contamination levels of soil and waste fill. This involved dispersing the material in water and counting asbestos-like fibres in a drop of water by light microscopy. These counts were correlated to known mixtures of asbestos in soil.

'The sampling showed contamination was widespread, consisting of large objects, such as blue asbestos blankets, and trace asbestos in a number of landfills across the railyard site,' Brown says.

After studying previous cases from Australia and overseas, Brown decided the best remediation approach – on the basis of environmental risk management, safety and cost – was to maintain the wastes on site and bury them in deep landfill cells.

This method had the advantages of containing disturbed waste during remediation, reducing site coverage with waste from 50% to 10%, and reducing costs. It also enabled a range of options for site reuse including industry, commerce or limited residential development.

Brown says the disposal of asbestos waste in Australia received little control before the 1970s and companies and governments now face the task of cleaning up contaminated sites. He says the Islington study will aid the development of national guidelines for asbestos remediation.

Contact: Steve Brown, CSIRO Building, Construction and Engineering (03) 9252 6027, fax (03) 9252 6244, email: steveb@mel.dbce.csiro.au.

Results of the Islington Railyard study will aid the development of national guidelines for asbestos remediation.