

# MANAGING FUEL SPILLS IN ANTARCTICA

Technology developed to clean up polluted groundwater – typically from mining or agricultural activities – is being modified to work in Antarctica to halt the flow of a large plume of diesel spilt at Casey in 1999.

A permeable reactive barrier has been built downhill of the spill and will be trialled over the next five to eight years for its ability to remove the fuel, which is released from its ice prison each summer when the snow melts.

The work is being led by the Australian Government Antarctic Division in collaboration with the University of Melbourne, Macquarie University and BP Alaska.

‘Each summer fuel from the original 5000 litre spill percolates down into a nearby melt lake and eventually into the sea,’ contaminants geochemist, Dr Ian Snape, said.

‘In 2005-06 we installed a permeable reactive barrier to help remove the fuel, but also to slow its flow so that we can apply other low-cost, on-site remediation techniques to treat the contaminated soil.’

The permeable reactive barrier was built by digging a trench 5.5 m wide, 2 m long and 1 m deep, in the path of the polluted melt water, with wings on either side to funnel the water into the trench. The trench was then filled with metal pallets containing three different layers of permeable, reactive materials.

‘The first layer contains nutrients which, when mixed with the water, stimulates naturally occurring microbes that will do the hard work of digesting the diesel hydrocarbons,’ Dr Snape said.

‘The second layer contains a reactive material that captures the hydrocarbons and holds them long enough for the microbes to break them down into harmless by-products – water and carbon dioxide. The third layer catches any excess nutrients before the filtered water passes back out into the soil.’

The team is testing different combinations of material in each of the three layers to identify the

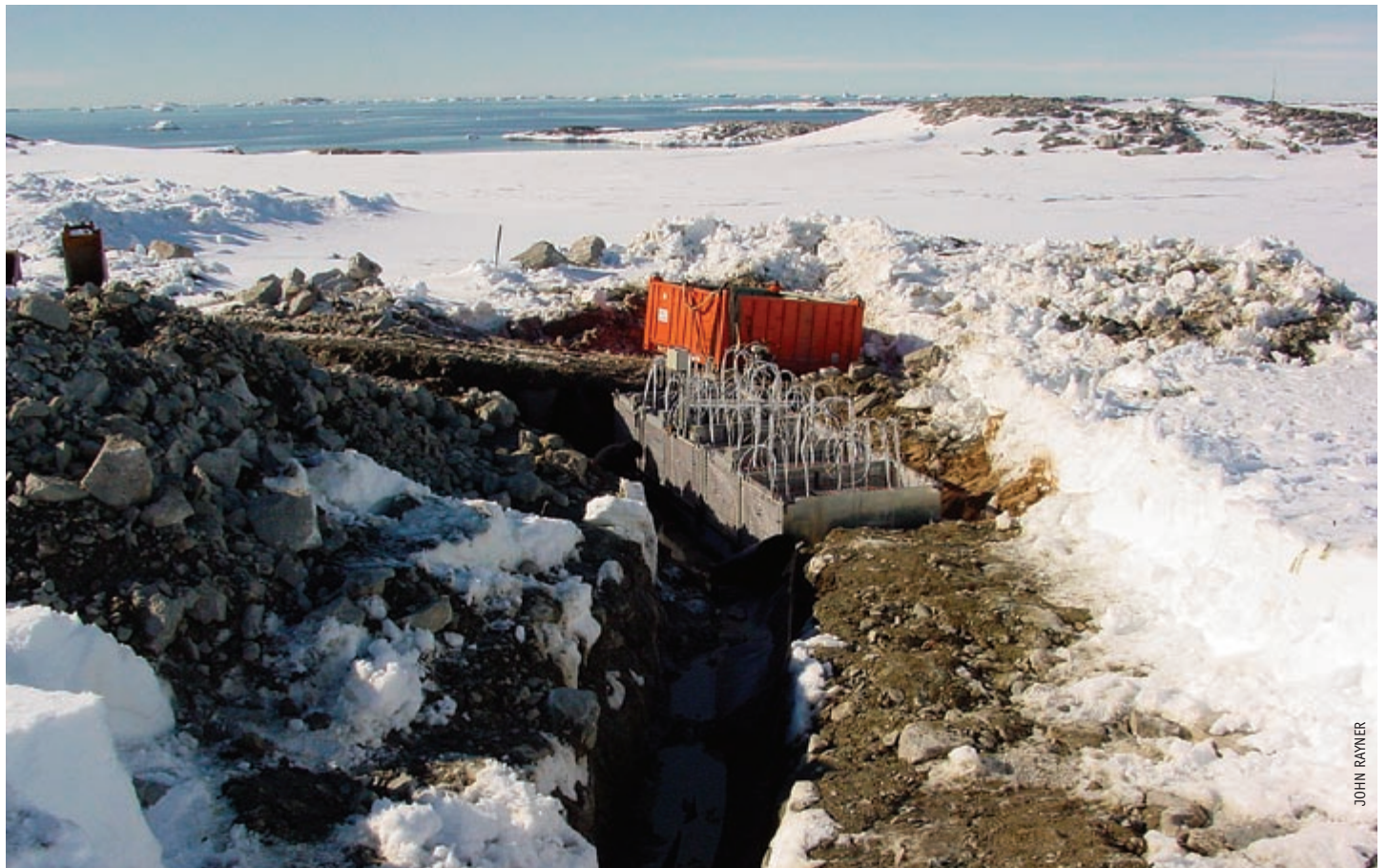
optimal combination for removing hydrocarbons, while ensuring the environment is not negatively affected. An array of sensors and probes have been inserted into each layer to monitor what goes into the barrier, the conditions inside the barrier, such as temperature, water flow, oxygen levels, nutrient and hydrocarbon concentrations, and what comes out.

‘We have worked closely with tradespeople and other staff on station to develop and install these barriers and set up the monitoring equipment,’ Dr Snape said.

‘We have also worked with policy makers to ensure our experimental protocols and the materials we use comply with environmental guidelines.’

Over the past decade the Australian Government Antarctic Division has been proactive in introducing improved fuel clean-up and spill prevention measures as part of its Environmental Management System. These include improved operational procedures for fuel handling and spill response, new spill equipment, and new response protocols and reporting procedures.

*The permeable reactive barrier is in place in the trench, which directs contaminated water from the site through the barrier. Probes and sensors which monitor conditions inside the barrier are visible.*



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