Ice pigging is starting to get the bit between its teeth in Australia since various water utilities trialled the technology for cleaning their mains in 2011. It is easy to see why, when considering one of the early adopters, Yarra Valley Water. Compared to flushing, it found cleaning the pipes with a semi-solid ‘ice pig’ took half the water and around half the time, was cheaper per kilogram of sediment removed and was up to 10 times more effective.

Wingecarribee Shire Council in NSW has also jumped on board to tackle manganese, while Queensland Urban Utilities is among utilities using it to remove the build up of fats, oils and grease in a sewer rising main.

With a minimum pipe diameter of 80mm and maximum of 450mm – limited only by the sheer volume of ice required – there are numerous applications.

Paul Banfield, the local commercial manager of patent-holder Aqualogy, said he’s fielding inquiries from the mining sector about cleaning bore water pipelines and food processors about removing in-pipe starch deposits.

In fact the key issue at the moment is keeping up with demand, with the two teams now in the country fully employed along the east coast for the next six months.

So what exactly is ice pigging? Yarra project manager Peter Dang told the Ozwater ’14 conference they inject an ice slurry with 5% salinity, which remained semi-solid at -6C, into the main via a fire hydrant, then open the upstream valve to push it through under water pressure.

“It picks up high sediment load at the front of the pig and it tends to wipe biofilms off the walls,” Dang said.

Operators at the downstream hydrant keep an eye on pressure, time, cumulative litres, salinity levels and temperature. When the temperature drops and the salinity rises they close the valve and pump the pig out to waste tanker for treatment at Yarra’s wastewater treatment plants. It is then flushed and returned to service, altogether taking a couple of hours for a 2-3km stretch of main.

**Operational issues**

While there is now solid evidence of the benefits of ice pigging, there are several operational issues worth considering.

For starters, Dang said Yarra has decided not to use it on unlined steel pipes but was comfortable using it on all other pipe material types, even asbestos cement-lined pipes after its’ testing for residuals came up clean.

Also, there has been no evidence of residual salt and no taste complaints.

The key issue, however, is cost. While ice pigging is cheaper per kilogram of sediment removed – $470/kg compared to $2,655 for flushing, according to Yarra – it was more than four times more expensive per metre of main, around $1.80/m compared to just 40c when flushing.

As a result, Yarra plans to ice pig around 400km of mains per year for the next five years, running the operation for just six months at a time. Altogether that is less than a quarter of its mains network, targeting water distribution zones with the most water quality complaints and highest level of total coliforms.

There is also the issue of peripheral costs, such as sending plumbers to premises that ignored the notice not to use water during the disruption.

“It is a risk that Yarra Valley Water is willing to take for the first year, but we are going to do an analysis of all the peripheral costs and then we will quantify that,” said Dang.