What the floc have we been drinking?

Gordon Cunningham, Palerang Council's Director of Engineering takes us on a tour of the new water treatment plant

Gordon Cunningham: "Bear in mind that what you're looking at has been removed from many thousands of litres of water, but nevertheless, it's what Braidwood residents are no longer drinking."

Water from the Shoalhaven River is still pumped into the town dam. There's a pipe coming in from the bottom of the dam. It's curled up so that it doesn't draw sediment from right on the bottom. As the water comes in to the treatment plant there's a little pipe adding a coagulant to make all the impurities floc (bind) together. We also have an activated carbon unit which is mostly off-line but we can switch it in if we have a problem with taste, odour or toxins. If we have, say, blue-green algae in the incoming water we can switch it on.

In this first tank there is a flash mixer followed by a slow mixer which causes the flocs (particles of stuff we want to remove from the water) to bind together.

There's a big baffle that goes right to the floor and the water comes underneath there where it's very still and then two mixing paddles going contra, against each other, very slowly make the floc a bit bigger and help it stick together.

Essentially what's happening is that it's taking all the suspended solids out of the water and making them stick together. The coagulant, aluminium sulphate, puts a charge onto the suspended particles and they grab on to each other and come out of suspension. It's separating the impurities from the water.

The water then comes into the big tank (where I'm standing in the photo). It's the real key to the process. It's called a DAFF tank, that is, dissolved air flotation and filtration and it's got two components. It's got a great big filter like a coke can, making bubbles like a soda stream. Air is injected into the water making it super-saturated like in a soda bottle.

The super-saturated water is injected into the bottom of the filtration tank and as it rises it bursts into little bubbles which grab hold of the suspended flocs and it all rises to the top. Then every two hours, water jets around the edge of the tank break the bond between the floc 'fudge' and the tank and a rotating blade travels down the tank and scoops the goo blanket off and chucks it out the back. Any other tiny floc that doesn't float goes straight to the bottom and gets caught by the sand, coal and garnet on the bottom, like a pool filter.

Every twenty-four hours the tank is automatically drained, the media is fluffed up with a mixture of air and water which effectively backwashes all of the retained impurities from the filter bed. The tank is then refilled and commences the next cycle.

The foamy fudge off the top of the tank and the sludge from the bottom are sent to a thickener and what's left is dried in 'pillow cases' and taken to landfill.

The water that comes out the bottom of the tank through the sands is the product water — it's beautiful, crystal clear. When you look down into the reservoir tanks you can see all the way to the bottom — aqua pura.

Before the water goes to the reservoir three things are added; caustic soda to control the pH (acidity or alkalinity) of the water, chlorine to kill any bugs in the reticulated pipe network and, subject to final approval of the plant by NSW Health, fluoride.

The reservoir tanks are eight metres high, about 10 metres higher than the old dam supply and this has raised the town water pressure by 100 kpa (14 psi) or so. We are expecting a bit of trouble with some of the older weak water mains bursting. The long-term solution will be to replace all of the problem mains although this will take some time and, of course, the necessary dollars.