

Responses to Queries from Binningup Desalination Action Group Dec '07.

1. How do we dispose of liquid waste (after cleaning membranes) - use of Verve Pond at Kwinana?

Currently at Perth Seawater Desalination Plant (PSDP), Kwinana, chemical cleaning is carried out using either sodium hydroxide solution (alkaline) or citric acid solution ONLY. On completion of the membrane chemical cleaning process, the spent cleaning solution is neutralised (to near pH 8) and then discharged to the ocean outfall.

The evaporation pond adjacent to PSDP, owned by Verve Energy, is not used for receipt of chemical cleaning wastes.

It has been proposed to install some tanks at the PSDP which allow the storage of the entire cleaning and rinse solution from the cleaning of two racks of RO membranes. This will then allow the possibility of using other chemicals in the cleaning process. The spent cleaning chemicals can then be destroyed (degraded to environmentally innocuous compounds) in the storage tanks and then discharged to the ocean outfall or, if necessary, removed from site to an approved disposal facility.

For the SSDP, Binningup, it is anticipated that buffer tanks for the chemical cleaning waste will be installed. Neutralised and treated waste would be discharged to ocean.

At both desalination plant sites, the occasional discharge of cleaning waste is still subject to approval by the DEC and the chemical waste must have been previously demonstrated as not causing environmental harm. The cleaning chemicals are selected on this basis.

2. Iron spill into ocean at Kwinana - how many tonnes in the process? ('50% of the sludge is iron')

No iron solution (ferric sulphate solution) has been spilt at the PSDP, Kwinana.

Ferric sulphate solution is used as a coagulant at PSDP, and will probably also be used at SSDP. The ferric sulphate solution is dosed into the influent seawater, just after the intake pumps and prior to the filtration system. The ferric sulphate precipitates as ferric hydroxide which forms small solid particles (flocs); it is these flocs which attach to the very fine suspended particles in the incoming seawater and enable them to be removed in the filters.

The suspended solids from the seawater, together with the precipitated iron, is captured in the waste treatment process and removed from site by truck as 'sludge'. This process differentiates PSDP from many other seawater desalination plants around the world, where waste solids are discharged directly back to the ocean.

The filtered water typically contains a trace amount (typically less than analytical detection levels) of iron. This is rejected by the RO membranes and is discharged to the ocean in the brine stream. The brine is analysed regularly; all results to date have indicated that the total iron concentration in the brine discharged to the ocean is less than the analytical detection limit (0.05mg/L) except one sample in March 2007 with a total iron concentration of 0.06mg/L. Seawater also naturally has low levels of iron.

Even at this low concentration of iron in water, staining of concrete occurs over time. At PSDP, the brine outfall tank exhibits brown staining; the seawater intake structure, some of the drain channels in the RO building and even the drinking water tank show similar staining.

The waste sludge from the PSDP comprises precipitated iron, solid particulate matter from the seawater (comprising silt, plankton, fragments of organic matter, etc) and also, a range of precipitated compounds from the seawater, including heavy metals. The waste sludge from

the PSDP is removed from site to a licensed disposal facility, for ultimate landfill disposal in accordance with DEC requirements.

Sludge removed from the PSDP site typically amounts to approximately 250 tonnes/month.

The iron content of the sludge is typically about 16% \pm 3%, as Fe.
Hence, of the 250 t/month of sludge removed from the PSDP, approximately 40 tonnes is iron as Fe (approximately 57 tonnes as hematite [Fe_2O_3]).

Blair Shackleton
WorleyParsons Services Pty Ltd
13 December 2007