

Chemical Questions

1. Proportion of power used in the seawater pump station (compared to total used at plant)?

The pumping power required is dependent upon the plant design. However, based on the Perth Seawater Desalination Plant, the absorbed power of the seawater intake pumps is 2.0 MW, in the total plant absorbed power of 24.1 MW – the seawater intake pump station about 8.5% of the total plant load.

2. Are there low frequency magnetic emissions from the PS?

No. Within the plant, all electrical equipment and cabling will be designed to eliminate electro-magnetic emissions. Failure to do this may cause problems with the electrical supply (in which case Western Power would insist on rectification works be performed), interference between electrical equipment, interference with control systems and interference with sensitive monitoring equipment within the plant.

3. Quantities of fluosilicic acid, ferric sulfate and sulfuric acid to plant?

	Dose point	Dose Rate *	Weekly Use **
Fluorosilicic acid	Potable water	0.9 mg/L	3.2 m ³
Ferric sulphate	Sea water	5 mg/L	17.3 m ³
	Waste water	12 mg/L	2.2 m ³
Sulphuric acid	Sea water	26 mg/L	31.3 m ³

* As 100% compound

** As commercial product

4. Chemicals used in membrane backwashing?

The two most common solutions for membrane cleaning are as follows:

- Solution of approximately 1,500 mg/L sodium hydroxide and 250mg/L sodium lauryl sulphate (a surfactant). The sodium hydroxide concentration in the solution is adjusted to achieve pH12.5
- 2,000mg/L citric acid solution, adjusted to pH2 with sodium hydroxide

Alternative cleaning solutions may be used under certain conditions.

Solutions include:

- Solution of sodium hydroxide only at pH 12.5

- b. Solution of sodium hydrosulphite at approximately 1,000 mg/L
- c. Solution of hydrochloric acid at pH 2.0
- d. Solution of sodium tripolyphosphate (2,000 mg/L) and EDTA (800mg/L) - not favoured due to presence of phosphate
- e. Solution of sodium tripolyphosphate (2,000 mg/L) and surfactant - not favoured due to presence of phosphate

5. Brine discharge temperature, pH, inorganics, residual chlorine oxides and dioxin generation?

The brine discharge temperature is very close (± 0.2 °C) to the ambient seawater temperature (ie the desalination process does not add significant heat).

The brine at point of discharge is approximately pH 7.1-7.4.

The brine is essentially seawater concentrated by a factor of approximately 1.8. Dosing of sulphuric acid and ferric sulphate into the feed seawater will increase the sulphate concentration in the brine marginally, relative to other ions. The added ferric irons will precipitate, be captured in the filters and ultimately be discharged to landfill. The added coagulant aid, polyDADMAC, similarly will be almost completely captured in the solids waste system for landfill disposal.

Chlorine / hypochlorite is not present in the brine. It is possible that some disinfectant byproducts result from dosing sodium hypochlorite to control marine growth in the seawater intake pipeline. The hypochlorite dosing is intermittent, typically occurring for about 30 minutes once per week at a dose rate of approximately 10 mg/L

There has been no measurement to date of disinfectant byproducts or dioxins in the brine.

6. What is the antiscalant and biocide used?

RO antiscalants are typically proprietary formulations. For the Southern Seawater Desalination Plant, it is expected that the antiscalant selected will be based upon a polycarboxylic acid / phosphonate polymer.

Sodium hypochlorite will most likely be used for control of marine growth within the seawater intake pipe.

Chlorine gas will be used as the disinfectant for the drinking water produced by the plant.

The biocide used in the RO membranes will be 2,2-bibromo-3-nitrilo propionamide (DBNPA).

7. What is the preservative used in the racks?

Sodium metabisulphite solution will be used as a membrane preservative.

8. Does the H₂SO₄ contain any selenium, cadmium, arsenic? If so in what quantities (ppm)?

Typical analysis (by vendor) of 98% sulphuric acid currently supplied to Water Corporation:

Arsenic (As) < 3 mg/L

Cadmium (Cd) < 2 mg/L

Selenium (Se) < 1 mg/L

Water Corporation, as part of their supply contracts, require chemical vendors to annually provide an independent analysis by NATA registered laboratory of the quality of supplied product.

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