

Information Sheet

Emigrant Creek Water Treatment Plant – treatment process

Manganese removal

Raw water is pumped from Emigrant Creek Dam into the treatment plant from the raw water pump station at a rate of up to 100 litres per second. The pump station has two pumps at the same depth which work in alternate duty, as well as provision to connect a pump at a lower depth if dam levels are low.

The raw water is initially dosed with potassium permanganate for iron and manganese removal. The chemical makes soluble forms of iron and manganese precipitate out of solution (form solid particles) so that they can be filtered out.

Buffering and pH correction

Hydrated lime ("lime") is dosed to raise the alkalinity and hardness and carbon dioxide (CO₂) is added to lower the pH. The CO₂ reacts with the lime to form calcium bicarbonate which "buffers" the water, making it more resistant to changes in pH and, together with the CO₂, prepares it for coagulation.

Coagulation

A coagulant (polyaluminium chloride) is then added to cause small, lightweight, non-settleable particles in the water, such as clay, to clump together and form "floc" which can then be filtered out. Unlike Nightcap WTP, the water at Emigrant Creek WTP does not go through flocculation tanks and instead forms a fine floc suited to the filtration process at this plant.

Filtration

The dosed water is then pumped into the membrane filtration plant via three self-backwashing strainers. The strainers provide a physical barrier upstream of the filters to ensure coarse material in the water does not damage the membranes.

The membrane plant consists of three "trains" each carrying 10 tubes of 0.05 micron membrane filters. Water is pushed through the membrane pores under pressure to remove the floc formed during coagulation including organic colour and solids as well as any microscopic organisms including bacteria, Cryptosporidium and Giardia. This also removes the coagulant chemicals which are bound up within the floc. Each filter train is backwashed approximately every 40 minutes of operation time and is chemically cleaned every 24 backwashes. The backwash waste water is collected and treated in the wastewater treatment system.

Primary disinfection

The filtered water (or permeate) is then pumped through the ozone contact tank where primary disinfection occurs. Ozone, a strong oxidant, is manufactured on-site using a generator which converts dried compressed air to ozone (O₃). Ozone breaks down any organic material that may be present (such as taste and odour causing compounds, algal toxins, pesticides and herbicides) into biodegradable compounds. The top of the tank is enclosed and air is extracted from the roof and diverted to an ozone destruction device, preventing excess ozone from escaping into the atmosphere. The water is then filtered through biologically activated carbon (BAC) filters, where the microbiological action in the filters consumes and removes the compounds. These filters are cleaned periodically by backwashing and the waste water is collected and returned to the beginning of the plant for reuse.

Secondary (residual) disinfection and pH correction

The treated water is then dosed with sodium hydroxide (caustic soda) to raise the pH to drinking water standards and sodium hypochlorite (chlorine) for residual disinfection. From here the water is pumped up to Knockrow Reservoir for distribution to consumers.

Wastewater treatment and disposal

Backwash water from the strainers and membrane filters is collected and sent to a wastewater thickening tank. The suspended matter in the waste water is allowed to settle out to the bottom of the tank and the clear water on top overflows in to a collection tank where it is then sent back to the beginning of the plant. The sludge at the bottom of the thickener is periodically discharged to drying beds on site where the water is allowed to drain and is then retreated through the wastewater plant. The dried earth-like sludge material is then removed for off-site disposal.

