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CORMIX simulations of brine discharges from Barka plants, Oman

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ABSTRACT

There are two power generation and seawater desalination plants currently operated at Barka, Oman: Barka I was commissioned in 2003, and Barka II in 2009. The cooling water from the power generation plants are mixed with reject brine (and other effluents) from desalination plants and are discharged through the same marine outfall systems. Therefore, during 2009, the brine discharge plumes changed from the previously positively buoyant from Barka I plant to a newly negatively buoyant from the combined Barka I and II plants. Consequently, instead of rising to the sea-surface, the new brine plume will now tend to sink and stay at the seabed. CORMIX simulations were carried out for two scenarios that represent the previous heated brine discharges and the new concentrated brine discharges from the Barka plants. Due to uncertainty in the input data, further simulations were carried out using salinity as a measure of the plume concentration for single port and multiport, and by varying the ambient current velocity, the effluent discharge density and flow rate. The results show that the water quality standards in the Omani coastal marine environment within the regulatory mixing zone at a 150 m radius from the discharge point have been met for both scenarios. However, the potential benthic impact due to the attachment of the new brine plume at the seabed should be monitored and investigated further.

Keywords: Barka desalination plants; Brine discharge; CORMIX; Marine outfall; Multiport; Oman

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