



A review of strategies for RO brine minimization in inland desalination plants

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ABSTRACT

Water scarcity in many inland areas is increasing the demand for new groundwater desalination plants. Co-produced coal seam gas (CSG) water (or coal bed methane as known in the USA), which is mostly brackish, is extracted in huge quantities during CSG production and requires advanced treatment. Reverse osmosis (RO) is the leading technology applied in municipal desalination and for treating CSG water in Australia and in some locations in the USA. Antiscalants are often dosed during RO pretreatment to prevent membrane scaling. Recovery rates are limited by antiscalant efficacy and large volumes of brine are frequently disposed of in evaporation ponds. The search for environmentally friendly methods for RO brine minimization is considered as a key global issue. In this paper, differences between inland and seawater desalination are highlighted. The existing technologies for RO brine minimization and zero liquid discharge (ZLD) for inland desalination are reviewed. The efficacy and application of two scaling reduction technologies for RO brine minimization: (i) acid/antiscalant addition and (ii) 'high pH precipitation treatment' are compared. Finally, more complex ZLD and volume reduction systems, such as the high efficiency RO (HERO™) and the SAL-PROC™, are analyzed as well.

Keywords: Reverse osmosis in inland areas; Brackish groundwater; Coal seam gas water; Brine minimization; Zero liquid discharge

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