

## Alternative approach for assessment and limitation of environmental impacts from desalination plant water discharges by substitution of the “mixing zone” by a “minimum dilution volume”

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### ABSTRACT

Desalination plants are processing huge quantities of seawater for the production of high quality potable and process water. With regard to environmental impact the main concerns are the increased temperature and salinity of the process effluent (brine, cooling water) which has to be rejected to the sea. Many national and international environmental regulations and guidelines are stipulating discharge limits for temperature and salinity to be complied with by the projected desalination plant in order to obtain the environmental approval for operation. The World Bank guidelines, as well as many national regulations, assume a so called “mixing zone” around the point of water discharge, within which initial mixing with ambient sea water takes place, and stipulate limits for temperature and salinity increase over ambient conditions at the edge of this mixing zone. However, the size of this mixing zone is not clearly defined and the procedures by which the temperature and salinity values are to be determined are missing. In consequence compliance with the stipulated discharge limits can hardly be proven in quantitative terms and the results of Environmental Impact Assessment (EIA) reports are usually rather imprecise in this regard. This presentation describes in a simplified manner an alternative approach for assessment of the environmental impact and corresponding limitation of temperature and salinity increase due to water discharge from desalination and power plants, which is considered more adequate for this purpose. It is proposed to substitute the unclear criterion of a “mixing zone” size by the water volume available for dilution of the discharged effluent. A basic procedure for the determination of a minimum dilution water volume is outlined, considering the temperature or salinity increase between intake and outfall and the discharged water flow rate. The described general approach may be considered by both environmental authorities stipulating discharge limits and the responsible project parties to enable a more adequate assessment regarding compliance of a desalination project with applicable environmental regulations on a sound data basis.

*Keywords:* Seawater; Desalination; Power; Plant; Temperature; Increase; Salinity; Environmental; Regulation; Guideline; Limit; Discharge; Cooling; Water; Brine; Mixing zone; Assessment; EIA; World Bank; Dilution; Impact; Procedure