



# Demonstration at Pilot Scale

## BRINE CONCENTRATOR UNIT

### Objective

In order to address the environmental concern with disposal of brine from desalination plant, Zero Liquid Discharge (ZLD) based desalination systems are envisaged. To concentrate brine of salinity 5-7 wt.% rejected from seawater desalination plants (i.e. RO & MED), development of thermal Brine Concentrator Unit (BCU), as an intermediate step to achieve ZLD in desalination, has been taken up.

### Salient Features

- Formation of thin falling film inside the vertical tubes for higher heat transfer rate.
- Low contact time for reduction in scaling potential.
- Low evaporation temp. ( $< 65^{\circ}\text{C}$ ) for reduction in scaling & corrosion potential.
- Thermal Vapour Compressor for better steam economy.

### Accomplishment

B.A.R.C. has successfully installed & commissioned indigenously developed  $5\text{ m}^3/\text{d}$  capacity thermal BCU, based on vertical falling film evaporation along with thermal vapour compression. BCU has successfully demonstrated its performance to concentrate brine from 7 wt.% to  $\sim 22$  wt.% (near to saturation limit of NaCl) and recovers 80 % water as low conductivity ( $\sim 2\ \mu\text{S}/\text{cm}$ ) distilled water.



5 m<sup>3</sup>/d BCU at DD, BARC

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BCU Control Desk

### Applications / Users

BCU is useful for minimizing brine discharge and implementing ZLD of effluent from various processes. Potential industries for application of BCU are:

- **Desalination Industries:** BCU is suitable for desalination industries to increase water recovery, minimize brine discharge and produce high purity salt. BCU is also very useful for desalination plants located in land locked area.
- **Nuclear Industry:** BCU can be used in nuclear industries for minimization of aqueous waste in front end of nuclear fuel cycle.
- **Power Plants:** BCU is useful for nuclear/thermal power plants working in co-generation mode to produce water, electricity and minimize brine. BCU can also be used also to treat cooling tower blow down and achieve zero waste water discharge .
- **Chemical Industry:** BCU is also useful to chemical industries such as leather and textile industries where zero liquid discharge of waste water is mandatory.

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