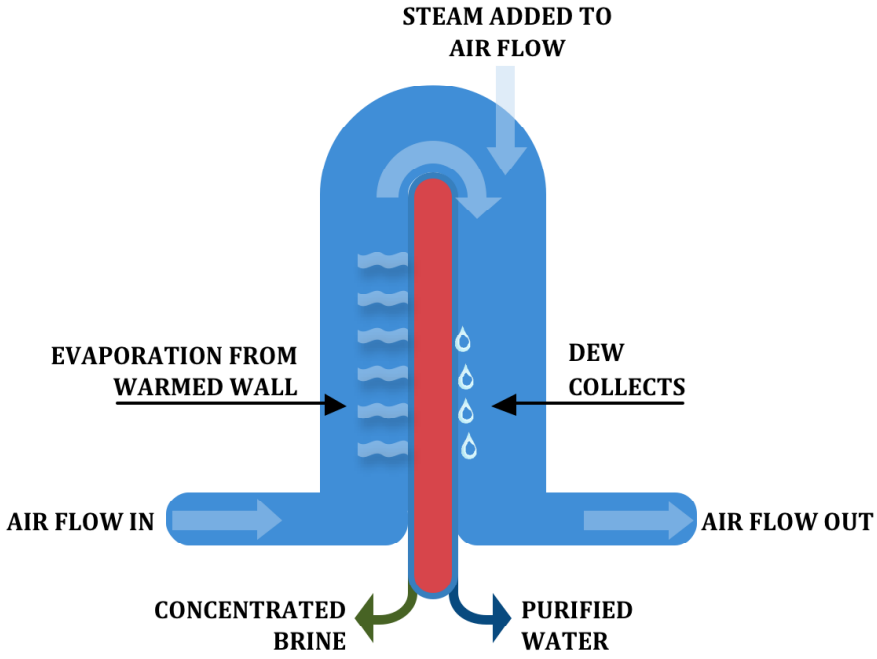
Dewvaporation – AltelaRain[SM] Process

Dewvaporation uses a humidification-dehumidification cycle to produce distilled product water. Feed water is evaporated by heated air, and fresh water is condensed on the opposite side of a heat transfer wall. The energy needed for evaporation is partially supplied by the recovered energy released during condensation. The tower unit is built of thin plastic films to avoid corrosion and to operate at atmospheric pressure to reduce energy requirements. The process designed by AltelaRain[SM] can treat approximately 4,000 gallons per day (100 bbl/day) of produced water with TDS in excess of 60,000 mg/L. The AltelaRain[SM] system can reduce effluent disposal volumes by as much as 90%.



Summary of technical assessment of AltelaRain[SM] process

Criteria	Description/Rationale
Status of technology	Full-scale application for produced water treatment.
Feed water quality bins	Applicable to water with TDS ranging up to 60,000 mg/L and having a broad variety of chemical composition, including BTEX.
Product water quality	Product water quality is very high with TDS in the range of 20-100 mg/L. The process also has a high removal rate of heavy metals, organics and radionuclides.
Recovery	Product water recovery is approximately 90%.
Energy use	AltelaRain[SM] claims that the electricity requirement is low because the system operates at ambient pressures and low temperature. The AltelaRain[SM] system's energy demand/costs are approximately 30% of comparable ambient pressure distillation/evaporation processes. The 'multiple-effect' energy savings are comparable to those achieved by pressure distillation methods such as MVC.
Chemical use	No chemicals are required for operation; however, acid cleaning to remove mineral scale may be required.

Summary of technical assessment of AltelaRain[SM] process

Criteria	Description/Rationale
Expected lifetime of critical components	No data available.
Infrastructure considerations	There are no special infrastructure, supplies, or consumables for Dewvaporation's unattended operation. The energy requirements include 110V electricity (from either a small generator or solar panels), and a source of thermal energy such as from industrial waste heat, well-site flash gas, or through the use of a small natural gas-fired boiler.
O&M considerations	Low level of monitoring and control. Low level of skilled labor required. High level of flexibility: easy to adapt to highly varying water quality and quantity. High level of robustness. High level of reliability. Types of energy required: electricity and thermal.
Capital and O&M costs	Not available. AltelaRain[SM] reported the cost structure associated with building, installing, maintaining and servicing the system is lower than the escalating costs associated with traditional produced water hauling and reinjection. http://www.usbr.gov/pmts/water/publications/reportpdfs/report120.pdf
Pretreatment of feed water	Requires no chemical pre-treatment. Screens (>300 micron) are required if debris are present in feed water to protect the pumps and valves in the incoming lines.
Post-treatment of product water	Product water needs remineralization because of the low TDS level. This may be achieved by lime bed contacting or by blending small amounts of filtered and sterilized feed water with the distillate.
Concentrate management or waste disposal	The current 10% brine stream is transported off the well site and then either injected into a disposal well or evaporated/stored in large ponds.
Status of technology	Excellent for produced water application. Like other evaporative processes, high-energy consumption might be a limiting factor for its applicability if waste heat or cheap energy sources are unavailable.
Note: 1 barrel = 42 US gallon	