

## Evaporation Ponds

Evaporation ponds use solar energy to evaporate produced water. After a large portion of the original water volume evaporates, the remaining concentrated salt sludge is either left in place or removed and hauled offsite for disposal. Depending on produced water quality and other regulatory criteria, the ponds may require liners, or constructed on natural geologic confining layers to prevent infiltration of the water to the aquifer. To maximize the evaporation rate, ponds are generally designed to have large surface area to volume ratios. Evaporation ponds are most viable in relatively warm, dry climates with high evaporation rates, level terrain, and available and inexpensive land. Evaporation ponds must be covered with netting or other deterrents to limit waterfowl and other species from coming into contact with contaminants in produced water.



### Summary of technical assessment of evaporation ponds

Criteria	Description/Rationale
Status of technology	An industrialized technology widely used for produced water management.
Feed water quality bins	TDS range from 2,000 mg/L to greater than 40,000 mg/L.
Product water quality	Not applicable.
Recovery	Concentrate management technology. All water is evaporated into the atmosphere and not recovered for beneficial use.
Energy use	The only energy requirement is pumping concentrate to the pond and in certain circumstances aeration for enhanced evaporation.

### Summary of technical assessment of evaporation ponds

Criteria	Description/Rationale
Chemical use	No chemicals required.
Expected lifetime of critical components	Depending on the projected oil/gas development and concentrated slurry management strategy.
Infrastructure considerations	Large land area requirements. Landscape and topography are important in the location of an evaporation pond. Clay or synthetic liners are often required. Monitoring wells or boreholes are required.  Design considerations must minimize the volume of water that enters the pond from natural runoff or flooding.
O&M considerations	Minimal, pumps are the only mechanical equipment. Other items may include liner repairs and monitoring.
Capital and O&M costs	Capital costs are highly variable and dependent on location. There is little economy of scale, so the method is most competitive for small flows.
Pretreatment of feed water	None
Post-treatment of product water	Sludge disposal if pond has been designed for periodic sludge removal (sludge would require proper handling, treatment, and disposal).
Concentrate management or waste disposal	Pond may be designed for either sludge accumulation throughout life of ponds with capping at the end of useful life, or for periodic sludge removal and disposal.
Status of technology	Excellent for disposal of produced water, more economical and competitive to treat small flows.
Note: 1 barrel = 42 US gallon	