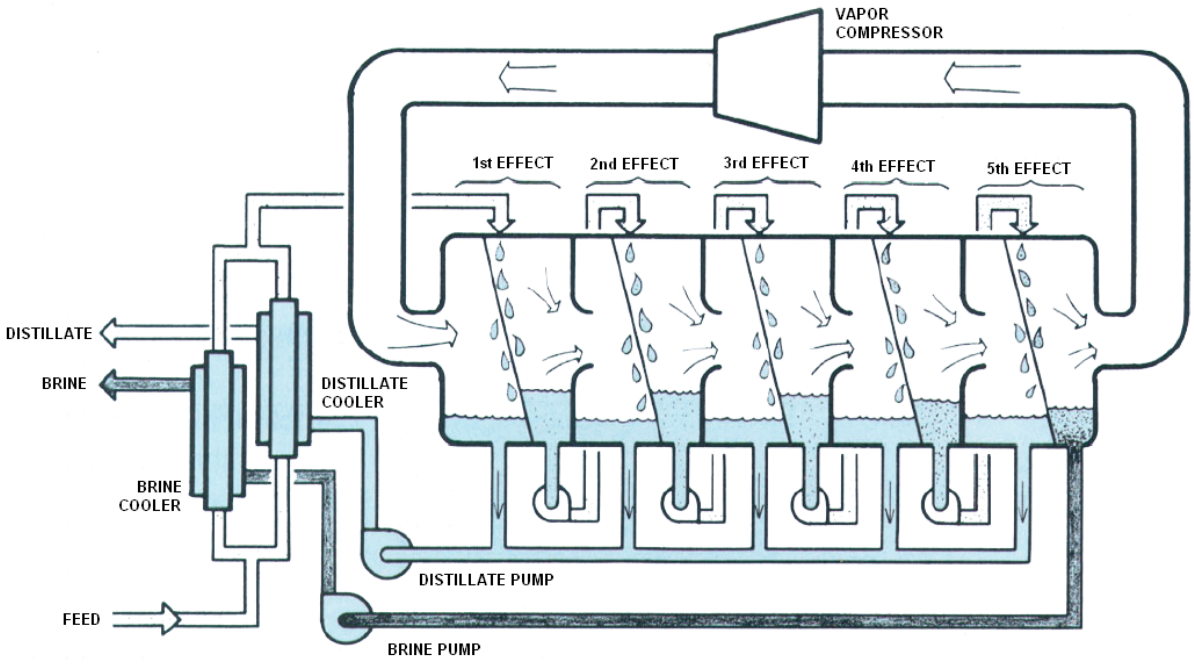
AGV Technologies: Wiped Film Rotating Disk

AGV Technologies, Inc. developed a new Wiped Film Rotating Disk (WFRD) system for produced water treatment. The WFRD is a vapor-compression distillation technology that can also operate in the Multi-Effect Distillation mode if thermal energy is available. The WFRD system uses rotating disks as heat transfer surfaces, upon which a thin microfilm of feed water is applied to the outside surface of the rotating disk. Superheated vapor in the cavity of a disk condenses on the inside surface. A slight temperature difference across this disk allows heat to flow from the condensing liquid to the evaporating fluid, driving evaporation and recycling of the latent heat of evaporation. The evaporated water flows to the next disk/effect and condenses, providing the energy to evaporate more feed water. Currently, AGV technologies, Inc. is developing the PW-600, the first commercial AGV product. The PW-600 system is designed to process 600 barrels of produced water per day. While the initial PW-600 units are electrically powered, models will be available that use renewable energy.



Summary of technical assessment of AGV Technologies Wiped Film Rotating Disk

Criteria	Description/Rationale
Status of technology	Emerging technology in produced water treatment. Has been previously employed for CBM produced water treatment at bench-scale (capacity 2.6 gallons per hour). Currently, the manufacturer is developing a commercial unit for treatment of 600 barrels of produced water per day.
Feed water quality bins	Applicable to TDS range between 1,000 to 23,000 mg/L.
Product water quality	TDS rejection 99%; TOC rejection 70-86%; ammonia rejection is low.
Recovery	Water recovery may exceed 90%.
Energy use	Not available.

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Criteria	Description/Rationale
Chemical use	It is expected that scale inhibitor and acid may be required for process control to prevent scaling. Corrosion control is achieved with pH control. Annual cleaning is typically conducted using acid, EDTA, or other chemicals.
Expected lifetime of critical components	Not available.
Infrastructure considerations	No special infrastructural requirement because the unit is skid-mounted. The system requires housing or shed. Energy sources may be gas, electrical, thermal, and renewable energies.
O&M considerations	High level of monitoring and control required for feed pH, flow rates, as well as steam and vessel pressures. High level of skilled labor required to operate distillation system. High level of flexibility: easy to adapt to highly varying water quality and quantity. High level of robustness: equipment capable of withstand harsh conditions. High level of reliability.
Capital and O&M costs	Not available. AGV Technology estimates that the operational cost of processing produced water with the WFRD will be approximately 30% of conventional distillation systems (~$0.67/bbl). If powered with thermal energy from a methane-fired boiler, the operating cost would be reduced 45% compared with the electrically powered WFRD. A cogeneration configuration results in a 67% cost reduction compared with electrically powered WFRD configuration.
Pretreatment of feed water	Pre-treatment may be required to remove suspended solids or oil and grease.
Post-treatment of product water	UV and activated carbon may be needed to remove miscible hydrocarbons. Remineralization or blending may be required depending on the use of product water.
Concentrate management or waste disposal	The concentrated brine stream will require disposal by deep well injection or evaporation pond.
Status of technology	Similar to other thermal technologies, the WFRD is a good candidate to treat high salinity produced water
Note: 1 barrel = 42 US gallon	