

zero liquid discharge

eliminate liquid discharge, recover valuable process water



experience, reliability, results

Complying with stringent wastewater treatment regulations and reducing water usage are critical considerations in industry today. Numerous environmental regulations, rigorous permitting processes, and lack of water availability, among other factors, are driving many industrial facilities to implement zero liquid discharge (ZLD) systems as a solution.

SUEZ's ZLD systems eliminate liquid waste streams from your plant and produce high purity water for reuse. In many cases, your plant's water consumption can be reduced by up to 90 percent—saving money and helping to protect the environment. You may even be able to capture valuable by-products and sell them to offset your costs.

With more than 35 years of experience in the design, delivery, commissioning and service of ZLD systems, SUEZ provides a comprehensive portfolio of technologies for ZLD applications, including brine concentrators, evaporators, and crystallizers. Proven performers and highly reliable, SUEZ ZLD systems offer 95% availability and are up to 30 percent more energy efficient than conventional designs. These technologies can often be combined with other SUEZ equipment, such as ultrafiltration (UF), reverse osmosis (RO), electrodeionization (EDI) and ion exchange to provide the optimal solution. Our specialists can tailor a system to fit your wastewater characteristics, flow rates, and end-product requirements.



Shenhua Coal Liquefaction Project, Inner Mongolia, 590 gpm, 2009

As the pioneer of thermal ZLD systems, SUEZ is continually developing new thermal solutions that respond to changing market needs. Our extensive global experience can help you tackle the challenges of



Huntington Power Station, Huntington, UT, 200 gpm, 1974



Indiantown Generating Plant, Indiantown, FL, 580 gpm, 1995



Gila River Power Station, Gila Bend, AZ, 2,400 gpm, 2003

stringent discharge regulations, process optimization and effective water and wastewater management. SUEZ ZLD systems can help simplify the permitting process, thereby accelerating your plant development schedule and alleviating environmental concerns.

Our strong vendor relationships enable strategic sourcing agreements and, in turn, offer you the most competitive pricing available. With multiple contracting methods, a variety of system options, and highly experienced design and delivery teams, SUEZ can custom-design a system for your maximum benefit.

robust solutions for demanding applications

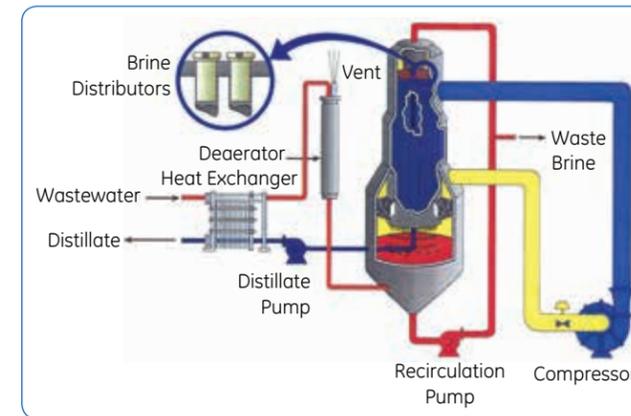
SUEZ's large installed base of robust systems is proven to perform across a broad range of applications, including:

- Power
- Synthetic fuels
- Primary metals processing
- Microelectronics
- Chemical
- Pulp and paper
- Coal mining
- Battery manufacturing
- PVC manufacturing
- Uranium mining
- Petroleum and petrochemical
- Oil refining
- SAGD heavy oil recovery
- Cogeneration
- Fertilizer
- Solid waste (leachate and secondary sewage effluent)
- Coal liquefaction
- Ethanol production

brine concentrator

SUEZ brine concentrators recover up to 95% of industrial wastewater as high purity distillate. This can be used

achieving ZLD: equipment overview



for boiler makeup, NOx control, cooling tower makeup and process use. The remaining five percent is a slurry concentrate that may be sent to a small solar pond, reduced to dry solids in a crystallizer or spray dryer, or used for ash wetting.

brine concentrators can recycle:

- Cooling tower blowdown
- Oil and gas field produced water
- Demineralizer waste
- Reverse osmosis reject
- Electrodialysis reject
- FGD wastewaters
- Boiler blowdown
- Softener waste
- Plant drains
- Salty effluents
- Mine drainage
- Landfill leachate

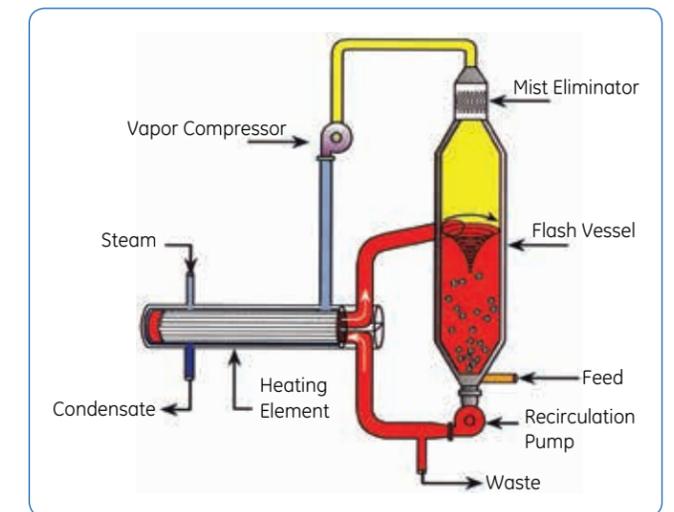


PEMEX Cadereyta Refinery, Monterrey, Mexico, 116 gpm, 1998

benefits:

- **Corrosion resistant titanium**—High grade construction materials mean SUEZ brine concentrators will last for decades and provide reliable operation.
- **Scale control**—Proprietary seeded slurry technology controls scale, often limiting cleanings to only once per year.
- **Patented brine distributors**—Individual tube distributors ensure a smooth flow of brine, avoiding scale formation.
- **Variable waste flows**—SUEZ's largest single brine concentrator treats 1,200 gpm, while small units treat as little as 10 gpm.

- **Energy-efficient operation**—In the vapor compression configuration, the brine concentrator uses 21 to 37 BTU per pound of waste feed. This converts to 50 to 90 kWh per 1,000 gallons of feed, which is 25 to 50 times more efficient than conventional single-effect, steam-driven evaporators
- **Ability to run on electricity or steam**—Typical operation is by mechanical vapor compression, but brine concentrators may also run on steam in a multiple-effect configuration.
- **Fully automated operation**—Maintain precise system control while minimizing operator interaction.



crystallizer:

Meeting stringent zero-liquid-discharge requirements also requires a crystallizer, to reduce brine concentrate to a dry solid. Recovered water can be recycled back to plant processes, while an easy-to-handle dry solid can be safely disposed of in an approved landfill.

- **Ease of use**—With simple color graphic controls and an automatic wash system, SUEZ's crystallizers are easy to operate.
- **Ease of installation**—Skid-mounted, fully packaged systems with all auxiliary equipment and controls.
- **Valuable product recovery**—Systems can be designed to recover specific salts from a waste stream.
- **Expertise in zero liquid discharge**—SUEZ has more than 35 years of experience developing and implementing thermal technologies to solve zero liquid discharge challenges for customers worldwide.

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