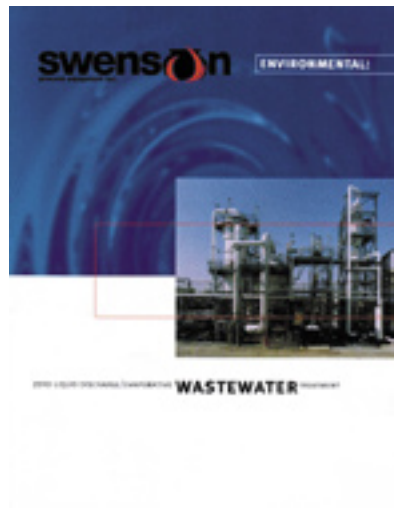




**Whiting Equipment Canada Inc.
Swenson Wastewater Treatment**



swenson: THE LEADER IN EVAPORATIVE AND CRYSTALLIZATION TECHNOLOGY.

SWENSON provides wastewater evaporator/crystallizer systems using the most advanced and reliable resources in the industry. Our design engineering resources include a comprehensive research laboratory, high-end computer databases for chemical and physical properties, and dynamic computer modeling of crystallizer and evaporator design to specific customer requirements.

More than a century ago, Swenson began developing evaporator and crystallizer technology to meet a wide range of industrial application needs. This gives us a unique database for today's applications.

Throughout our history we have established an unparalleled reputation for service and innovation. Our process equipment has provided reliable, safe, and cost-efficient solutions to generations of industrial clients.

WHAT IS WASTEWATER?

Wastewater may be defined as water contaminated during its use in manufacturing and other industrial processes, making it unsuitable for return to the environment. Wastewater is an economic and legal concern for every process plant. The water in waste is a valuable resource worth recovering. Many wastewater contaminants have value as well.

TURNING WASTEWATER TO GOLD:

We've all heard the saying "one man's trash is another man's treasure". The same axiom can be applied in the process industries. For example, common salts recovered from wastewater applications can be used in NPK agricultural blends and metals recovery, or as feedstock for other manufacturing products. The clean water resulting from the wastewater treatment process can reduce or replace the need for water that has been produced by more expensive processes.



WASTEWATER APPLICATIONS:



- :Zero Liquid Discharge
- :Reverse Osmosis Reject
- :Cooling Tower Blowdown
- :Demineralization Regeneration Waste
- :Hazardous Waste Liquids
- :Scrubber Bleed
- :Metals Recovery and Recycle
- :Planting Operations Wastewater
- :Pharmaceuticals Wastewater and Recycle
- :Brine Pond Closures or Volume Reduction
- :Plant Water Balancing
- :Fish Stickwater, Hydrolysates, Fish Meal
- :Blood Water Evaporation
- :Distillery or Brewery Effluent
- :Mine Tailings Run-off
- :Desalinization

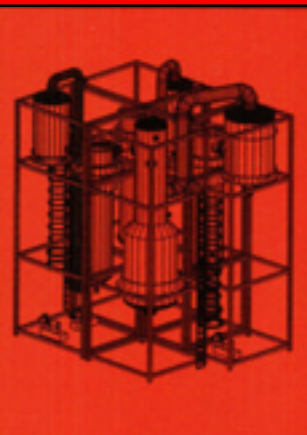
SOLVING WASTE WATER TREATMENT PROBLEMS:

IF YOU HAVE ANY OF THESE PROBLEMS, SWENSON CAN PROVIDE SOLUTIONS:

- (1) Large volume of wastewater to be processed
- (2) Increased government regulations
- (3) Expensive energy
- (4) Hazardous waste elements present in wastewater
- (5) Corrosive substances present in waste water
- (6) Limited space available

SWENSON PROVIDES INNOVATIVE SOLUTIONS DESIGNED TO KEEP YOUR WASTEWATER PROJECT ON TRACK:

- (1) Reduce waste water volume through evaporation
- (2) Designs to meet government standards
- (3) Design project-specific, energy efficient treatment to minimize costs
- (4) Eliminate personnel exposure through waste containment and isolation
- (5) Incorporate corrosion-resistant materials and coatings
- (6) Provide skidded systems, creating optimum space utilization



VTFF EVAPORATOR PROCESS

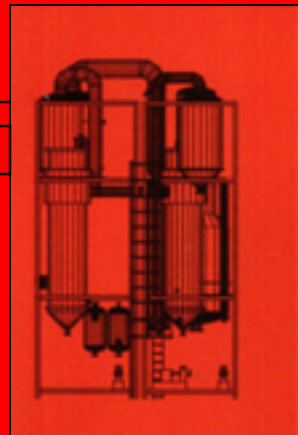
Swenson's vertical tube falling film evaporator (VTFF) is an ideal solution for many wastewater applications. The VTFF is inherently efficient and flexible. High falling film heat transfer rates enable economical equipment designs. The VTFF is easily adapted to mechanical vapor recompression (MVR) or multiple effect thermal configurations.

Wastewater often contains chemical compounds that will deposit on heat transfer surfaces. Swenson designs use a variety of chemical pretreatment and mechanical features which minimize the rate of heater scaling and maximize system productivity.

The VTFF will often be followed by a brine crystallizer or spray drier to recover 100% of the total dissolved solids from the wastewater.

FORCED CIRCULATION EVAPORATOR PROCESS:

Swenson has been writing and re-writing the book on forced circulation evaporation/crystallization technology for over 50 years. The forced circulation evaporators and crystallizers are the most versatile because of their inherent resistance to scaling of their heat transfer surfaces. Often, falling film or calandria design is not the correct choice for an application. Most commonly this is the case when the process has a high percentage of suspended solids or the salts present are known to form scale on heat transfer surfaces. For these and many other reasons, forced circulation is often the correct choice.



OUR PROCESS ENGINEERING CAPABILITY:

Our on-going research and our long record of innovation are unparalleled in the industry. Crystallizers and evaporators appear to be very simple devices, and they are very simple and easy to operate. However, their design and operating dynamics are extremely complex. Swenson scientists and engineers have devoted their careers to understanding and improving evaporation/crystallization as a science. When appropriate, we have collaborated with technical experts in universities and industry to further our science. What all of this means to you, our customer, is that we will provide to you a correct design for your application at lowest cost and designed for long run times, high operating rates, and minimum energy cost.

SWENSON® EQUIPMENT FOR THE PROCESS INDUSTRIES:

y **CONDENSERS**
 Direct Contact Type
 Digester Blow
 Surface Type

y **COOLERS**
 Flash
 Fluidized Bed
 Rotary
 Spray

y **CRYSTALLIZERS**
 Batch
 Direct Contact Refrigeration
 Draft Tube
 Draft Tube Baffle
 Forced-Circulation
 Surface Cooled
 Reaction
 Decomposition
 Recompression
 Teflon Tube

Multi-Stage Horizontal
 Spray Evaporators

y **DRYERS: FLUIDIZED**
 Closed Cycle
 Direct Fired
 Indirect Heated

y **DRYERS: ROTARY**
 Countercurrent
 Direct Fired
 Indirect Heated
 Parallel Flow
 Steam Tube

y **DRYERS: SPRAY**
 Closed Cycle
 Countercurrent
 Mixed Flow
 Parallel Flow
 Research
 Reverse Flow

y **DRYERS: FLASH**
 Direct Fired
 Indirect Heated

y **LABORATORY FACILITIES**
 Bench Scale Tests
 Crystallization
 Evaporation
 Flash Dryers
 Fluidized Bed Crystallizers
 Fluidized Bed Dryers - Coolers
 Rotary Dryers - Coolers
 Spray Dryers
 Steam Tube Dryers

y **EVAPORATORS**
 Calandria
 Forced-Circulation
 LIV Falling-Film
 LIV Rising-Film
 Natural Circulation
 Recompression

y **FILTERS**
 Top Feed

y **HEAT EXCHANGERS**
 Direct Contact
 Shell and Tube

y **PROCESSING AND PROJECT ENGINEERING**
 Ammonium Sulfate Crystallization & Drying
 Caustic Soda Systems
 Citric Acid Systems
 Fluorine Recovery
 Salt Crystallization & Drying
 Sodium Sulfate Recovery & Drying
 Sodium Chlorate System
 Wet Process Phosphoric Acid
 Potash Crystallization & Drying
 Soda Ash Calcining, Crystallization & Drying
 Others

Testing Center



Equipment Supply



Modular Systems



Total Turnkey

Whiting Equipment Canada Inc.



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