

[Form 2 (to be reported to Committee on Countermeasures for Contaminated Water Treatment and to be disclosed to public)]

Technology Information	
Area	2 (Select the number from "Areas of Technologies Requested")
Title	Treatment of contaminated water by Exergy Evaporators
Submitted by	<b>Swedish Exergy AB</b>
<p>Overview of Technologies (features, specification, functions, owners, etc.)</p> <p><b>Evaporation Systems (Thermal separation)</b></p> <p>Mechanical vapor recompression (MVR) evaporator for the treatment of water-based solutions.</p> <p>Exergy has specialized in Forced Recirculation Evaporators. Robust and stable operation makes it ideal for difficult waste-waters or special liquids where fouling of heating surfaces is a problem. The forced recirculation evaporator can provide a fouling free system where minimal maintenance is needed.</p> <p>In the heat exchanger the process liquid is heated under pressure to avoid boiling on the heating surfaces. Our shell and tube heat exchanger is specially designed to ensure a high circulation flow and high turbulence resulting in a non-fouling operation. After heating the pressure is released by a pressure control valve and the liquid flashes into the flash chamber. The water partially evaporates and the vapors are either condensed directly or reused in MVR (Mechanical Vapor Recompression) design. The produced condensate can either be treated and used as process water or sent to a recipient.</p> <p>The Evaporator is developed and designed by Swedish Exergy AB, which can also design systems for distillation, rectification, crystallization, etc.</p>	
<p>1. Notes (Please provide following information if possible.)</p> <ul style="list-style-type: none"> <li>- Technology readiness level (including cases of application, not limited to nuclear industry, time line for application)</li> </ul> <p><b>Swedish Exergy has more than 35 years on Evaporation Technology. The following lists all evaporator plants designed, developed and installed by Swedish Exergy AB:</b></p>	

Kemira/Boliden Helsingborg, Sweden	Evaporator for concentration of 63% mono-sodium phosphate to 75% at a rate of about 10 Ton/hr. Non-fouling design comprising frequency controlled circulation pump for highly viscous fluid. Heated by 7 bar boiler steam. Product is dried in rotating granulating drum.
Graab-kemi Göteborg, Sweden	Pilot scale evaporator for collected industrial waste water including leachate from chemical waste dump. Steam heated 3 bar, forced recirculation type. Plant now used for pilot testing.
Volvo Lastvagnar Skövde, Sweden	Reverse Osmosis treatment and Evaporation after Ultra-filtration of collected waste water from the factory. Machining fluids (coolants) as well as inorganic contents from alkaline washing, etc. Final concentration 40-60% dry solids using MVR technique and forced recirculation type evaporator constructed in 254 SMO. Membranes of spiral wound configuration.
SAKAB, WMI, Inc Norrtorp, Sweden	Forced recirculation type evaporator in Hastelloy C-22 for concentration of collected industrial hazardous waste waters. Concentration of organic, inorganic contents from 5 to 50% dry solids before destruction through incineration. Plant is heated with boiler steam at 8 bar and produces 4 bar steam for atomizing nozzles.
Hoogovens Steel Ijmuiden, Holland	Forced recirculation type in batch operation for concentration of Ultra filtration oily concentrate from 75% to <5% water content. Plant is steam heated and concentrate is used as a fuel in the steel factory.
Youghal Carpets Corc, Ireland	Evaporator for concentration of Ultra filtration concentrate from 80% water to 10% water. Waste water contains spinning oil fluids (mineral oil as well as vegetable oil). Concentrate is used as a fuel in a steam boiler. Evaporator is operated in a batch mode and is heated with steam from the boiler. Start up 1996.
Volvo Aero Corp. Trollhättan, Sweden	Forced recirculation type evaporator with treatment of the Trollhättan, Sweden condensate by activated carbon. Continuous operation using MVR, 4 ton evaporation per hour. Concentration of coolants, alkaline wash waters and crack penetration fluids from about 1-2% up to 40-60% dry solids. Material of construction SS2343/AISI 316. Start up 1995.
Imatran Voima Vladivostok, Russia	Complete pre-engineering June 1995 of an evaporator plant to concentrate sea water with nuclear contamination from about 1% to 25-30% dry solids. Material of construction Ti Gr II. Plant designed to be steam heated.
Confidential Great Britain	Forced recirculation type evaporator with MVR, 5,5 ton per hour. Concentration of chemical cleaning fluids containing alkaline permanganate and boron from 1-2% up to 15-20% dry solids. Start up 1996.
Skellefteå Kraft AB Sweden	Falling Film evaporator as re-boiler for steam generated by Exergy Dryer. 22 ton evaporation per hour. Material of Construction AISI 316/SS2343. Start up 1997
SKF/Ovako Steel Hofors, Sweden	Forced recirculation type evaporator with treatment of the condensate by activated carbon. Continuous operation using MVR, 1 ton evaporation per hour. 20-40 times concentration of alkaline wash water and steel rolling lubrication/cooling oil. Material of construction AISI 316 (SS2343). Start up 1997.
M&I Materials Great Britain	Forced Recirculation Evaporator for acid stripping under 0,5 mbar vacuum at 250°C for transformer oil production. Material of construction AISI 316/SS2343. Start up July 1998.
Orchid Chemicals India	2 effect Forced Recirculation Evaporator for concentration of scrubber concentrate and NH <sub>4</sub> -Cl solution from 16 % to 65% TS. Plant works as a crystalliser together with crystallisation and vacuum belt System. Material of construction SAF 2507 (Duplex steel). Start up November 1998.
NSR AB Waste Handling Helsingborg, Sweden	Forced Recirculation of oil emulsions and electroplating waste water. Continuous operating unit MVR, capacity 0,5 t/hour. Material of construction SAF 2205 (Duplex steel). Start up 1999.
WMI Sellbergs AB Skara, Sweden	Falling Film Evaporation of Leachate from landfill. Capacity 5 t/h using MVR. Material of construction SAF 254. Delivery including pre-treatment and complete building. Start up November 1999.
Kadeco Tankclean AB Gothenburg, Sweden	Forced Recirculation Evaporator of tanker rinsing water. MVR operation, 0,5 ton per hour. Material of construction SAF 2205 (Duplex steel).