

Achieve Zero-liquid Discharge of Industrial Wastewater

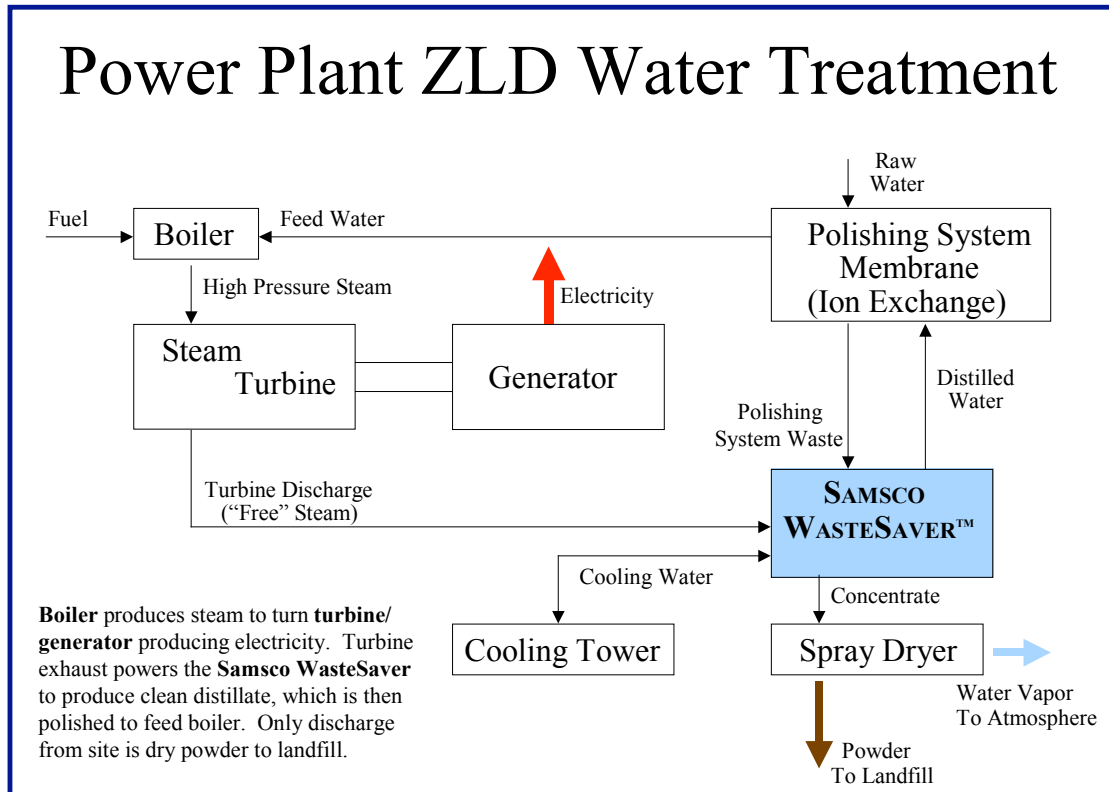
(Distill Process Waste for Reuse)

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Innovative, patented, multi-staged, full distillation, vacuum technology evaporation equipment from Samsco Corporation, Goffstown, NH can be combined with salt-crystallizing spray dryers in order to recycle process waste from various water contaminating processes (e.g., ion exchange membrane regeneration water from boiler feed water systems). The result of such processing can be very clean water, capable of economically recirculating through the ion exchange system to provide the very high quality makeup water required by the boiler system. Contaminants will have been so concentrated that they are removed as dry powder from the spray-drying final stage of the distillation system.

The process diagram below shows a typical, simple technique for recycling such process wastes and simultaneously slashing wastewater disposal costs. The same approach can be used for wastewater generated in many manufacturing process industries such as chemical, pharmaceutical, biotech, metalworking, metal finishing, etc.

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The selected equipment will produce very clean distillate from the process waste (e.g., reject streams from the boiler feed system's Ion Exchange regeneration membrane). Recirculating this distillate for final-stage polishing in the membrane system, instead of hauling it for off-site disposal, will produce an immediate bottom-line boost for the user, such as in the Co-gen Power Plant example shown.

Typical U.S. industrial wastewater hauling rates run from \$0.35 to \$1.00 per gallon. Alternate treatment systems (other than distillation) are likely to process the water at costs more like \$0.05-0.10/gallon. A distillation system sized to handle 1,000 gal/hr then, would save hauling 168,000 gallons of wastewater

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per week and would likely incur operating cost in the vicinity of \$0.02/gallon, even less if the plant is a steam-producing co-generation facility, where steam is—essentially—free. In this case, operating cost could be less than \$0.01/gallon.

The wastewater disposal cost savings generated by distillation vs. hauling to a disposal site can easily be seen to amount to more than \$50,000/week. If compared to alternate on-site processing, savings likely would be much lower; but even here, the amount saved could be enough to make such a zero-liquid discharge (ZLD) system financially attractive.

Consider that wastewater processing, using a membrane-only system, suffers from the disadvantage of increasingly high maintenance costs (expensive membrane replacement components and increasingly frequent labor required to back flush membranes in order to restore filtering efficiency and maintain the membrane at its optimum performance level. As a result, real process costs of \$0.02-0.04 per gallon are more likely to be encountered—and should be anticipated. When compared to the ZLD system suggested here, *operating cost savings in the range of \$90,000/year are achievable for every penny of savings differential vs. the alternative methods considered.* Typically, such systems can repay the investment they represent in very short order—as quickly as one to two years.

Designed by Samsco Corporation, this ZLD system could tie an existing wastewater-producing process (e.g., an Ion Exchange membrane regeneration system, a salt-bearing metal rinse, a chemical mixing vat cleanout wash, etc.) together with both a SAMSCO WASTESAVERTM vacuum distillation evaporator, and a spray dryer, (or other crystallizer module).

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Given the system's inputs: (1) raw wastewater, (2) boiler fuel, and (3) a small amount of electrical energy, the output is a reusable distillate (very clean, with low conductivity), dry (low moisture content) powder, and in the case of a system using a spray dryer final stage, a small amount of clean water vapor emitted to atmosphere.

Such a system will eliminate liquid waste, thus creating a Zero Liquid Discharge (ZLD) wastewater pretreatment system. As an example of its use, if a co-gen power plant, were to use this system, the boiler feedwater treatment system could be combined with this ZLD disposal system such that this one set of components would comprise the complete recycling system for cleaning and reusing spent boiler feed water.

In this way, the SAMSCO WASTESAVER™ system would greatly reduce the pressures felt by the management of such sites: both waste disposal cost and environmental concerns for wastewater handling. Such a ZLD system would eliminate off-site disposal costs (hauling and final disposal) associated with liquid waste and would eliminate all wastewater hauling: a highly desirable objective given the onerous liabilities associated with over-the-road transportation of contaminated water. It would recycle almost the entire boiler feed stream's regenerated effluent and, in the case of a co-gen plant, it would do so at almost zero labor and energy cost due to the plant's production of virtually "free" steam heat energy (the energy input required to operate the WASTESAVER™).

Samsco designs, manufactures, and services a complete line of wastewater evaporation systems.

They offer this innovative WASTESAVER™ system to the metal-working/finishing industries, to chemical process industries, and to power plants (especially co-gen plants) and others concerned about maintaining boiler feedwater quality, reducing generic industrial wastewater disposal cost, and

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eliminating liquid waste discharges (ZLD capability). SAMSCO equipment employs simple technology in a cleverly elegant way such that it can be used effectively in industrial wastewater recycling application ranges involving as little waste as a thousand gallons/year up to applications in the hundred million-gallon/year range. For more information, contact Samsco at info@samsco.com.



Samsco WasteSaver™ Vacuum Distillation System

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