

# PROJECT PROFILE SERIES # 14

## EAST COAST POWER PLANT REALIZES 95% WATER RECOVERY



### The Facility

Bechtel Power Corporation built a power plant in Northampton, Pennsylvania for U.S. Generating Company. The power plant burns culm, a lower quality coal rejected from use in previous decades. By using culm as the fuel, U.S. Generating will clean up a solid disposal site. The power plant contains the usual systems including cooling towers and demineralizers that produce waste brines in the course of their operation.

### The Problem

Environmental regulations require that no liquids be discharged to the environment. In this case the LeHigh River. A system was required that would recover at least 95% of the water from the waste brine steam for spraying onto an ash pile.

### The Solution

Aqua-Chem ICD worked closely with Bechtel to develop an evaporator system to meet the zero liquid discharge requirements. Since there is an excess of low cost steam in the plant, a two effect evaporator was selected rather than an electric driven vapor compression system. The maximum waste brine flow is 100 gpm and can be many combinations of cooling tower blowdown and demineralizer regenerant waste.

The waste brine is high in calcium sulfate and silica. To prevent scaling on the evaporator heat transfer surface the first effect (the more concentrated effect) is designed to operate "seeded." Calcium sulfate crystals are circulated through the system. Instead of scale forming on the heat transfer surface, the scale forms on the circulating crystals.

The 98gpm of distillate recovered will have less than 10 ppm dissolved salts. The purified water will be combined with boiler condensate and used as make-up water for the demineralizer system. The 2 gpm concentrated brine is combined with pretreatment sludge blowdown and pumped to an ash conditioning tank.

### The Result

Installation of the evaporator commenced in October 1993 and commissioning was in January 1995.

### Technical Data: Wastewater Chemistries

Feed, TDS .....	0.56%
Waste rate .....	2 gpm
Concentrate, TDS.....	23.5%
Recovered water .....	98 gpm
Feed Rate .....	1001 gpm
Recovered water quality .....	<10mg/l
Sodium Na <sup>+</sup> .....	1621
Chloride, Cl <sup>-</sup> .....	203
Magnesium, Mg <sup>++</sup> .....	36
Sulfate, SO <sup>-</sup> .....	3427
Calcium <sup>4</sup> .....	125
Silica, SiO <sub>2</sub> .....	9
Bicarbonate <sup>2</sup> , HCO <sup>-</sup> .....	168
pH .....	6.2
Temperature is	50-116°F
Concentrations expressed as the ion in mg/l	

