PROJECT PROFILE SERIES #33

Power Plant Converts Gray Water into Boiler Feedwater using HERO ™ Technology

The Facility

The Bajio Power Project is a 600 MW combined cycle project owned by the Energía Azteca, a Mexican project company jointly owned by InterGen and American Electric Power. The build, own and operate facility is in commercial operation near the municipality of San Luis de la Paz in the state of Guanajuato, approximately 160 miles from Mexico City.

In 1999, Energía Azteca won the open bidding tendered by Mexico's national electric utility, the Comisión Federal de Electricidad (CFE), to build Bajío in response to the increasing need for electric power required to support economic growth in Mexico's central and northern regions.

Bajio was built by Bechtel Power under a turnkey contract.

The Problem

There are limited water resources in this arid area. Ground water is not permitted for industrial and power generation purposes. The only supply for boiler feed is a silica laden secondary treated sewage gray water. Because of limited supply and discharge restrictions a high- recovery reliable solution was required.

The Solution

The solution was a treatment plant designed, built and commissioned by Aquatech International Corporation to produce demineralized water for power plant use. It is composed of a pretreatment section and a demineralization section, which is composed of HERO pretreatment and HERO parts.

The pretreatment consists of clarification and two-stage filtration. More specifically, it consists of a gray water receiving sump and pump facility, a solids contact clarifier, gravity dual media filter, clear well & pressure filter feed pumps, pressure dual media filters, filtered water tank, backwash pumps and air scour blower. The pretreatment also includes the sludge handling facilities comprising sludge transfer air diaphragm pumps, sludge thickener and plate and frame filter press. In addition, various chemicals dosing systems like sodium hypochlorite, caustic, coagulant ($FeCl_3$), coagulant aid, thickener aid and carbon dioxide also form part of the pretreatment section.

The demineralization section comprises filtered water pumps, weak acid cation exchanger units, a decarbonator tower with a catch tank, HERO feed pumps, cartridge filters, HERO booster pumps, HERO units, a permeate tank, mixed bed feed pumps and mixed bed exchanger units. A unique reject stream inclined plate clarifier is used for silica laden sludge thickening.

The Results

The water treatment system was commissioned in 2000 and has been operating trouble free since then producing 0.1 µs/cm boiler feedwater.

Aquatech International Corporation
One Four Coins Drive;Canonsburg, PA 15317 USA
T: 724-746-5300 F: 724-746-5359 aic@aquatech.com www.aquatech.com

PROJECT PROFILE SERIES #33

Design Water Analysis

Parameter	Minimum	Maximum	Typical
pH	7.2	9	7.5
Alkalinity (as CaCO3), mg/l	75	200	100
Total Suspended Solids (TSS), mg/l	20	45	30
Volatile Suspended Solids (VSS), mg/l	14	30	20
Conductivity, uS/cm	1000	1600	1300
TDS (measured), mg/l	500	1000	800
BOD5, mg/l O_2	20	45	30
COD, mg/l O_2	60	400	200
Oil & Grease, mg/l	10	20	15
Ammonia nitrogen , mg/l	2	10	5
Nitrate nitrogen, mg/l	38	75	68
Organic nitrogen, mg/l	0	10	2
Total phosphorus, mg/l	7	20	12
Phenol, mg/l	0.05	0.1	0.1
Calcium, mg/l	50	80	65
Magnesium, mg/l	10	35	20
Sodium, mg/l	150	760	390
Chloride (adjusted for ionic balance), mg/l	200	1050	520
Fluoride, mg/l	0.8	5	2
Potassium, mg/l	30	60	50
Sulfate, mg/l	10	70	50
Hydrogen sulfide, mg/l	0	1	0
Silica, reactive, mg/l	60	75	70
Total silica, mg/l	75	100	85
Methylene Blue Active Substance, mg/l	0.2	0.6	0.5
Temperature ^{0} C, (^{0} F)	20 (68)	30 (86)	25 (77)
Strontium	0.4	0.6	0.5
Barium	1	3	2
Boron	0.1	0.3	0.2

Process Flow Diagram