Hatch Water Tampa
Design & Supply of the Bartow Process Water Treatment Plant

PWTP
Bartow Florida

Working Together SAFELY

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Safety

Safety

- Safety is number one focus
- Zero LTI’s for project
- PWTP has the potential to be a hazardous environment – pressure, acids, caustic

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Business Case

Overview & Business Case

- Treats highly acidic process water from phosphate fertilizer manufacturing plant
- Designed to produce 24/7
- Multi-stage membrane treatment process
- Concentrates from various stages are reused within the PWTP or may be reused within the phosphate manufacturing process
- Treated water will meet Florida Class III surface water discharge standards

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Milestones

Project Timeframe

- First study work began March 2003
- Studies continued 2003/04
- First pilot – Riverview September 2004
- New Wales pilot – April 2006
- Bartow pilot – September 2006
- Selected for Bartow PWTP April 2007
- Contract signed for plant supply June 2008
- PWTP – Currently in start-up mode

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General Characteristics

General Characteristics of Process Water

- Highly acidic (pH 1.6)
- Feed temperature ~110°F (range 90°F-128°F)
- TDS ~35,000 mg/L, Supersaturated, high solute concentrations; greater than 1,000 mg/L each of
  P, F, SO4, Si/SiO_2, Na, and Ca
  These six contaminants make up over 80% of TDS present in the stream
- Scaling species (calcium sulfate, calcium fluoride, sodium fluorosilicate)
- Large volumes to treat – 4 billion gallons typical per site

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Feed Characteristics

Process Water Feed

Analyte	Pond Water (average ppm)
pH	1.5 – 2
TDS	30,000 – 40,000
Phosphorus	6,000 – 7,000
Fluoride	6,000 – 7,000
Sulfate	5,000 – 6,000
Silicon	3,000 – 3,500
Sodium	2,000 – 2,250
Calcium	1,250 – 1,500
Ammonium	700 – 750
Potassium	200 – 300
Magnesium	200 – 300
Iron	100 – 200
Aluminum	100 – 200
Chloride	50 - 100

Membrane Treatment of Process Water

Piloting

Piloting – Knowledge Gained

- Discharge quality fluid could be economically produced with membrane technology alone, (numerous other water treatment companies had failed to do this)
- Multi-unit / Multi-stage membrane process
- Sequential removal of targeted species
- Operation at low recoveries was key to scale management
- Optimized operating conditions used for final plant design
- Determined best membrane types/brands, materials of construction

Process

The Process

- Targets removal of fluoride (F), nitrogen (as NH3), and phosphate (P)
- TDS reduced from 30-40,000 mg/L to < 250 mg/L
- Treated water meets F, N, P limits for discharge to Florida Class III surface water

Bartow Process Water Treatment

Bartow Process Water Treatment

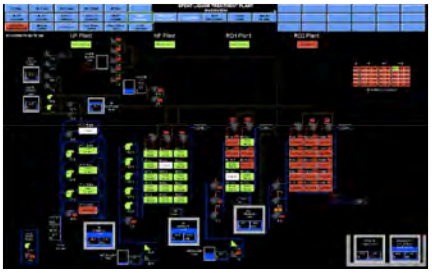
Bartow Process Water Treatment Process

Membranes

Custom-built Membranes

Process Control

PLC Process Control



Typical SCADA HMI Screen

Project

Project Execution

Joint Project Execution with Client

Client
- Civil design and construction
- Electrical installation
- OSBL infrastructure

Hatch
- Process design
- Pilot Plant studies
- Structural, mechanical, piping, PLC, instrumentation, electrical design
- Procurement, construction, commissioning

Project

Results

Analyte	Pond Water (average or range)	Typical Plant Discharge (typical or range)	Contract Limits
pH	1.3 – 2.0	7.5 – 8.5	6.5 - 8.5
Conductivity (uS/cm)	30,000	50-250	1,275
Phosphorus (mg/L)	7,085	0.1	10
Fluoride (mg/L)	5,175	5	10
Ammonium (mg/L)	741	ND	0.02*