

REINHOLD ENVIRONMENTAL Ltd.



**2018 APC & Wastewater Round Table
& Expo Presentation**

July 23 & 24, 2018 in Lexington, KY / Hosted by East Kentucky Power Coop

All presentations posted on this website are copyrighted by Reinhold Environmental, Ltd (RE). Any unauthorized downloading, attempts to modify or to incorporate into other presentations, link to other websites, or obtain copies for any other uses than the training of attendees to RE's Conferences is expressly prohibited, unless approved in writing by RE or the original presenter. RE does not assume any liability for the accuracy or contents of any materials contained in this library which were presented and/or created by persons who were not employees of RE.

Barry Steam Plant FGD Return Water Project

Sandra Sellers
Process Engineer

PCUG Conference
7/24/2018



Overview



Unit Overview

- Supercritical Boiler
- Columbian coal
 - 0.6% S
 - <60ppm Cl
 - High Se
 - HHV: 10,500 lb/BTU
 - 9-10% ash
- Unit equipped with several environmental controls
 - SCR
 - Cold side ESP
 - FGD
 - Calcium Bromide Injection
 - Mercury Re-emission Control System



FGD Overview

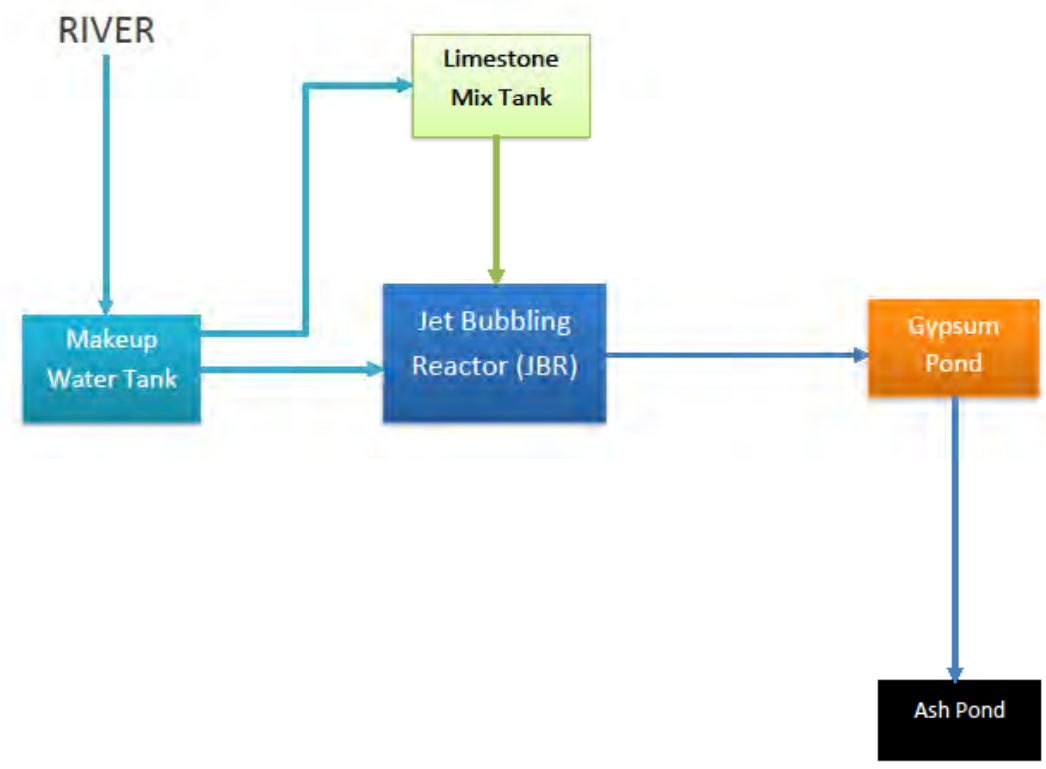
- Southern Company/ Chiyoda Design
 - CT-121 750
 - Originally designed for IB coal
 - Make-up water source is filtered river water
 - Pulverized limestone delivered
 - Natural gypsum dewatering





Original Process Flow

- Once-through system
- Process water discharged to ash pond



Return Water Project



Project Purpose

- The purpose of the FGD Return Water System is to reroute the Flue Gas Desulfurization (FGD) process water back to the unit's Jet Bubble Reactor (JBR) process from the existing gypsum surge pond. Ash pond will be closed as part of CCR.
- The existing gypsum and surge pond will remain with the process water being either sent to the JBR system or out to the Wastewater Treatment Facility.
- This re-routing strategy will also set a foundation for future compliance with the new Effluent Limitation Guidelines (ELG) and reduce the amount of water requiring treatment.



Project Purpose

- In addition to the Return Water system, a new Gypsum Slurry Transfer system was added.
 - Collects gypsum draw off and water collected in area sumps
 - Allows for continuous draw off thus improving JBR chemistry control
- Project completed in May 2018



Return Water/ Gypsum Transfer New Equipment

- Return Water Tank
- Return Water Tank Agitator
- Return Water Pumps (2)
- Associated piping, valves, and instrumentation

- Gypsum Transfer Tank
- Gypsum Transfer Tank Agitator
- Gypsum Transfer Pumps (2)
- Density Control Valve
- Associated piping, valves, and instrumentation





Return Water Tank End Users

Return Water system supplies to:

- Limestone Mix Tank
- JBR Fill/ Level Control
- Gas Cooling Pumps Flush
- Gypsum Draw Off Pump Flush
- Return Water Flush
- Wash Down Water

Make-up system supplies water to:

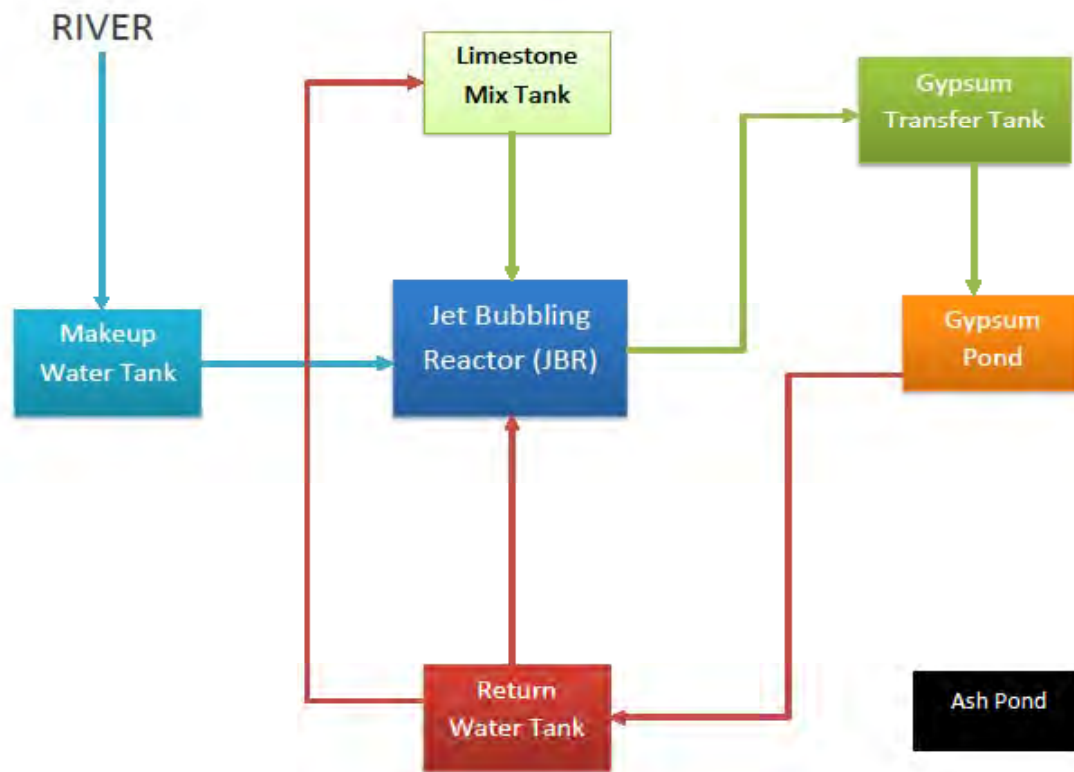
- Pre-quench
- MRCS Slurry Tank
- JBR Shell and Riser Wash
- Mist Eliminator Wash
- JBR Agitator Seal Water



Gypsum Transfer Tank Contributors

- All area sumps
 - FGD Sump
 - LS Sump
- Gypsum Draw Off
 - Draw off amount varied to control JBR density to 20%

New Process Flow



Return Water Chemistry



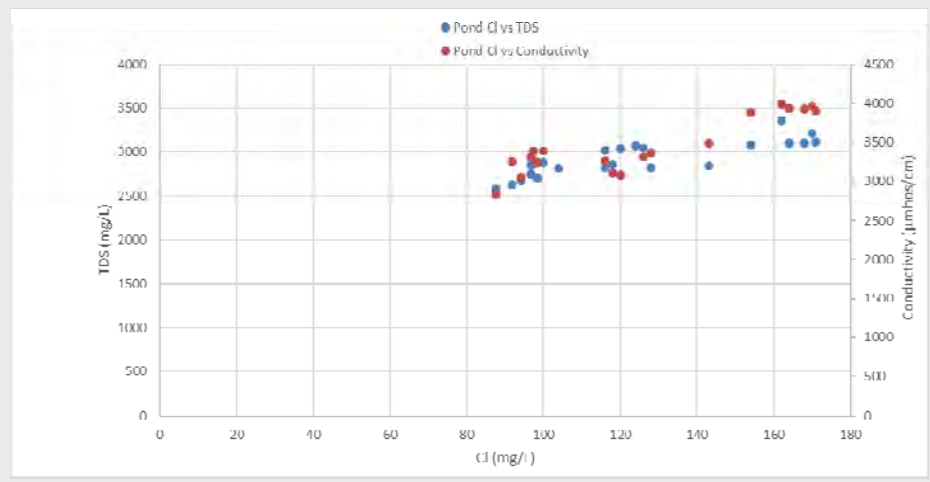
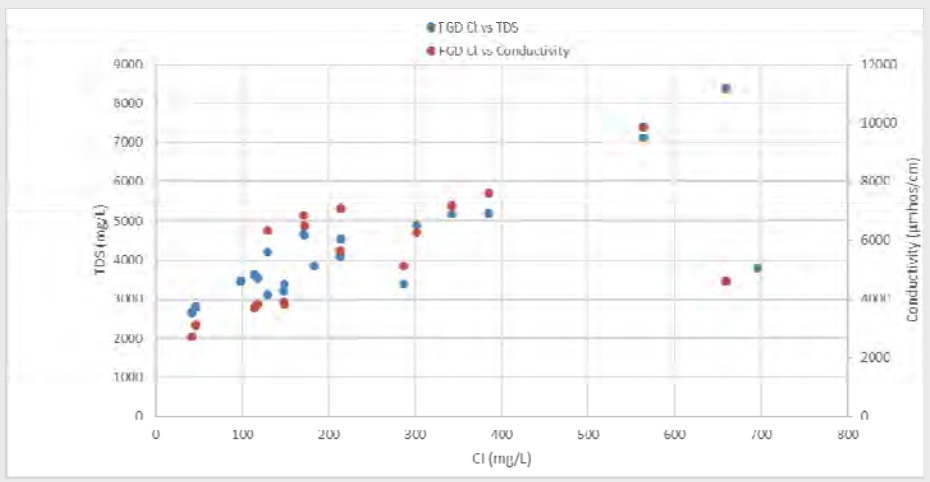
Return Water Chemistry

- Samples taken at JBR, Return Water Tank, and at Gypsum Pond prior, during and after start-up.
 - Se, Hg, As, Br, Cl, conductivity, ORP, TDS, sulfates, etc.
 - Cycling up of chemistry monitored
 - Process effects were noted

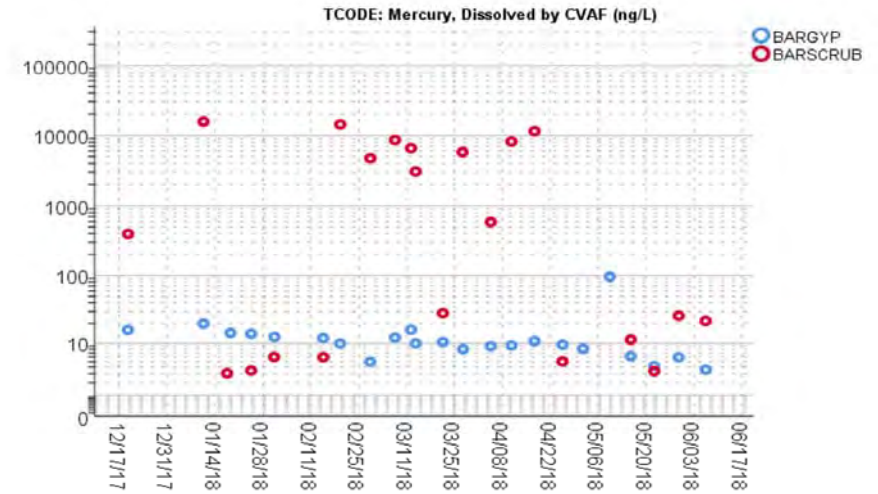
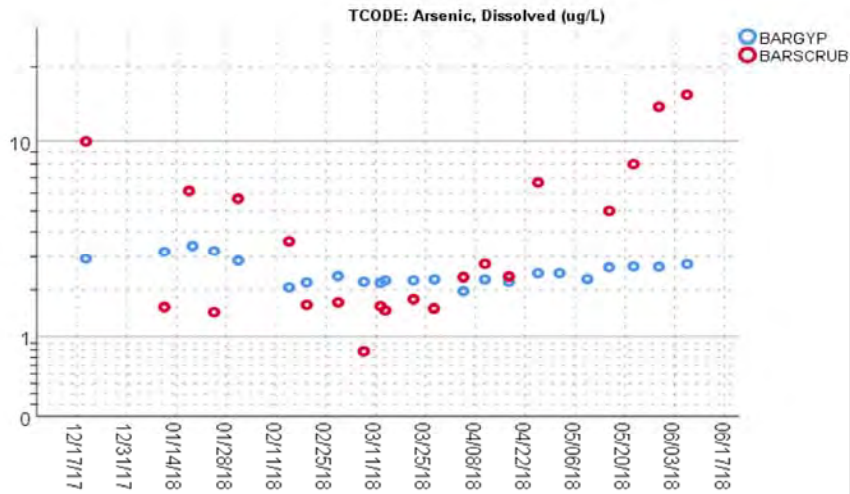


Return Water Impacts

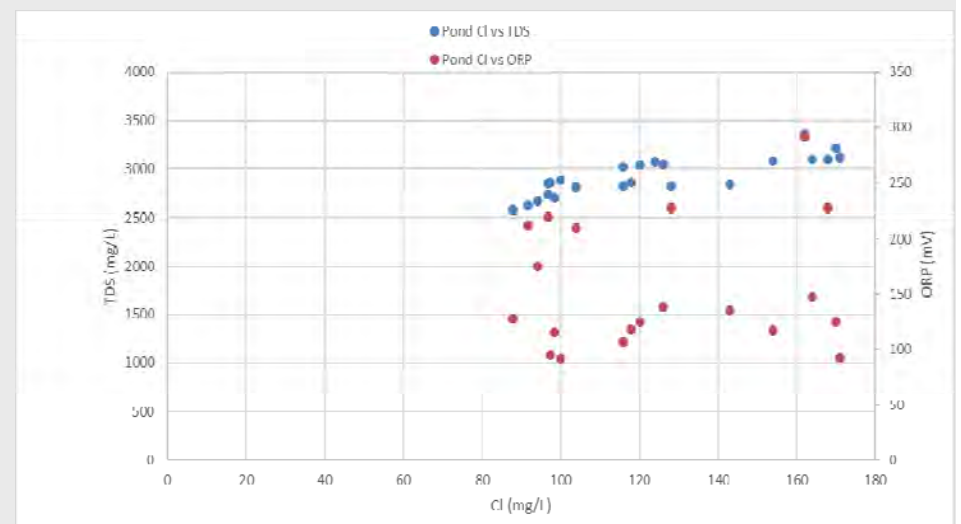
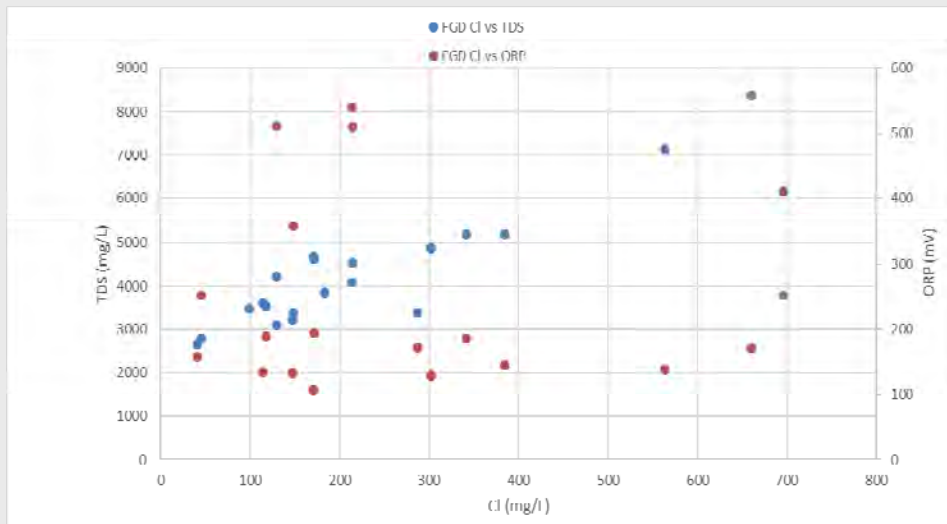
- Chlorides, TDS and conductivity increases in the JBR and at pond



Return Water Impacts



Return Water Impacts- ORP







Challenges

- Dilution of Return Water Tank with Make-up Water
 - Unable to fill tank with Return Water
 - Low pond level
 - Maintenance issues
 - Lack of rainfall
- JBR Fill/ Level Control Valve undersized
 - Causes pre-quench (make-up water) to be used



Chemistry Benefits

- Chemistry cycling
 - Higher TDS
 - Higher Cl
 - ORP stabilized
 - Less Hg re-emissions
 - MRCS need lessened

Moving Forward





Moving Forward

- Install new 4" fill/level control valve
- Re-balance return water and make-up water end users to stabilize flows
- Continue collecting and analyzing data as chemistry cycles up
- Install smaller ox air blowers
- Re-test MRCS
- Gypsum quality tests

