



Intel/Chandler – Responsible Water Management at Ocotillo

Jake Davis Ph.D.

Presentation Outline

Introduction

History of the Ocotillo Brine Reduction Facility (OBRF)

OBRF Process Flow Diagram

OBRF Operational Parameters

OBRF Learnings

Recognitions

Jake Davis

- Started college as a fine arts major
- Graduated with Ph.D. in chemical engineering from the UofA in 2015
- Dissertation: the production of expendable reagents from industrial wastewater
- Focused on electrochemical and electro-dialytic techniques
- Intel is a great place to work!



The OBRF was originally known as the Chandler RO Facility

The Chandler RO Facility (CHRO) was:

- Built as a partnership between the City of Chandler and Intel in 1994
- This facility leveraged RO, with chemical and MF pretreatment, to reduce saline industrial discharge to the publically owned treatment works (POTW) by 75%
- Product water was returned to the local watershed via the Chandler Heights Recharge Facility
- RO reject was discharged to local brine ponds owned and operated by the City of Chandler



When the CHRO facility was upgraded in 2014 it became the OBRF

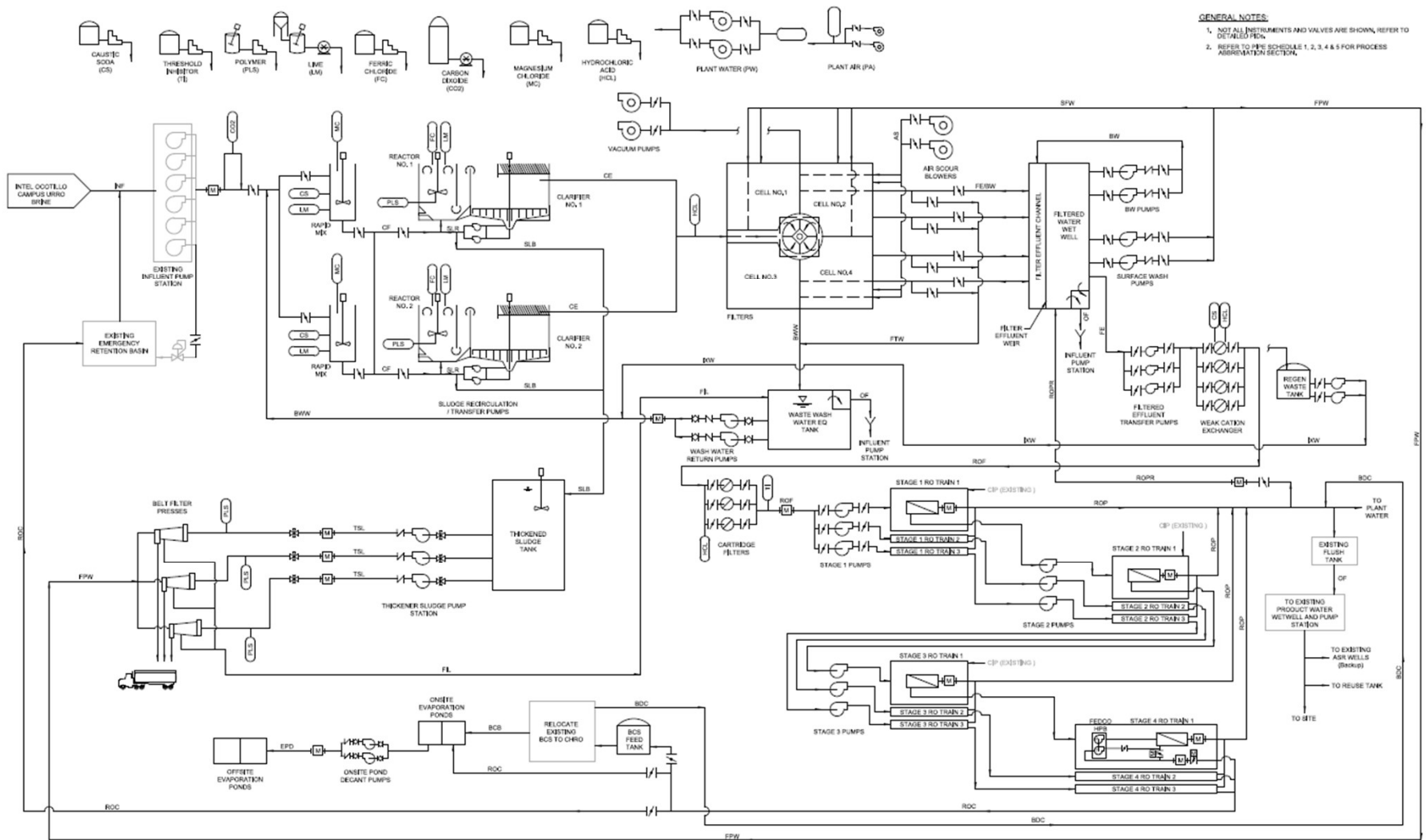
The upgrade was driven by the partnership's desire to:

- Eliminate brine discharge to the sanitary sewer
- Reduce potable water consumption

The OBRF Facility Currently:

- Receives all of Intel's UPW RO reject
- Recovers > 94% of the water
- Returns product water to Intel for reuse
- Reuse effectively offsets potable water consumption

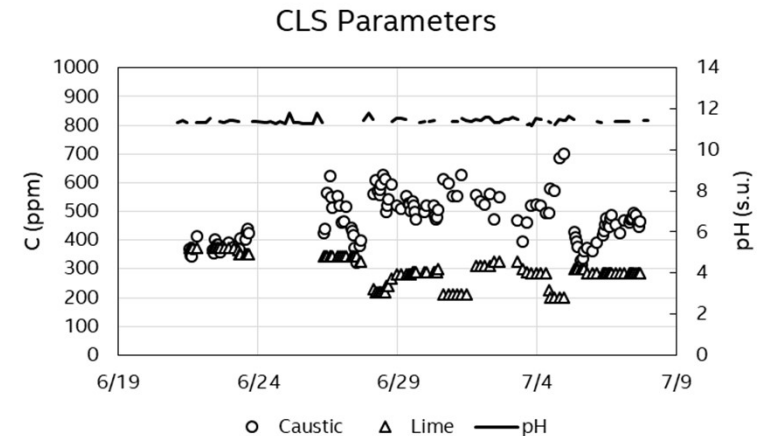
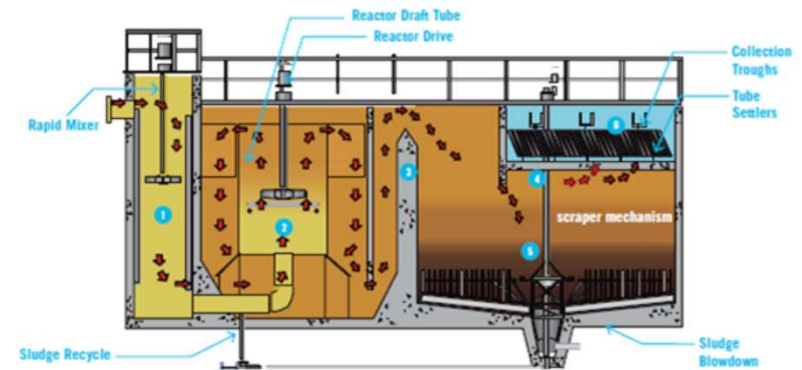




- GENERAL NOTES:**
1. NOT ALL INSTRUMENTS AND VALVES ARE SHOWN, REFER TO DETAILED P&ID.
 2. REFER TO PIPE SCHEDULE 1, 2, 3, 4 & 5 FOR PROCESS ABBREVIATION SECTION.

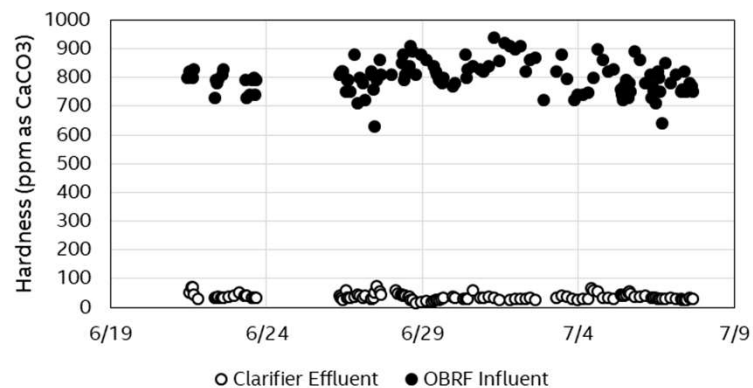
Cold Lime Softening (CLS)

- The CLS operation is monitored by taking clarifier and clarifier effluent grab samples (Alk, hardness, pH, settling time, etc.) about every three hours
- Operators use experience based decision making to adjust lime, CO₂, and polymer dose
 - Caustic flow pace and trim set-point pH = 11.3
 - Polymer dose is flow paced (set-point < 2.2 ppm)
 - Lime dose is flow paced
 - CO₂ dose is flow paced
 - Iron and magnesium chloride are not used
- Operators also have to manually correct for lag in the caustic dose set-point trim controller during IXW recycle

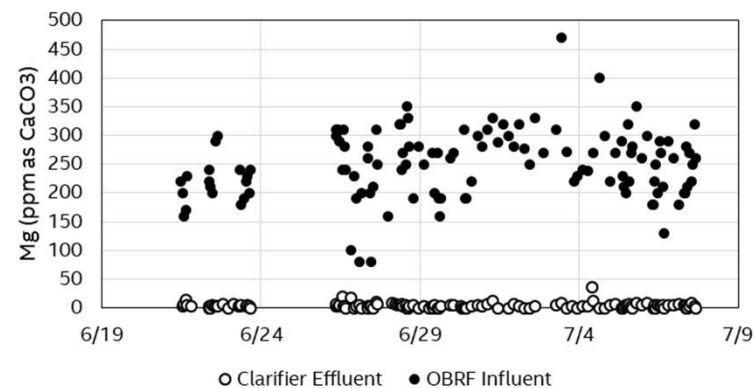


CLS Performance

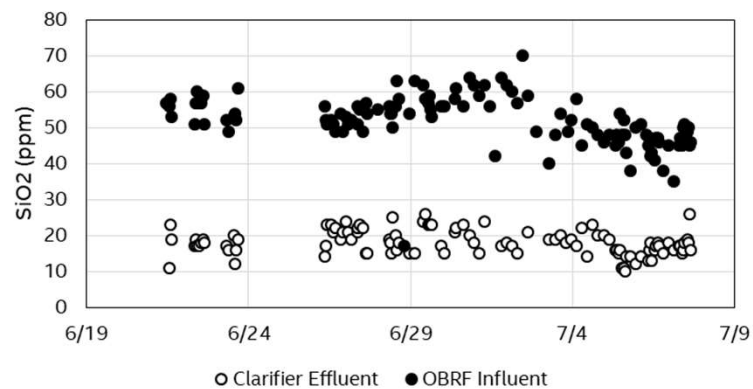
Hardness Removal



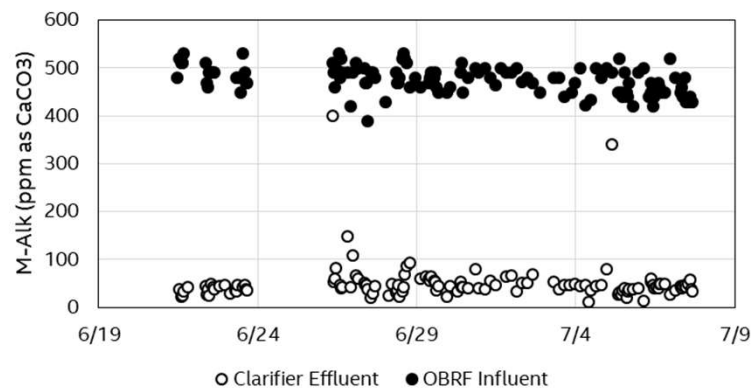
Mg Removal



SiO2 Removal



Alkalinity Removal



Lessons Learned

- **Mix ion exchange regeneration waste tanks before returning them to the headworks**
- **High pH RO does require all of the performance monitoring analytical, no matter what they tell you, especially if you want to process cooling tower blowdown**
- **Solids accumulate in equalization tanks receiving belt filter press filtrate**
- **The industry standard cold lime softening polymers are not the best choice for the OBRF... but use of the “best” polymer is not without risk**

Recognitions

The City of Chandler

- **Danny Sargent – OBRF Superintendent**
- **Rick Kilborn – OBRF Maintenance Manager**
- **Kim Neill – Utility Operations Manager**
- **John Ardans – Utility Maintenance Manager**

Intel

- **Michael Lay – Intern**
- **Rachael Fiala – Intern**

