Brackish Water Desalination in El Paso

Nine Years In and Planning for the Future

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Kay Bailey Hutchison Desalination Facility

- El Paso Water Utilities
- 27.5 mgd delivered capacity
  - 15 mgd RO permeate
  - 12.5 mgd blend well water
- Startup in 2007
- Used as “reserve capacity” plant when other sources are limited
- 3 mgd (1 skid) continuous permeate production
Water Supply

Brackish and Fresh Wells in the Hueco Bolson

- 15 Source Wells
  - For RO Feed
  - Production and Water Quality Declining

- 16 “Blend” Wells
  - Each produce 700-1000 gpm
  - Subject to Ft. Bliss Royalty Fee:
    - $35/AF or $100/AF
  - Water Quality Declining
The Challenge
Source Water Quality and Quantity

- Declining Water Quality → Higher RO Operation
  - Re-drilled, deeper wells = higher TDS
  - Design: 1200-1500 mg/L
  - Current: Average 2660 mg/L
- Production Rate Declining in Source Wells
  - Water level dropping, minimum feed pressure to RO plant
  - More wells required for same production
Increase in Feed TDS $\rightarrow$ Decrease in Blend Ratio

- RO permeate quality & production not significantly impacted
- RO feed pumps currently running at ~100%
Using Blend Wells for RO feed is Inefficient and Costly

Recent Peak Day Operation (August 24, 2013)

Current Operation Uses Some Series 600 Supply for RO Feed,

From Source (Airport) Wells (9.4 MGD)

From Blend (Series 600) Wells (14.3 MGD)

(18 MGD) Reverse Osmosis

(8.6 MGD) By-Pass Blending

(3 MGD @ 83% Recovery)

Chlorination

To Distribution (20.7 MGD @ 600 mg/L TDS)

(15 MGD)

(5.7 MGD)
Use Freshwater Blend Wells for Blending Only

**Recommended Peak Operation**

We recommend using only Source Wells for RO Feed

- From Source (Airport) Wells (18 MGD)
- From Blend (Series 600) Wells (12.5 MGD)

Reverse Osmosis

Concentrate Flow

3 MGD @ 83% Recovery

By-Pass Blending

We recommend using only Source Wells for RO Feed

Chlorination

To Distribution

(27.5 MGD @ 700 mg/L TDS)
Plans for the Future
Immediate Improvements

Needed to maintain 27.5 mgd production

- Projects underway
  - Rehab source wells (underway)
  - Modelling for “bottleneck” in source well delivery network
  - Upgrade deficiencies in source well network
  - “Freshwater Express” pipeline for wells 601-609

- Upcoming Improvements
  - Replace RO Membranes
  - Install Interstage Boosters
Need for Expansion

- Drought conditions mean shorter irrigation season = less surface water available for less time
- KBH is Critical when surface water (Rio Grande) is not available.
  - No surface water in non-irrigation season (winter)
  - Supplements a finite supply of fresh groundwater wells
- In summer, KBH provides peaking capacity to support surface water plants. In winter, provides (emergency) high capacity supply
- Supplies base demand in nearby service area + Ft Bliss
- With water quality decline, blending ratio decreases = total production drops
Phase 1 - Near Term Improvements

- Add 6th skid in existing building (3 mgd)
- ~7 new wells and collector pipeline (minimum 3.6 mgd supply)
- Manage increase in concentrate with brine minimization (EWM partnership)
  - Well injection currently limited by pipeline capacity and permit restrictions
- 3-7 year timeline
Phase 2- Long Term Improvements

- Increase permeate production capacity by 12 mgd to a total of 30 mgd
  - New treatment building
  - Additional finished water pumping capacity
- 20+ new wells
  - Each well only ~500 gpm
- Concentrate Management:
  - Install parallel (20”) concentrate pipeline to injection wells
  - Add 1-2 new concentrate disposal wells
  - Improvements to concentrate pump station
  - Ongoing Coordination with EWM
- 8-10 year timeline
Phase 2- Wellfield Addition

- “700 Series” wellfield at full buildout
- 20 new wells, in addition to Phase 1
- 500-700 gpm each
- Total Supply: 20 mgd
- 4+ miles of additional collector pipeline
Ultimate Buildout

- Net finished water production: 42.5+ mgd on peak day
- Will run at max capacity only seasonally and as “emergency” supply
- Continued blending of 12 mgd with 30 mgd permeate, due to degrading blend water quality
- $120 M capital investment (preliminary)
Thank you!

- Special thanks to El Paso Water Utilities
  - Scott Reinert, PE
- CDM Smith Colleagues
  - Jim Steele, PE
  - Horacio Juarez, PE
  - Doug Brown, PE
### Source Well Data

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<th>Flow, gpm</th>
<th>Chloride, mg/L</th>
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### Blend Well Data

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Phase 1- Wellfield Addition

- 7 new wells in short-term
- 500-700 gpm each
- New 2-mile collector pipeline to KBH
- “700 series” wellfield
- Wells located on Ft Bliss, subject to “royalty fee” ($/af TBD)
- Water quality expected: 2000-4000 mg/L TDS