Solving Seawater Intrusion in the Central and West Coast Basins of Coastal Los Angeles County….for Now

Ted Johnson, PG. CHG.
Chief Hydrogeologist
Water Replenishment District of Southern California
tjohnson@wrd.org
LA County Population Growth

5,700% increase in 110 years
1930s – 1950s Pumping Double Natural Replenishment

- 50 foot drop (15 m)
- 160 foot drop (49 m)

Unsustainable. Severe Overdraft. Wells Went Dry. Seawater Intrusion. Great threat to local water supply.
With Population Growth Came Groundwater Pumping Greater than Natural Replenishment... Overdraft and Seawater Intrusion
By 1950s, groundwater was below sea level in half of the basins, resulting in Sea Water Intrusion Several miles inland along the Coast
Sea Water Intrusion

Modified from DWR 1961, Cross Section E-E'
All coastal aquifers likely have minor seawater intrusion, even if not in overdraft.

But heavy pumping can increase rate and distance of intrusion.

Seawater intrusion barriers can block the inflow of salt water and replenish the basins with fresh water.
Initial Barrier Tests 1952 - 1954
Seawater Barrier Wells

Build up pressure to overcome intrusion

Injected water also replenishes aquifers

Pico Formation ("bedrock")

Modified from DWR 1961, Cross Section E-E’
West Coast Basin Barrier Project 1950s

Dominguez Gap Barrier Project 1970s

Alamitos Gap Barrier Project 1960s

Nearly 300 injection wells, 16 mile overall length
Water for the Barriers

- **Treated Drinking Water (potable) from MWD (imported water):**
  - Partial Source 1995 – Present.
  - 1.5 Million acre-feet to date.

- **Advanced Treated Recycled Water:**
  - Since 1995 at West Coast Barrier (WBMWD).
  - Since 2005 at Alamitos Barrier (WRD).
  - Since 2006 at Dominguez Barrier (City of LA).
  - 184,000 acre-feet to date.

- **Goal is to move towards 100% recycled water at all three barriers (Water Independence Now—WIN).**
Advanced Treated Recycled Water for Barriers

Secondary or Tertiary Wastewater

To Barriers

Advanced Oxidation H2O2

Ultra Violet Light

Microfiltration

Reverse Osmosis
Barrier Injection Amounts & Costs

- **Injection Amounts (2016-17 estimate):**
  - **Potable Water:** 6,260 af
  - **Recycled Water:** 26,040 af (81%) 32,300 af

- **Total Cost of Water:**
  - **Potable Water:** $ 8.5 million ($1360/af)
  - **Recycled Water:** $18.4 million ($ 707/af)
  - **Total:** $26.9 million
Going to 100% Recycled at Barriers

West Coast Barrier: Permitted for 100%

Dominguez Gap Barrier: Permitted for 50%. Moving towards 100% 2017

Alamitos Barrier: Permitted 100%
Seawater barrier injection wells have been a proven deterrent to intrusion for over 60 years. Steep inland gradients caused by groundwater pumping are the main driver for the intrusion.

Recycled water is an effective injection source for the barriers to offset the need for potable water use.

WRD’s goal is to have the barriers at 100% recycled water in 2017.

Impact of increased pumping and/or sea level rise may require additional injection and/or additional wells. Modeling can help predict the impacts.
Thank You