State Bar of Texas
CHANGING FACE OF WATER RIGHTS
February 24-25, 2016
San Antonio

UPDATE ON ASR AND BRACKISH GROUNDWATER PRODUCTION ZONES

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ASR – What is it?

- TWDB defines ASR as “the storage of water in a suitable aquifer through a well during times when water is available, and recovery of the water from the same aquifer during times when it is needed using the same well or different wells.”
- David Pyne (the expert on ASR) defines ASR as only includes well fields where same wells are used for injection and recovery.

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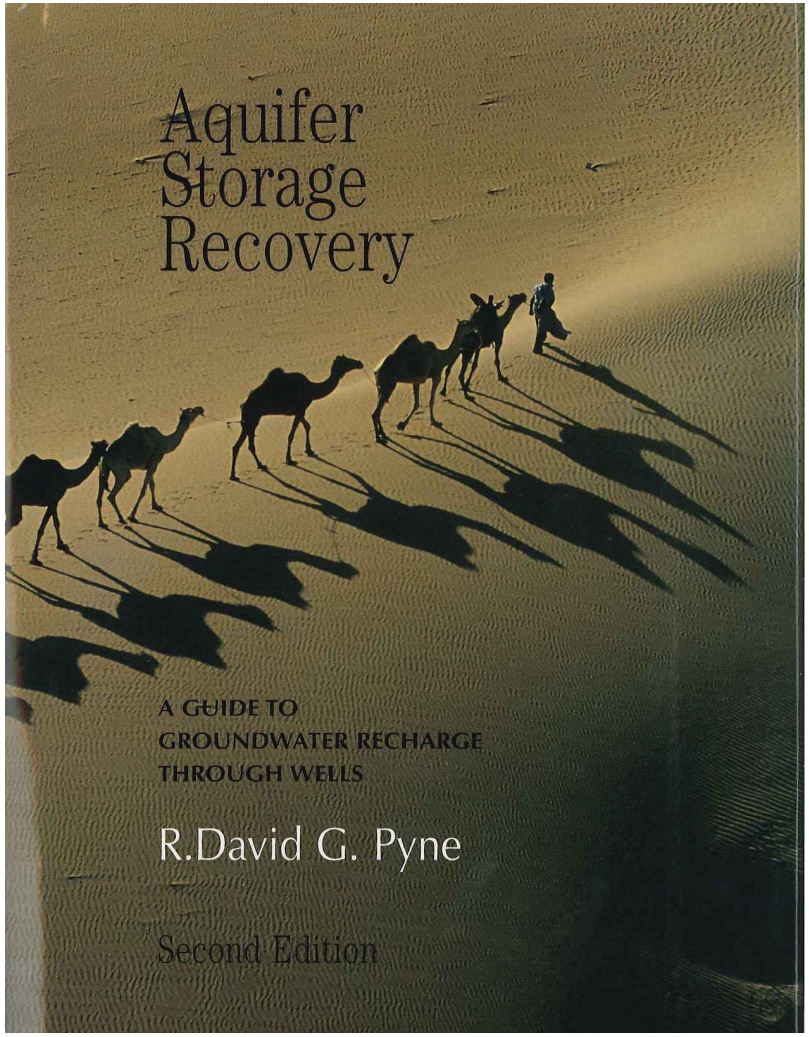

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ASR – What is it?

- Approximately 175 ASR wellfields in US in 25 states (more than 500 wells)
- More than 10 countries using ASR, with more in the planning stages
- Rapid growth in use of technology in last 25 years
- Economical (particularly for municipal supplies) and can be phased in incrementally

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ASR – What is it?

- Conceptualize as a “bubble” of external water surrounded by a “buffer zone” floating in a pool of native groundwater
- Potential external water sources
  - Other Groundwater
  - Treated Surface Water
  - **Treated Wastewater**
- Quality of injected water
  - Almost always **potable** – generally can be used when recovered without additional treatment other than disinfection and maybe pH adjustment
  - Even potable source water may require additional treatment before injection - water chemistry concerns

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ASR – What is it?

- Suitable aquifers – theoretically all
  - Unconfined aquifers less attractive – lower recovery efficiencies/contamination risk
  - Confined/semi-confined preferable
  - TWDB – Carrizo-Wilcox – very suitable - smaller buffer zone, higher recovery efficiency
- Potential storage volumes
  - Up to 270,000 AF (SAWS Twin Oaks - 120,000 AF)
  - Wellfield capacity up to 157 MGD (planned projects up to 400 MGD)(SAWS – 60 MGD)

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ASR – What is it?

- Potential uses (Pyne lists 24 categories of uses)
  - Substitute for surface water reservoir to eliminate evaporate losses of stored water
    - Long term storage (drought management)
    - Seasonal storage and recovery
  - Substitute for large ground-storage tanks
    - Injected water typically meets drinking water standards and can be used without further treatment following disinfection
    - Meet peak demands without expanding treatment/distribution capacity
    - Reduce power costs by shifting treatment/pumping to off-peak power periods

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ASR – What is it?

- Potential uses (cont.)
  - Water treatment
    - Disinfection byproduct reduction
    - Improve water quality
    - Stabilize aggressive water
  - Restore groundwater levels/reduce subsidence
  - Prevent saltwater intrusion

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ASR - What is it?

- Conjunctive use with surface water reservoir (an ideal Texas solution?)
  - Reservoirs (including off-channel) better suited to to capture “flashy” Texas runoff
  - ASR wells can only recharge and recover water slowly
  - Where feasible, operate reservoirs at lower levels to capture flood flows and transfer to storage in the ASR
- Costs – difficult to compare with other water supply projects because ASR delivers treated water and may be designed for use other than purely operation water supply - emergency/drought use/peak shifting

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Brief History of ASR

- Kara Kum Plain (Turkmenistan) – For centuries, nomad tribes have used hand dug wells for recharge and recovery
- Israel/England – managed aquifer recharge through wells since mid-1950s
- US – prior to early 1970s almost no managed aquifer recharge through wells – almost all surface water recharge methods

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ASR In Texas

- Beginning in 1940s through 1970s, limited ASR in El Paso, Amarillo and three other locations. All projects ceased operation
- Three ASR facilities currently in operation in Texas
  - SAWS Twin Oaks
    - 140,000 AF/60 MGD (3rd largest in US behind Las Vegas (175 MDG) and Calleguas Municipal (68 MGD)
    - Excess Edwards Aquifer water stored in Carrizo Aquifer
    - 29 dual use wells
    - 2014 SAWS recovered approximately 20,000 AF

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ASR in Texas

- 3 existing ASR facilities in Texas (cont.)
  - Kerrville
    - 2 ASR wells (2.6 MGD) expanding to 3 wells (3.6 MGD)
    - Target storage 4,600 AF – current storage about 1,800 AF
    - Water from Guadalupe River
  - El Paso Water Utilities
    - Technically not ASR (Pyne definition) since recharge wells not used for recovery
    - Initially 10 wells – casings failed – now 4 wells completed to a lower depth and infiltration basins
    - Uses treated wastewater – up to 10 MGD

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Brief History of Regulation in Texas

- Prior to 1995, use of surface water for ASR not clear
- 1995 – Legislature created 2-step process
  - Pilot project to demonstrate feasibility – term water right/amendment
  - If pilot successful – permanent water right/amendment
  - Recharge and recovery subject to regulation by groundwater conservation districts, including permitting, well spacing, production limits, and water quality limitations
- Not many ASR projects developed under this regulatory structure – none within jurisdiction of a GCD
- 2011 – TWDB found legal and regulatory issues hindering development of ASR in Texas. Recommended:
  - Eliminate 2-step process
  - Relax surface water permitting to allow seasonal/scalping permits
  - Clarify role and responsibilities of GCDs

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TWCA Effort

- 2014 – TWCA groundwater committee developed consensus bill (HB 655) to address legal/regulatory issues
  - Eliminated 2-step process
  - New water rights do not have to be based on continuous availability of historic stream flows
  - Clarified role of GCDs in ASR
- Some uncertainty left – but changes should encourage development of new ASR projects

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Current Texas Regulatory/Legal Requirements

- Project development issues post HB 655
  - Need to have authority to use source water (Water Rights)
  - Need to have authority to store/recover/protect water on private property (Property/Other Rights)
  - Need permit to inject water into potential groundwater source (UIC Permits)

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Legal/Regulatory Requirements Water Rights

- Surface Water - Texas Water Code §11.153
  - Water right/contract that does not prohibit the use of water in ASR may be used for ASR project without additional authorization under Chapter 11
  - New/amended water right associate with ASR project may be approved without continuous availability of historic stream flows
- Groundwater sources – groundwater must be produced in accordance with state law

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Legal/Regulatory Requirements Property Rights

- Maybe the biggest remaining impediment – ***uncertainty about property rights***
- Need legal right to use the property under which water will be stored and keep others from adversely affecting the bubble
- When in doubt – get consent from all possible property owners
- Need consent from owner of groundwater rights
- May need consent of owner of surface estate (if severed from groundwater estate)
  - Law unclear on who owns subterranean pore space (surface or groundwater estate)
  - *FPL Farming Ltd v. EPS*, 351 S.W.3d 306 (Tex. 2011) – Compliance with UIC permit does not insulate operator of injection well from tort liability
  - *EPS v. FPL Farming*, 457 S.W.3d 414 (2015) –Consent by landowner precludes liability for trespass

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Legal/Regulatory Requirements Property Rights

- May also need consent from owner of mineral right
  - Under Accommodation Doctrine mineral owner has the right to use as much of the surface, subsurface, and adjacent airspace of property as reasonably necessary to enjoy the mineral estate (with “due regard” to the rights of the surface owner)
  - Without a reservation to the surface owner, mineral owner may use groundwater to the extent essential to the enjoyment of the mineral estate
  - ASR developer needs agreement that mineral owner not going to drill through ASR project or use the water stored in the ASR project.
- Need protection from adjacent groundwater owners who could adversely affect ASR bubble
  - GCD protection – not likely
  - Municipal zoning protection – possible
  - Enter contract/lease with neighbors to limit pumping

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Legal/Regulatory Requirements Property Rights

- Bottom Line
  - Secure rights to all groundwater and subterranean pore space within the limits of the proposed bubble, plus enter into agreements with neighboring landowners/mineral rights owners that could adversely affect maintenance of the bubble.

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Regulatory Requirements
UIC Permits

- **Federal Safe Drinking Water Act (SDWA)** – regulates injection activities that could endanger underground sources of drinking water
- Texas has primacy for the UIC program
  - TCEQ administers UIC program for Class I, III, IV, and V wells
  - RRC administers UIC program for Class II wells
- ASR injection wells – Class V wells that inject non-hazardous fluids underground

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Regulatory Requirements
UIC Permits

- Prior to 2016, ASR Class V permits handled like all other Class V permits
- HB655 gave TCEQ exclusive jurisdiction over ASR injection wells and clarified requirements
- TCEQ Actions under HB655
  - Adopt technical standards by May 1, 2016
    - How TCEQ will determine limits on volume of water that may be recovered
    - Construction/completion standards
    - Metering and reporting requirements

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Regulatory Requirements
UIC Permits

- TCEQ Technical Standards
  - Proposed December 9, 2015 (40 Tex.Reg. 9487)
  - Public Hearing held January 22, 2016
  - Comment period closed February 8, 2016
    - Issues raised regarding notice and injection water quality
  - Adoption scheduled for April 27, 2016
- TCEQ Permitting Options
  - By rule
  - Individual permit
  - General permit
  - Assume TCEQ will initially use individual permits

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Regulatory Requirements
UIC Permits

- Class V ASR Application Notice Requirements -Notice to affected groundwater conservation districts and published notice
- TCEQ must consider
  - Will injection comply with SDWA standards
  - Cumulative volume of water injected that can be recovered
  - Effect on existing water wells
  - Will introduction of water alter native groundwater to a degree that would render it detrimental to people, animals, vegetation, or property or require unreasonable treatment to make groundwater suitable for beneficial use

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Regulatory Requirements
UIC Permits

- TCEQ ASR permits
  - Each injection/recovery well must be metered
  - Monthly reports of water injected/recovered
  - Annual testing of quality of water injected/recovered
  - Annual reports of water quality
  - If in GCD
    - Wells must be registered with GCD
    - Provide GCD with copies of monthly volume reports and annual quality report
    - Report volumes of water recovered in excess of volume authorized to be recovered

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Groundwater Conservation Districts

- Prior 9/1/15 GCDs could regulate ASR injection/recovery
- Only about 20 out of 99 GCDs had ASR-related rules
  - None of the existing ASR projects within a GCD
  - GCD requirements more stringent than HB655 (Evergreen UWCD – limited recovery to 90%)
  - Some GCDs expressly prohibited ASR (Live Oak UWCD)
  - In most GCDs rules would have to be adopted before permitting an ASR project

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Groundwater Conservation Districts

Role of GCDs after HB655 (assuming operator does not recover more than the volume authorized by TCEQ)

- All injection/recovery wells must be registered with the GCD
- Copy of monthly TCEQ volume report sent to GCD
- Copy of annual TCEQ water quality report to GCD
- Registration fees and other administrative fees to the same extent as other registered wells within the GCD

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Groundwater Conservation Districts

Role of GCDs after HB655 (if operator recovers more than the volume authorized by TCEQ)

- Recovery wells subject to permitting, spacing, and production requirements of the GCD, but only to the amount that exceeds the authorized amount
- Bottom Line – make sure you stay within TCEQ amount or space wells appropriately

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ASR – The Future

- 2012 State Water Plan
  - 12 ASR Projects (yields 23k AF/yr to 58k AF/yr)
  - Included expansions to Kerrville & SAWS, new projects by GBRA, LCRA and BexarMet
- 2015 IPPs
  - GBRA and Kerrville expansion (other strategies from 2012 dropped
  - ASR strategies in Regions F, G, J, K, N, O, and P
  - GBRA and Austin strategies > 50k AF/yr
  - Bryan – inject highly treated effluent into Sparta/Queen City 3,000 AF/yr
  - Much of 2015 planning based on pre-HB655 law (GCD uncertainty)
- 2022 State Water Plan
  - Look for significant increase in ASR projects

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Brackish Groundwater Production Zones

- 2013 Legislative Session
  - 5 bills introduced to clarify permitting requirements, reduce costs, and provide necessary regulatory certainty for investment in capital-intensive brackish desalination projects
  - All but one bill (HB2578 - Larson) died in committee
  - HB2578 passed House but died in Senate
- TWCA Interim Work
  - Subcommittee formed. Met for months. Developed draft based on HB2578
  - Draft bill did not obtain consensus support

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Brackish Groundwater Production Zones

- 2015 Session (HB30)
  - Based on HB2876
  - 2 distinct parts as introduced
    - Designation of Brackish Groundwater Production Zones by TWDB
    - GCD permitting of projects in Brackish Groundwater Production Zones
  - Modified in committee to remove provisions relating to GCD permitting

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Brackish Groundwater Production Zones

- HB30 Details
  - RWPG required to identify opportunities for development of large-scale saltwater and brackish groundwater desalination
  - Expanded TWDB obligations in biennial desalination report to include brackish groundwater
  - Requires TWDB to designate Brackish Groundwater Productions Zones
    - Areas with moderate to high availability and productivity of brackish GW that could reduce use of fresh GW.
    - Separated by hydrogeologic barriers sufficient to prevent significant impacts to water availability or water quality
    - Not located in EAA, subsidence district, or brackish aquifer serving as a significant source of water supply
    - Work with GCDs, and stakeholders and consider relevant scientific data
    - By 12/1/16 designate zones in middle Carrizo-Wilcox, Gulf Coast, Blaine, and Rustler aquifers
    - By 12/1/22 designate zones in remaining aquifers

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Brackish Groundwater Production Zones

- TWDB activities on designations
  - 10/25/15 Initial stakeholder meeting
  - Proposed approach
    - Map entire brackish resource for each aquifer
    - Propose potential production areas in each aquifer in a stakeholder meeting
    - Prioritize potential production areas
    - Perform impact analyses of 30 and 50-year pumping
    - Propose zones to TWDB Executive Administrator
    - Present EA's recommendation to Board
    - Include designations in Biennial Report on 12/1/16

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Brackish Groundwater Production Zones

- TWDB sought comments due 10/30/15 on:
  - How to define “significant impacts”?
  - How to define “separated by hydrogeologic barriers sufficient to prevent significant impacts”?
  - Does there have to be a physical barrier?
  - Can separation also include distance?
  - How define “significant source”?
  - Is there a distance from an existing use that would be sufficient to allow designation?

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Conclusion

- ASR more than an alternative to surface reservoirs – also provide flexibility in distribution system.
- HB655 should allow ASR to play a more significant role in the development of future water supplies and water system operations in Texas.
- Development of desalination projects using brackish groundwater is unlikely within a GCD until after the Legislature provides some guidance on permitting.
- Legislation may be more likely after the resolution of the technical issues through the designations of brackish groundwater production zones.

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Questions?

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