

New Developments in Aquifer Storage & Recovery in Texas 2019

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Texas Commission on Environmental Quality
Office of Waste, Radioactive Materials Division



Presentation Topics

- TCEQ's UIC Regulatory Authority
- 86th Texas Legislature: Bills Related to ASR and AR
- TCEQ's ASR Program Highlights
- TCEQ's AR Program Highlights



Regulation of ASR and AR in Texas

Texas has regulatory primacy for the Underground Injection Control (UIC) Program, with the goal of protecting the quality of underground sources of drinking water.

Texas Commission on Environmental Quality (TCEQ) UIC jurisdiction covers Classes I, III, IV, and V injection wells, including Class V Aquifer Storage and Recovery (ASR) and Aquifer Recharge (AR) injection wells.



Photo Credit: Texas Water Development Board
2017 State Water Plan

Key UIC Aquifer-Related Legislation Texas 2019



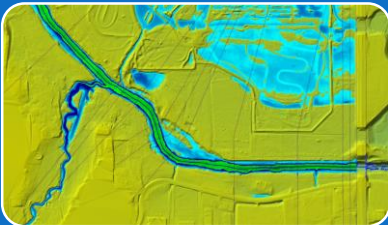
SB 483 and SB 520: Aquifer Storage and Recovery (ASR) Projects in portions of the Edwards Aquifer



HB 720: Use of unappropriated water in AR or ASR projects, including storm water and floodwater



HB 721: Studies of aquifers in Texas to determine feasibility of ASR or AR projects (by TWDB)



HB 723: TCEQ to obtain or develop updated water availability models for certain river basins in Texas

Legislative Implementation 2019-2020

- Revising UIC rules to allow certain injection operations into or through Edwards Aquifer, including ASR and AR projects:
 - SB 483: Covers the Barton Springs Edwards Aquifer Conservation District, including south Austin and Buda, a high-growth area along the I-35 capitol area corridor
 - SB520: Covers the Edwards Aquifer in New Braunfels, along I-35 corridor between Austin and San Antonio
- Revising agency rules on use of unappropriated water, including stormwater and floodwater, for ASR and AR projects:
 - HB 720: Writing new rules and establishing standards and requirements for aquifer recharge wells

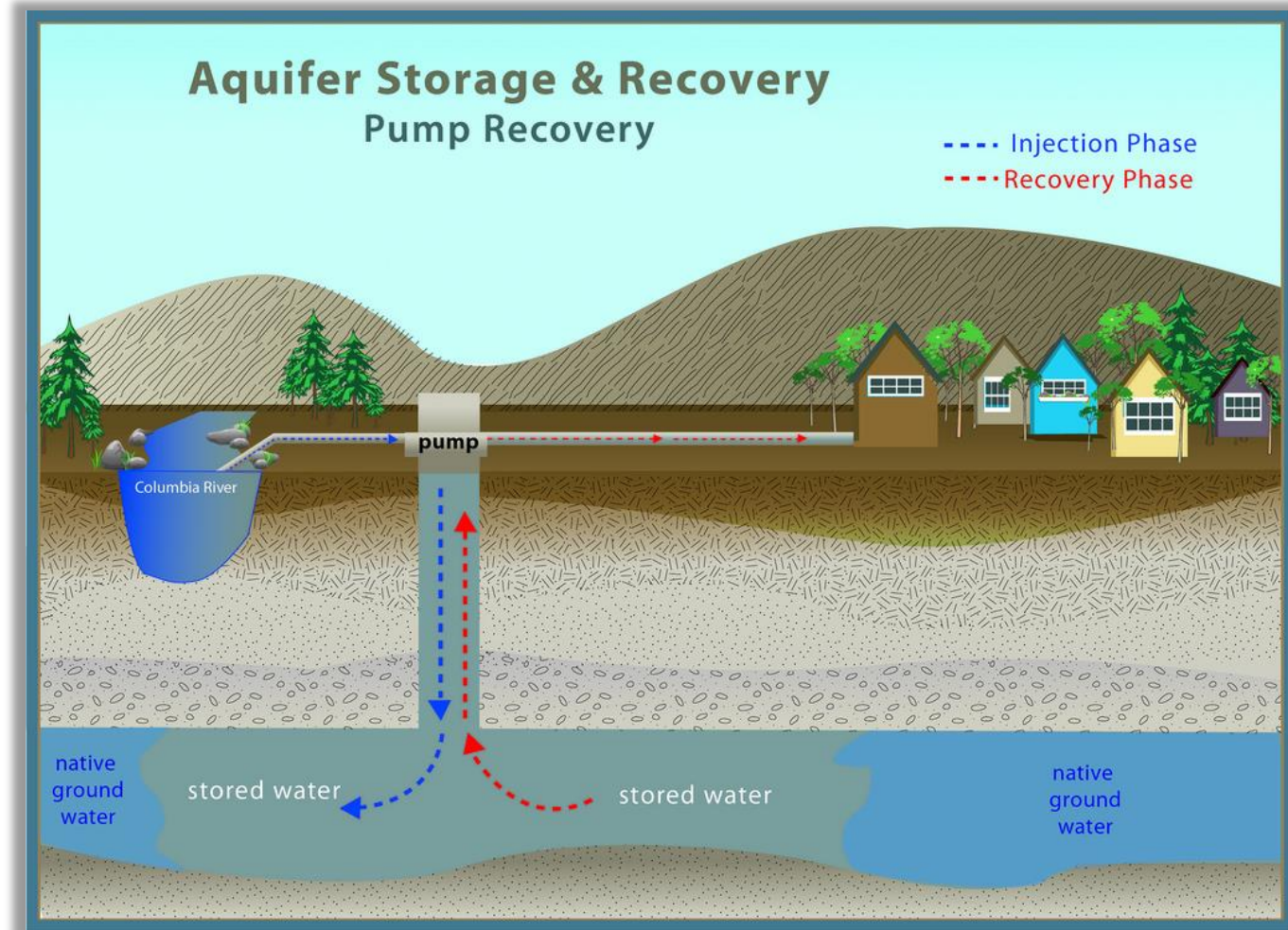




Aquifer Storage and Recovery

What is Aquifer Storage and Recovery?

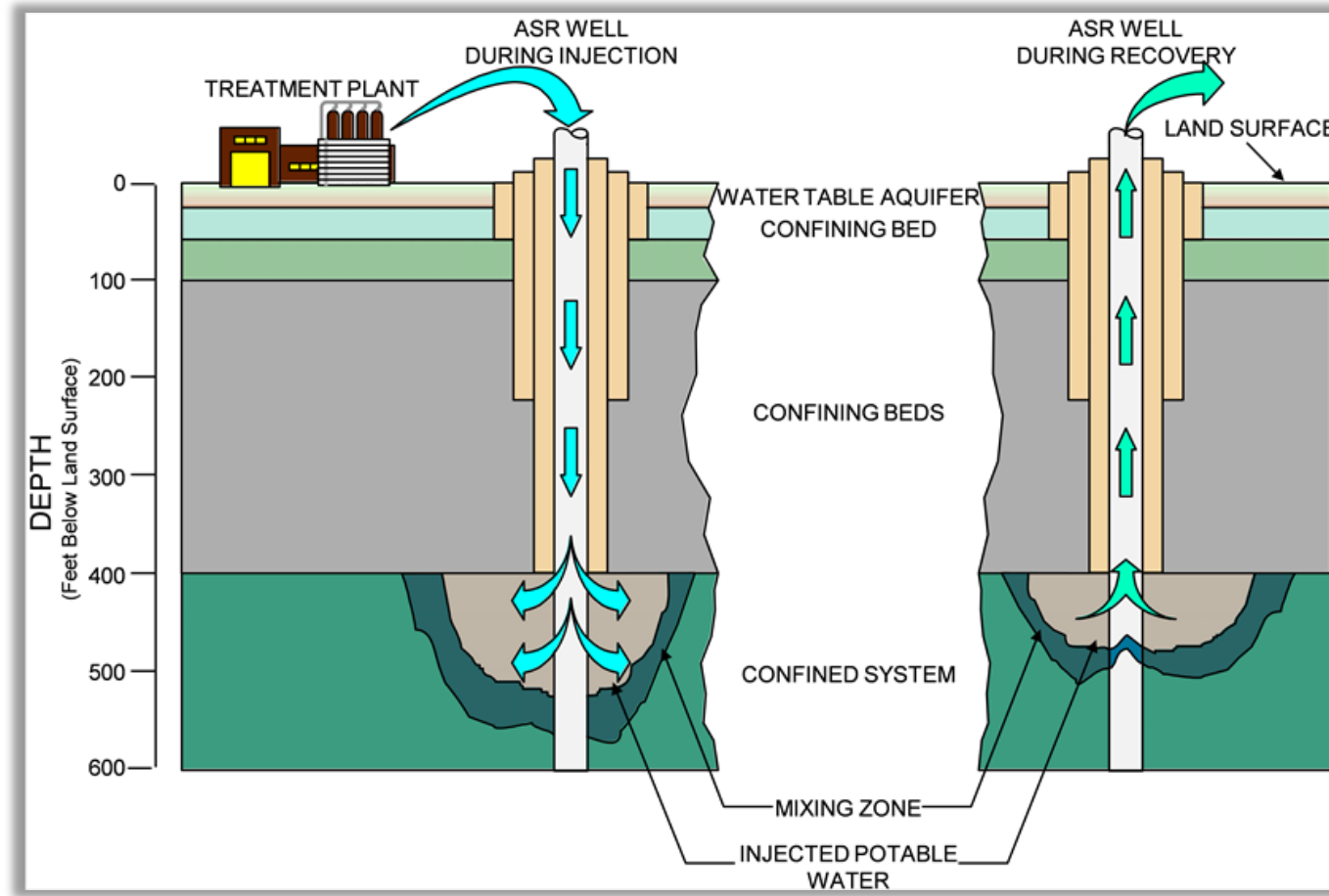
Storage of available water underground in a geologic formation



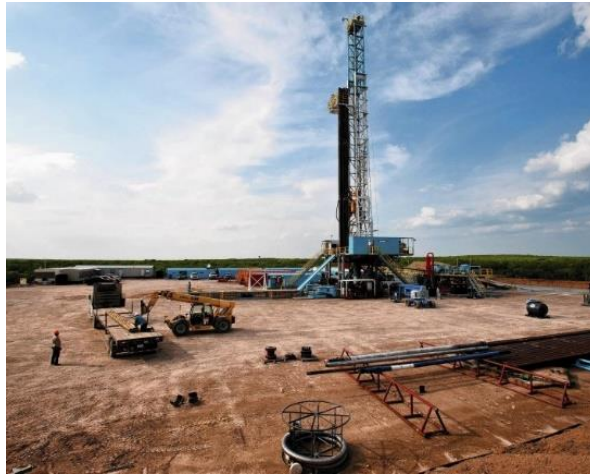
Subsequent recovery of the stored water when water demands are higher

What is Aquifer Storage and Recovery?

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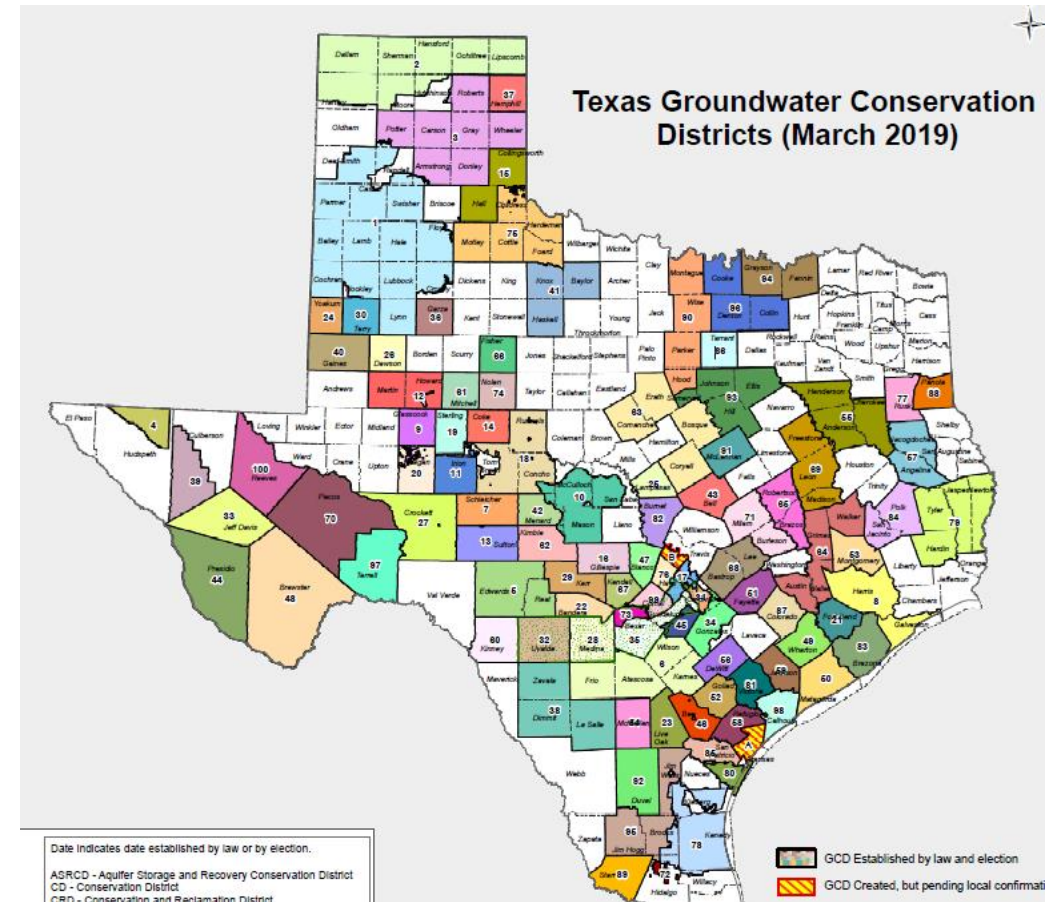
ASR – It's Not Just for Drinking Water

- Potable Water
- Irrigated Agriculture
- Oil and Gas Production
- Livestock Operations
- Industrial Facilities



ASR Regulatory Framework in Texas

- In Texas, ASR projects may be authorized by:
 - Rule - authorization letter issued
 - Individual permit - public notice required
 - General permit - *not yet developed*
- TCEQ notifies the groundwater conservation district when it receives an application for an ASR project authorized by rule if the project is located within the district.



ASR Regulatory Framework in Texas, cont.

- Texas ASR rules require all wells for an ASR project to be located within a contiguous boundary of one parcel or two/more adjacent parcels under common ownership, lease, agreement or contract.
- While the rules no longer require pilot projects, it is useful to conduct cycle tests and other studies to better design ASR projects.



ASR Water Quality Requirements

- Texas ASR rules for injectate water quality are consistent with federal Safe Drinking Water Act
- When authorizing ASR wells, TCEQ must evaluate effects of the ASR project on existing water wells and consider whether injection of water will:
 - alter the native groundwater quality to a degree that would make groundwater that is produced harmful or detrimental to people, animals, vegetation or property, or
 - would require an unreasonably higher level of treatment to make the groundwater suitable for beneficial use



Photo Credit: Texas Water Development Board

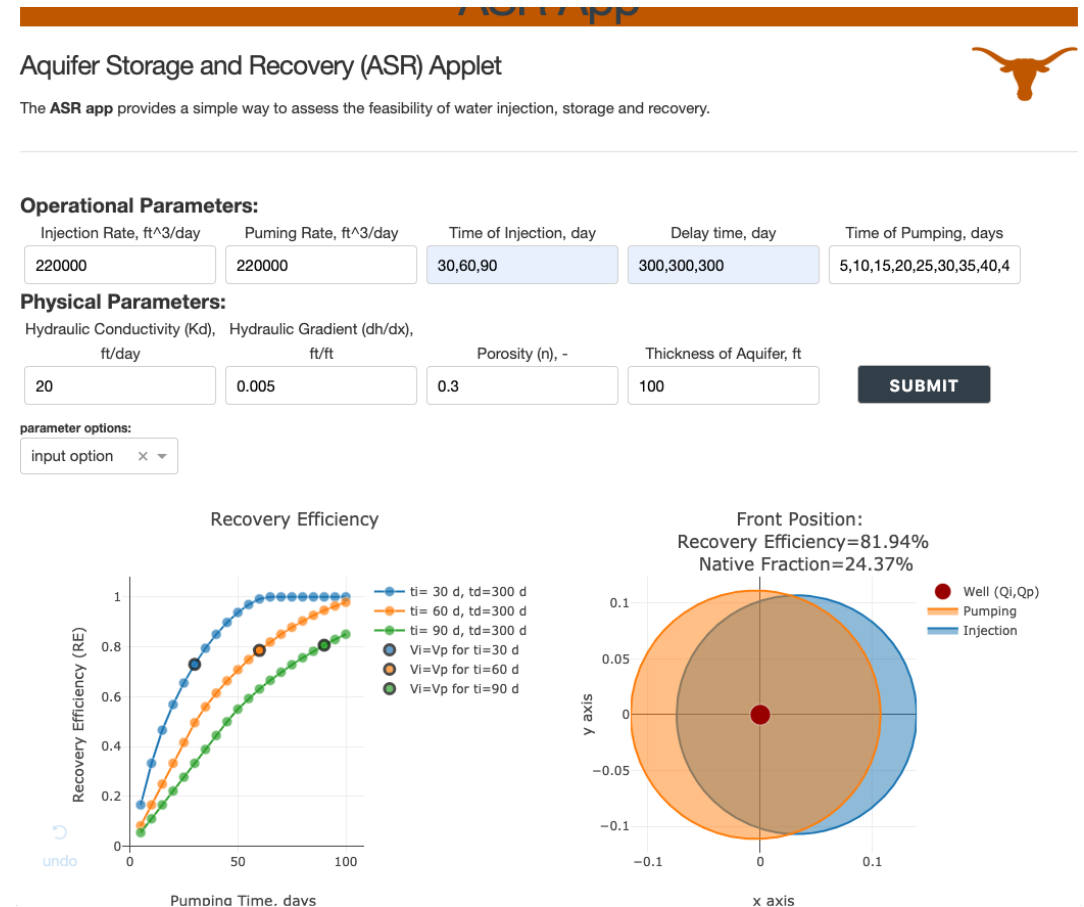
ASR Water Quality Requirements, cont.

- ASR projects producing water as part of a public drinking water supply must submit plans and obtain approval from TCEQ's Water Supply Division. Applicants should coordinate with TCEQ's UIC Permits Section and Water Supply Division concurrently.
 - Water recovered from an ASR project for public water supply must meet or be treated to the drinking water standards in 30 TAC Ch. 290



TCEQ ASR Rules on Recoverability

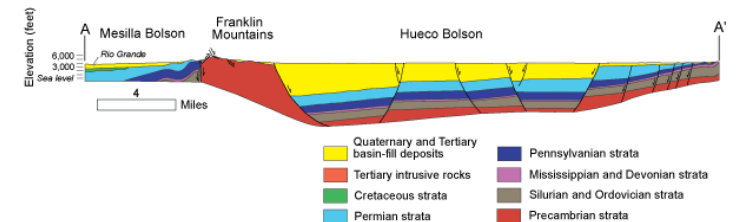
- ASR projects in a groundwater conservation district with authority to regulate withdrawal are subject to district's rules for the volume of water produced that exceeds the "recoverable volume."
- TCEQ must make a determination on the volume of water that can be recovered, compared to the volume of water injected.
- TCEQ's ASR application form asks applicants to demonstrate recoverability.



Factors in Determining ASR Recoverability

Hydrogeologic Factors:

- Aquifer permeability
- Aquifer thickness
- Aquifer lateral continuity
- Aquifer confinement
- Aquifer hydraulic gradient
- Geology: structural setting
- Geology: formation, mineral content
- Ambient water quality

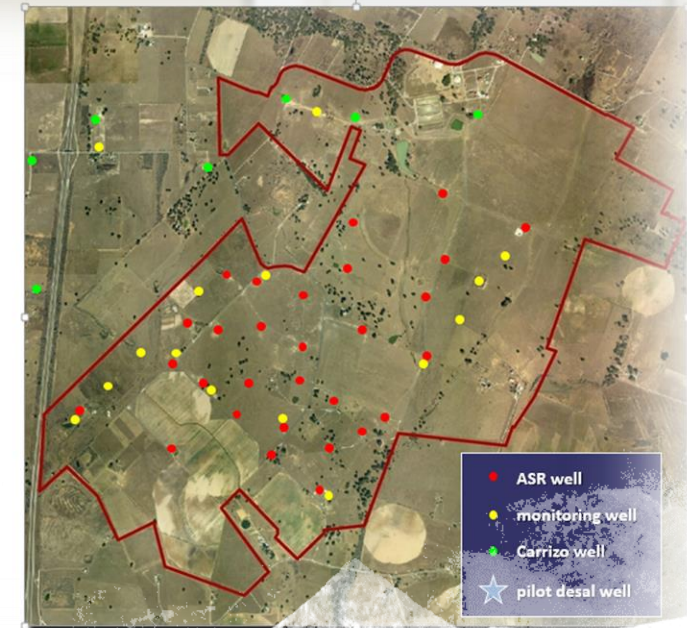


Factors in Determining ASR Recoverability

Design and Operational Factors:

- Purpose: seasonal or drought storage
- Size of project; depth to injection zone
- Storage zone thickness; location in aquifer
- Initial buffer-zone building; long-term maintenance of buffer zone
- Volume of injected water for each cycle
- Duration and frequency of storage cycles
- Well design and performance
- Quality and pre-treatment of injected water

Well Locations



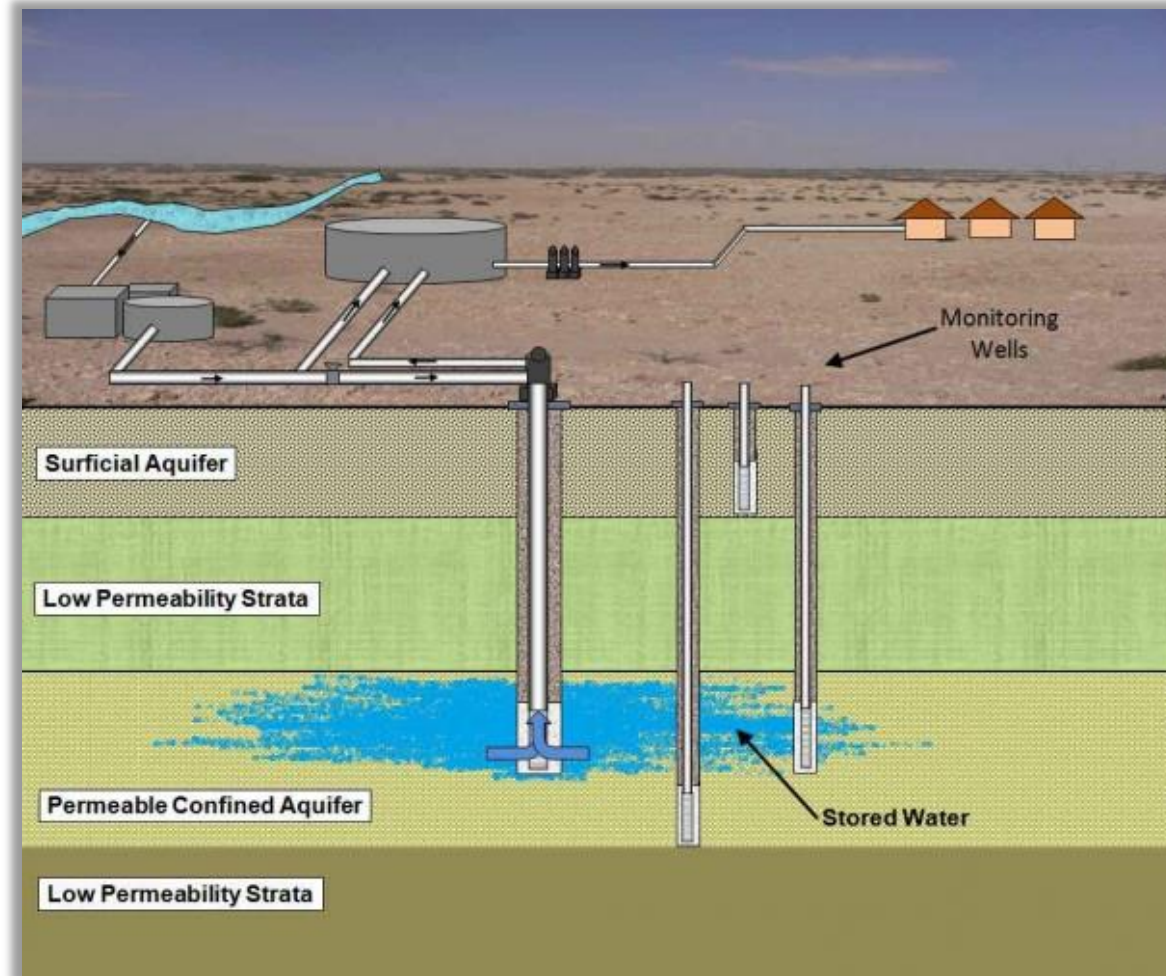
ASR Monitoring and Reporting Requirements

- ASR operator must monitor all ASR injection and production wells. Each calendar month, the ASR project operator must submit to TCEQ:
 - Volume of water injected for storage
 - Volume of water recovered for beneficial use
 - Monthly average injection pressures
 - Other information (e.g., monitoring well data)
- Annual water quality testing of injected and recovered water required. Written report must be submitted to TCEQ annually with water quality analytical results.



ASR Surface Equipment & Monitoring Wells

Surface equipment can include storage, distribution, and treatment facilities (pre-injection and/or post-recovery treatment may be needed)



ASR system can be monitored using a series of monitoring wells to evaluate water levels and changes in water quality

Established ASR Project Highlights

City of Kerrville

- Injection of river water
- In operation since 1996
- Authorized to inject up to 4.25 MGD
- Considering expansion of ASR project

San Antonio Water System

- Injection of groundwater
- In operation since 2001
- 34 ASR wells authorized (29 installed)
- As of 2/2018 over 157,000 AF stored

2017 ASR Authorization Project Highlights

City of Victoria

- Injection of river water
- Old well retrofit issues
- Initial cycle test conducted
- Potential geochemical interactions

Ruby Ranch

- Injection of groundwater
- Use of existing water well
- Cycle testing underway
- Potential geochemical interactions

2018/19 ASR Authorization Project Highlights

New Braunfels

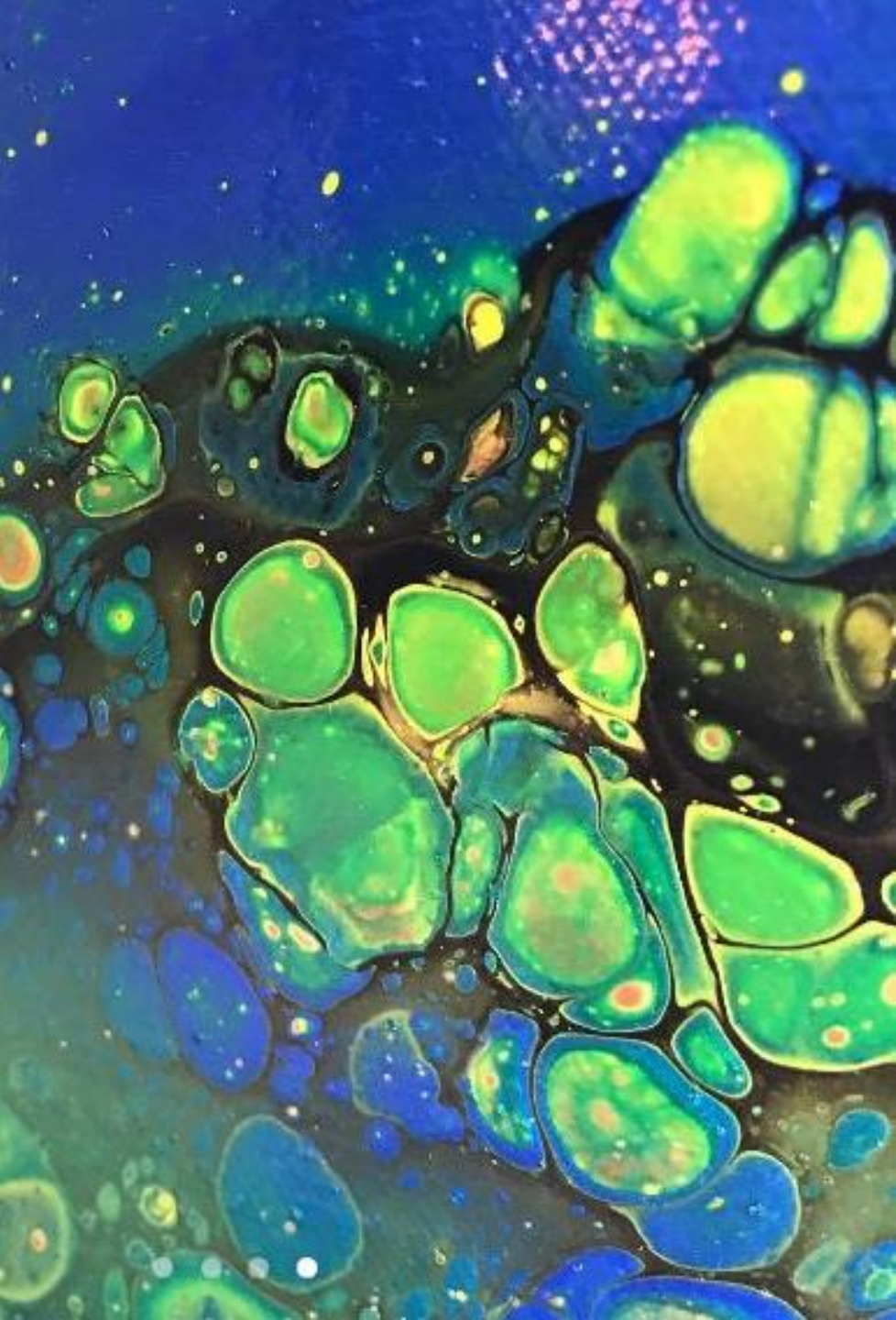
- Injection of groundwater into brackish zone
- New well construction
- Will conduct cycle testing

City of Buda

- Injection of groundwater into slightly brackish zone
- New well installation
- Initial 5-year storage cycle

City of Bryan

- Injection of groundwater into slightly brackish zone
- Retrofitting older well
- Will conduct cycle testing



Aquifer Recharge

Aquifer Recharge and HB 720 (86th TX Legislature)

Texas Rep. Lyle Larson introduced HB 720 to facilitate use of high magnitude flows for AR and ASR projects:

- Recognizes aquifer recharge as a beneficial use
- Addresses water rights and use of unappropriated water, including stormwater and flood flows
- Statute establishes new requirements for UIC AR projects that are similar to ASR requirements enacted in 2015
- Rulemaking is underway for water rights and for AR, including a new UIC rule subchapter on AR



Aquifer Recharge UIC Rule Revisions 2019-20



UIC rules currently being revised in response to HB 720 to include:

- Definitions of *aquifer recharge project*, *recharge injection well*, and *project operator*
- Authorization of AR injection well projects by rule, individual permit, or general permit
- TCEQ's duty to evaluate effects of an AR project on existing water wells, springs, etc.
- Injectate water quality requirements are the same as in the ASR rules
- Metering of recharge wells and annual reporting of injection volumes
- Annual testing of injectate for water quality parameters and annual reporting

Notable Existing AR Project Highlights

El Paso Water Utility

- Recharge of treated wastewater under a “no-discharge” permit for WWTP
- Initially authorized for 10 ASR wells in 1980
- Over time EPWU shifted to recharge via infiltration basins

Seco Creek Sinkhole

- Injection of surface water during high magnitude flows
- Edwards Aquifer Authority installed diversion channel from Seco Creek to the sinkhole (improved)
- Currently retrofitting weir gate system on channel

Wintergarden GCD

- Injection of stormwater in rural area into Carrizo Aquifer
- Conducting pilot study to evaluate fate of microorganisms injected into aquifer ~600 ft below ground surface
- If successful, GCD wants similar AR projects district-wide



Aquifer Recharge in Texas: Improved Sinkhole Recharging Edwards Aquifer

<https://www.facebook.com/SanAntonioExpressNews/videos/10154178607555762/>



Thank You! Any Questions?

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www.tceq.texas.gov/permitting/waste_permits/uic_permits/uic.html