Status of TWDB-funded ASR Projects

ASR for Texas! Seminar

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Austin, Texas

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*Unless specifically noted, this presentation does not necessarily reflect official Board positions or decisions.

Funding Background

- 84th Texas Legislature, House Bill 1, Rider 25
  - $1,000,000 from General Revenue Fund
  - For innovative storage approaches, including but not exclusively, ASR
  - One-for-one matching grant funds
  - Competitive grant application process
    - Request for application notice – September 22, 2015
    - Application deadline – November 3, 2015
    - Grant approval – January 7, 2016

Application Summary

- Six applications received
  - Four ASR field studies
  - One ASR desktop/planning study
  - One enhanced recharge field study
- Three grants awarded

Recipient	Funding		
	Total	Requested	Awarded
Edwards Aquifer Authority/New Braunfels Utilities	$563,000	$281,500	$281,500
Victoria County Groundwater Conservation District	$570,226	$285,112	$285,112
Corpus Christi Aquifer Storage and Recovery Conservation District	$1,000,000	$500,000	$433,388

New Braunfels ASR Demonstration Project

- Contractor – Edwards Aquifer Authority
- Primary partner – New Braunfels Utilities
- Project manager – Arcadis, U.S. Inc.

EDWARDS AQUIFER AUTHORITY

NBU® New Braunfels Utilities

Scope of Work

1. Coordination with TCEQ
2. Coring design
3. Wireline coring, data collection and analysis
4. Monitor well design
5. Monitor well construction, data collection and analysis
6. Final reports and presentations

Completed Work

- Executed Interlocal Agreement between EAA and NBU
  - Serves as permit for storage and recovery in brackish Edwards
- 1-acre site adjacent to New Braunfels Regional Airport
- Opened bids on wells on January 8, 2018
- Awarded coring and well to Kutscher Drilling Company
  - Cascade Drilling & Environmental as coring subcontractor
- Coring started on March 19, 2018
- Coring completed April 5, 2018 at around 1,100 feet TD

Lessons Confirmed

- Limited existing data on brackish Edwards Aquifer
  - More assumptions required
- Limited number of ASR-qualified coring contractors in U.S.
- Important to build flexibility into bid documents and schedule of values
- Involvement of EAA essential for moving forward with future phases

Next Steps

- Coring data collection
  - Lab analysis
  - Identify potential geochemical issues
- Final decisions about monitor well depths
  - Based on information from coring
- Construction of monitor well
- Monitor well data collection and analysis
- Coordination with TCEQ
- Reports to TWDB
  - Draft report- March 2019
  - Final report- August 2019

Victoria ASR Demonstration Project

- Contractor – Victoria County GCD
- Primary partner – City of Victoria
- Project manager – Arcadis, U.S. Inc.

Scope of Work

1. Permitting with TCEQ
2. ASR well rehab and facilities design
3. Retrofit of Well No. 19
4. Potable water pipeline design and construction
    - » Approximately 2,000 feet long
    - » 12-inch ID for recharge/recovery
    - » 2-inch ID for trickle flow
5. O&M manuals and training
6. Cycle testing, data collection and assessment
7. Final reports and presentations

Completed Work

- Obtained Class V Injection Well from TCEQ
  - Experimental well, 5X25 well designation type
- Completed design and bidding for project
- Removed motor, pump column and pump
- Completed initial video log of well for confirmation of condition and bid schedule items
  - Modified well rehab approach
  - Less aggressive approach (surging with acid vs. abrasive brushing)
- Performed second video log to confirm rehab status
- Installed new pump and column pipe
- Completed above-ground piping and facilities
- Anticipate beginning recharge on week of April 9, 2018

Lessons Confirmed

- Multiple-party projects require more management and time commitment
- Early and continual communication and cooperation (e.g. between VCGCD and City) make for a smoother project
- Video logging important for decision making during rehab and retrofit
- With demonstration projects, expect unforeseen conditions:
  - Well condition worse than expected
  - Static water level higher than historic data
- Important to build flexibility into bid documents and schedule of values for contractor

Next Steps

- Complete construction
- Begin recharge of water from City distribution system
- Conduct training for City and Victoria County GCD on April 13, 2018
- Conduct cycle testing (recharge/storage/recovery) to:
  - Gather water level data at Wells 19 and 21 (monitor well)
  - Gather water quality data at Wells 19 and 21
  - Program details pending injection rate determination
- Reports to TWDB and VCGCD
  - Draft report- March 2019
  - Final report- August 2019

City of Corpus Christi ASR Feasibility Project

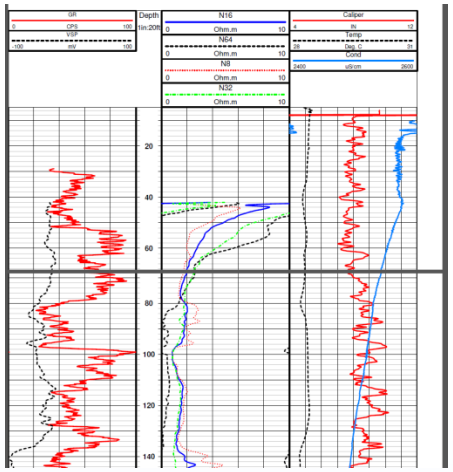
- Contractor – Corpus Christi Aquifer Storage and Recovery Conservation District
- Primary partner – City of Corpus Christi
- Project manager – HDR Engineering, Inc.

Scope of Work

1. Formulation of program
2. Exploratory test drilling program
3. Geochemical analysis
4. Field scale groundwater availability model
5. ASR operating policy considerations
6. Final reports and presentations

Completed Work

- Two-phase approach
- Well plans, specifications, and bid documents
- Service awarded in August 2017
  - Felder Water Wells and Pump Services
- Services from October 2017 to March 2018
  - Initial testing, four sites, 1,200 feet total depth
  - Multiple target intervals
  - Core analysis
  - Water quality analysis
  - 24 to 72 hour pump tests
- Three permanent monitoring wells



Lessons Learned

- Two-phased approach benefit confirmed
  - Flexibility to respond to aquifer conditions
  - High quality data
  - Lower costs
- Gulf Coast aquifer coring practices
  - Inter-bedded sand and clay layers
  - Continuous core tool modification required
  - Achieved 70-80% recovery unconsolidated sands; nearly 100% clay
- Well production
  - Estimate of 300-400 gpm in best sands confirmed
- Deeper formations
  - Swelling clays below 900 ft depth
  - Poor water quality
  - Higher drilling/operation costs
  - Less attractive option

Next Steps

- Compile exploratory testing results and evaluate field data
- Geochemical analysis
  - Analyze source water and aquifer compatibility
- Field scale groundwater model
  - Evaluate aquifer response and recovery for different schedules and rates.
  - Estimate ASR capacity
- ASR operating policies
  - Evaluate regulatory framework and policies
  - Mitigate risk and protect supply
- Reports to TWDB
  - Draft report- March 2019
  - Final report- June 2019

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