Best Practice Guidance for ASR Operators in Texas – A Preview

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Background

- Requirements for Aquifer Storage and Recovery (ASR) Projects revised under House Bill 655, passed during the 84th Session of the Texas Legislature (2015)
- Subchapter G added to Chapter 27 of the Texas Water Code (TWC)
- Rules to implement House Bill 655 adopted in 2016
- Under HB 655:
  - TCEQ required to determine the amount of water that can be recovered
  - Water recovered from an ASR that is provided to a public water system must meet applicable requirements under 30 TAC Chapter 290, related to public water supply, including water quality standards
  - For ASR projects within a Groundwater Conservation District, the requirements of TWC Chapter 36 Subchapter N apply to the volume of water recovered that exceeds the volume determined by TCEQ to be recoverable

What can happen to water after injection into an ASR storage zone?

Injected water may be “lost” by:

- Discharge to the surface
- Migration from injection (storage) zone through a conduit, such as a fault
- *Migration downgradient due to groundwater flow*

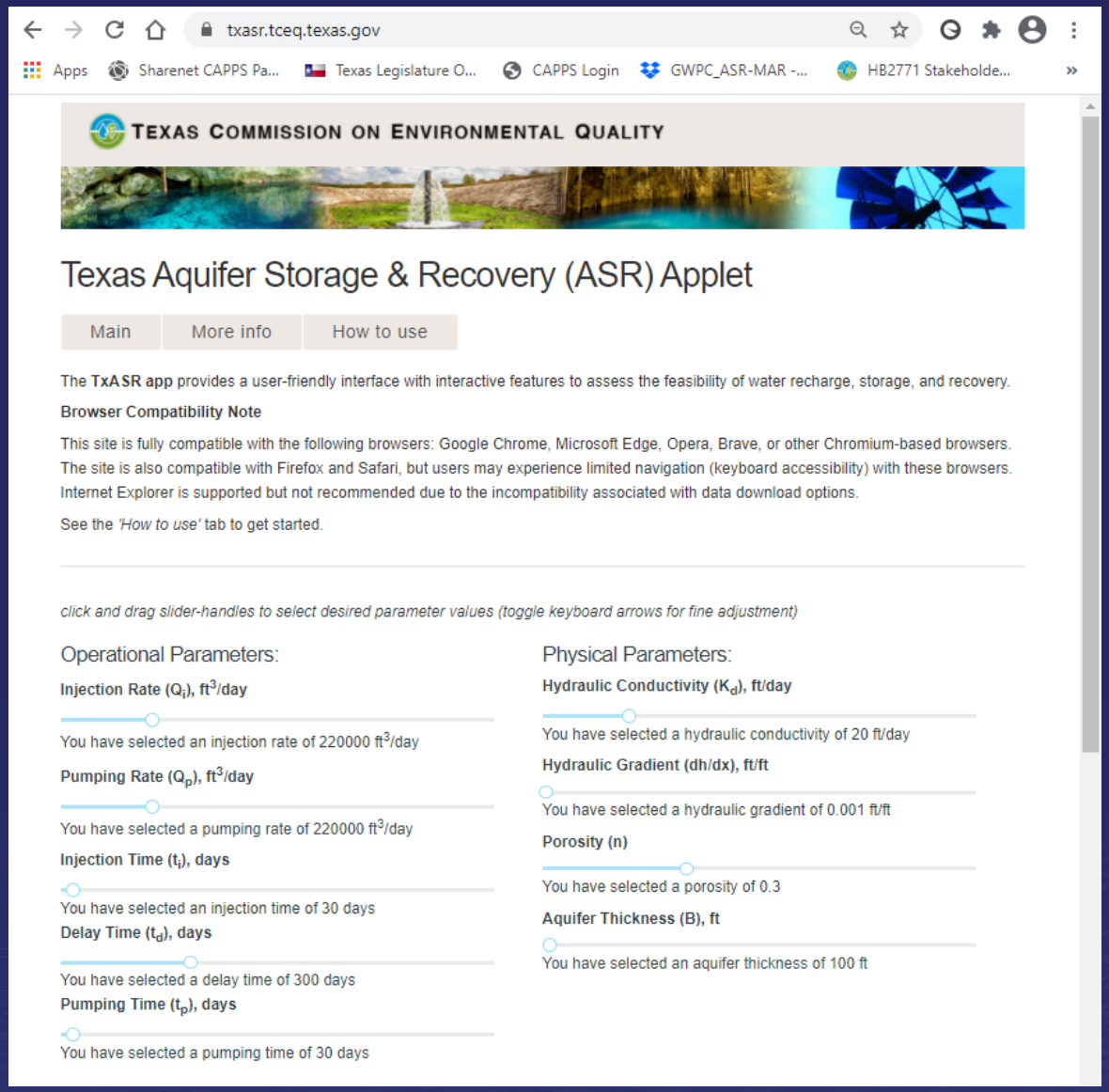
TCEQ contracted with the University of Texas at Austin - Center for Water and the Environment (UTA – CWE) to develop tools/guidance for determining recoverability of injected water

- A web-based application was developed under the direction of Dr. Charles Werth, Bettie Margaret Smith Chair of Environmental Health Engineering
- Texas Aquifer Storage and Recovery Application Applet (TxASR App)* may be accessed at: https://txasr.tceq.texas.gov/

*Notes:

- TxASR App only accounts for loss by downgradient migration
- Determines recoverability for a single ASR well under steady flow conditions
- Not intended as a substitute for groundwater modeling requirements in an ASR application

TxASR Applet input display (main page)



Example of TxASR Applet output display

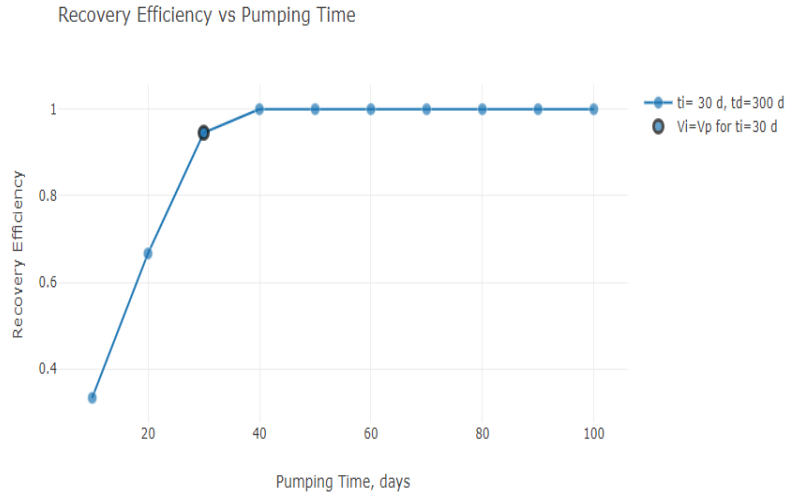
More Options:

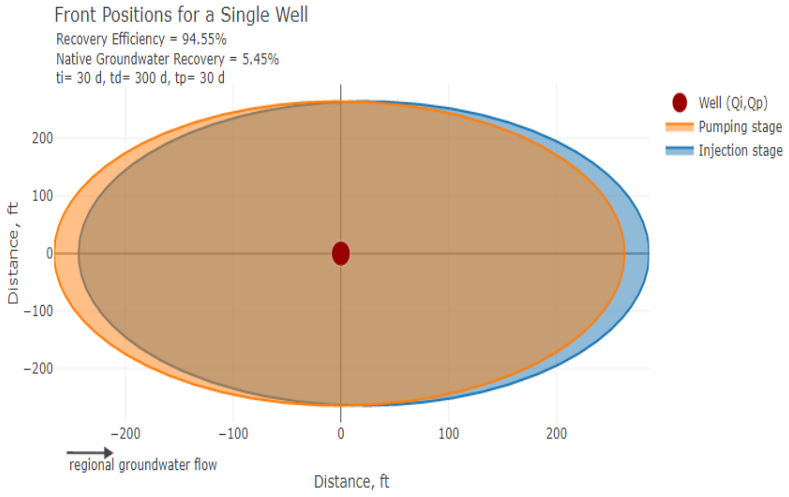
- ○ *Single time point entries*
- ◉ *Ranged pumping time entry*
- ○ *Ranged injection & pumping time entries*
- ○ *Ranged delay & pumping time entries*
- ○ *Manual data entry*

SUBMIT

click button to generate graphs below

click data points on "Recovery Efficiency vs Pumping Time" graph to generate corresponding "Front Positions for a Single Well" graph





DOWNLOAD DATA

download data for "Recovery Efficiency vs Pumping Time" graph

Internet Explorer does not support data downloads

DOWNLOAD DATA

download data for selected "Front Positions for a Single Well" graph

Mobilization of Arsenic during Aquifer Storage and Recovery

- Can be problematic - some ASR operators regulated by TCEQ have reported increases in dissolved arsenic concentrations in recovered water
- Arsenic concentrations in recovered water can not exceed State and Federal Drinking Water Standards (0.01 mg/l)
- What factors may contribute to increased arsenic concentrations?
- How can ASR operators attempt to mitigate this situation?

TCEQ contracted with The University of Texas at Austin – Bureau of Economic Geology (UTA – BEG) to develop guidance material to help understand the potential for arsenic mobilization during ASR

UTA – BEG Principal Investigator Dr. Bridget R. Scanlon led a team of research scientists/post doctoral fellows

Research primarily focused on:

- Comparison of ASR systems that have experienced arsenic mobilization in other parts of the U.S. as well as other parts of the world, including Europe and Australia
- Characterization of proposed ASR systems in Texas related to potential for arsenic mobilization based on parameters such as geology, aquifer type, groundwater chemistry, and potential water sources

TCEQ concurrently contracted with UTA – CWE to develop ASR guidance material under the direction of Dr. Charles Werth

Features of the guidance material include:

- Results of geochemical modeling simulating the effects of injected water on mineral, sorbed, and aqueous phase arsenic species in certain major aquifers in Texas
- Summary of the most important water quality parameters affecting arsenic release in representative Texas aquifers
- Guidelines on how to treat water in order to minimize the possibility of arsenic release during ASR operations

Final guidance documents for ASR

UTA produced two agency study (AS) publications for TCEQ

- AS-218
  - *Guidance for Understanding and Minimizing the Potential for Arsenic Mobilization during Aquifer Storage and Recovery,* Scanlon et al.
- AS-219
  - *Guidelines for Treatment and Management of Injected Water at Aquifer Storage and Recovery Sites to Minimize the Potential Release of Arsenic,* Werth et al.
- Documents may be accessed from UIC's Class V web page at https://www.tceq.texas.gov/permitting/radmat/uic_permits/UIC_Guidance_Class_5.html

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