

Updating the Chickasaw Wellhead Protection Plan

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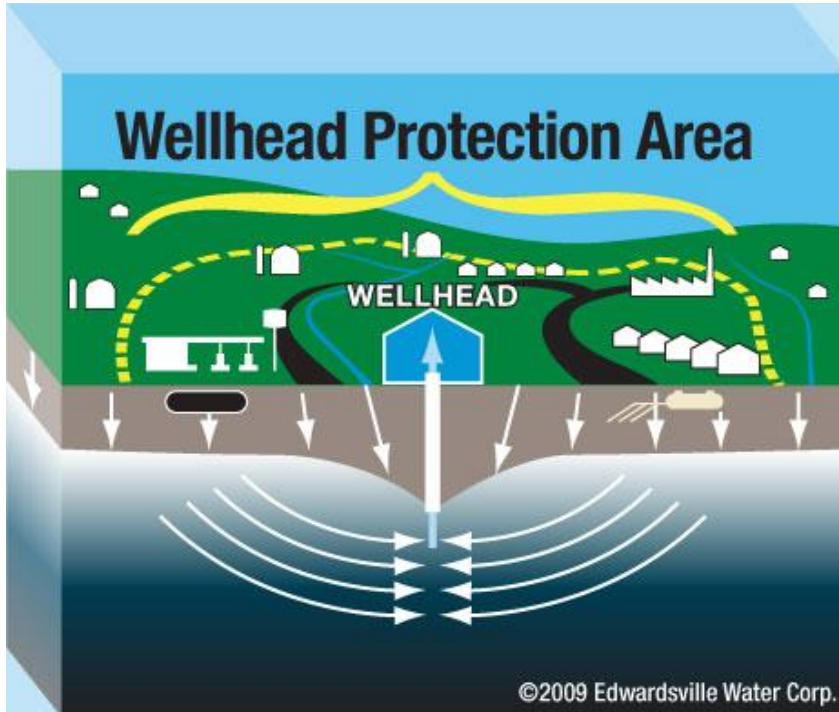
Oklahoma State University



Overview

- What is a Wellhead Protection Plan
 - Why is it important?
- Chickasaw Wellhead Protection Plan
 - Winstar World Resort and Casino
- Need for updating:
 - New Potential Source of Contamination
 - Other issues to consider

Wellhead Protection Plan



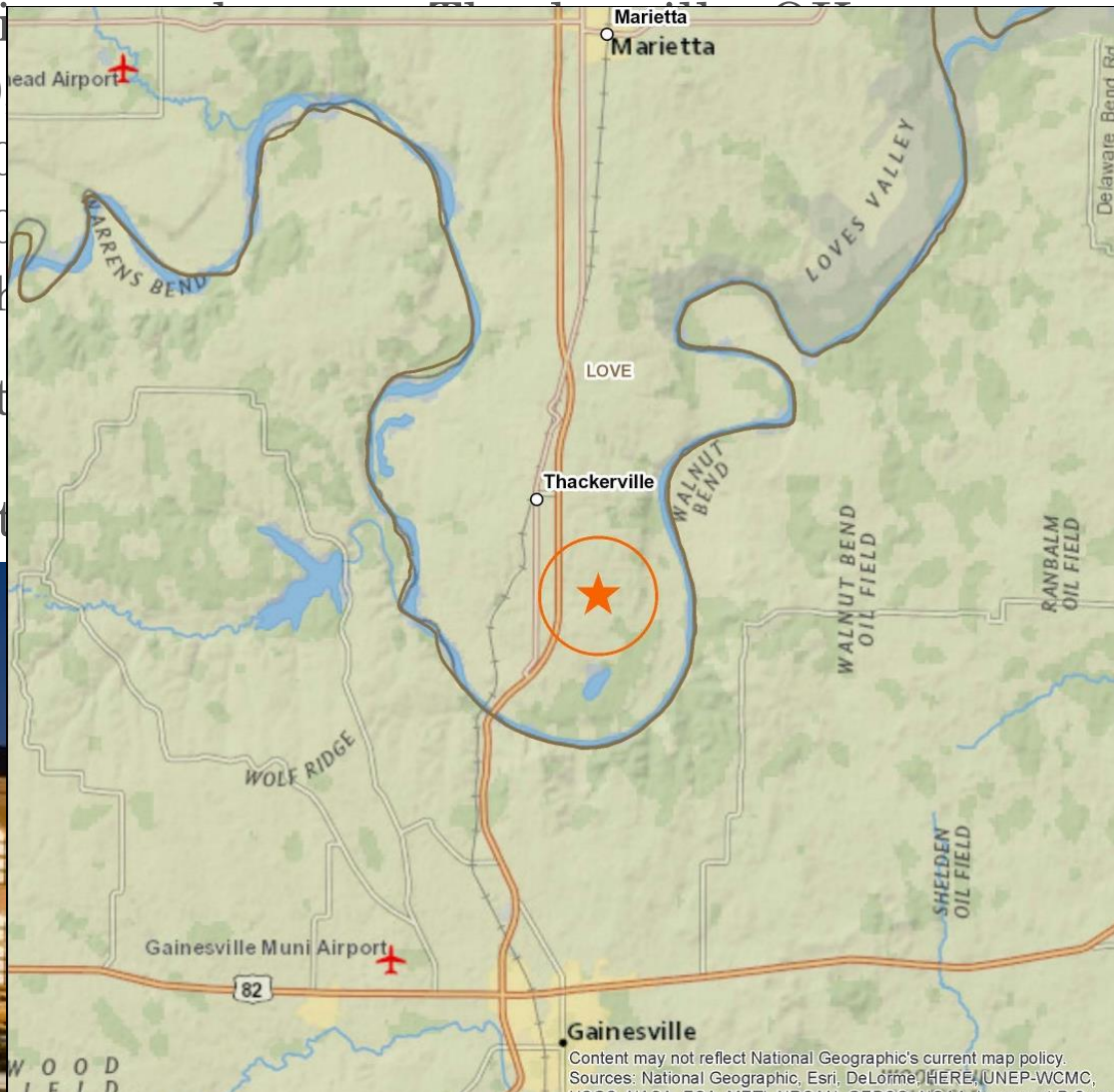
- Guidance document established by 1986 amendments to Safe Drinking Water Act
- Protect groundwater wells supplying drinking water to public water systems (PWS) from contamination
- Prevention is most cost effective means to maintain high quality drinking water

Wellhead Protection Plan

- WPP must cover:
 - Roles and duties of all state and local government entities and public water suppliers
 - Delineate Wellhead Protection Areas (WPA) for each wellhead
 - Identify known and potential sources of contaminants within each WPA
 - Develop management schemes to protect water source from contaminants
 - Develop contingency plans for response to contamination
 - Site new wells to maximize yield and minimize potential contamination
- States must develop and implement WPPs meeting the standards outlined in 1986 amendment to SDWA
- Living, iterative document

Winstar World Casino and Resort

- Mass
- 500
- 1,50
- 7,50
- 27-k
- Winst
- Park,
- Maint



Chickasaw Wellhead Protection Plan

- Chickasaw Wellhead Protection Plan (CWPP) serves WGC as their WPP since early 2000s
 - WGC exclusively on groundwater
- Deep Wells
 - 3 wells pull from Antlers bedrock aquifer
 - 750' deep
 - 200-250 gallons per minute
 - Generally of good quality, suitable for drinking*
- Shallow Wells
 - Multiple
 - ~70' deep, alluvial/terrace aquifers
 - 50-200+ gallons per minute
 - Irrigation
- Collectively, WGC can pump 1,000,000 gallons per day

Need for Updating

- August 2014: 07 Saltwater Disposal, LLC filed permit application with the Oklahoma Corporation Commission (OCC) to drill, complete & operate a commercial Class II disposal well
 - 16,000 bbl/day, 1,820 psi
 - Injecting into Arbuckle and undifferentiated Deese Sands
- Location of disposal well, < ½ mile west of WGC
- OCC grants approval without protest
- December 2014: OKA', LLC filed application with OCC to vacate or modify 07SWD's permit
 - OKA' is a subsidiary entity of CTUA
- November 2015: As the consequence of an administrative hearing, 07 Saltwater Disposal, LLC agrees not to proceed pending outcome of formal protest

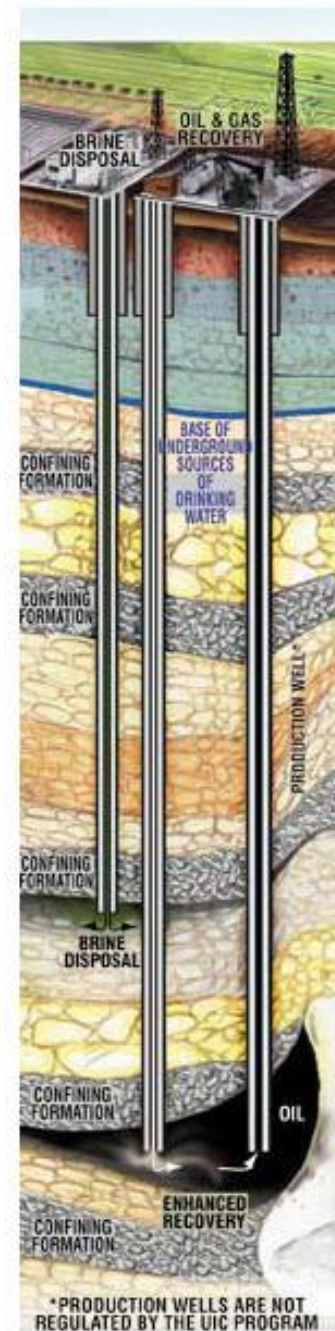
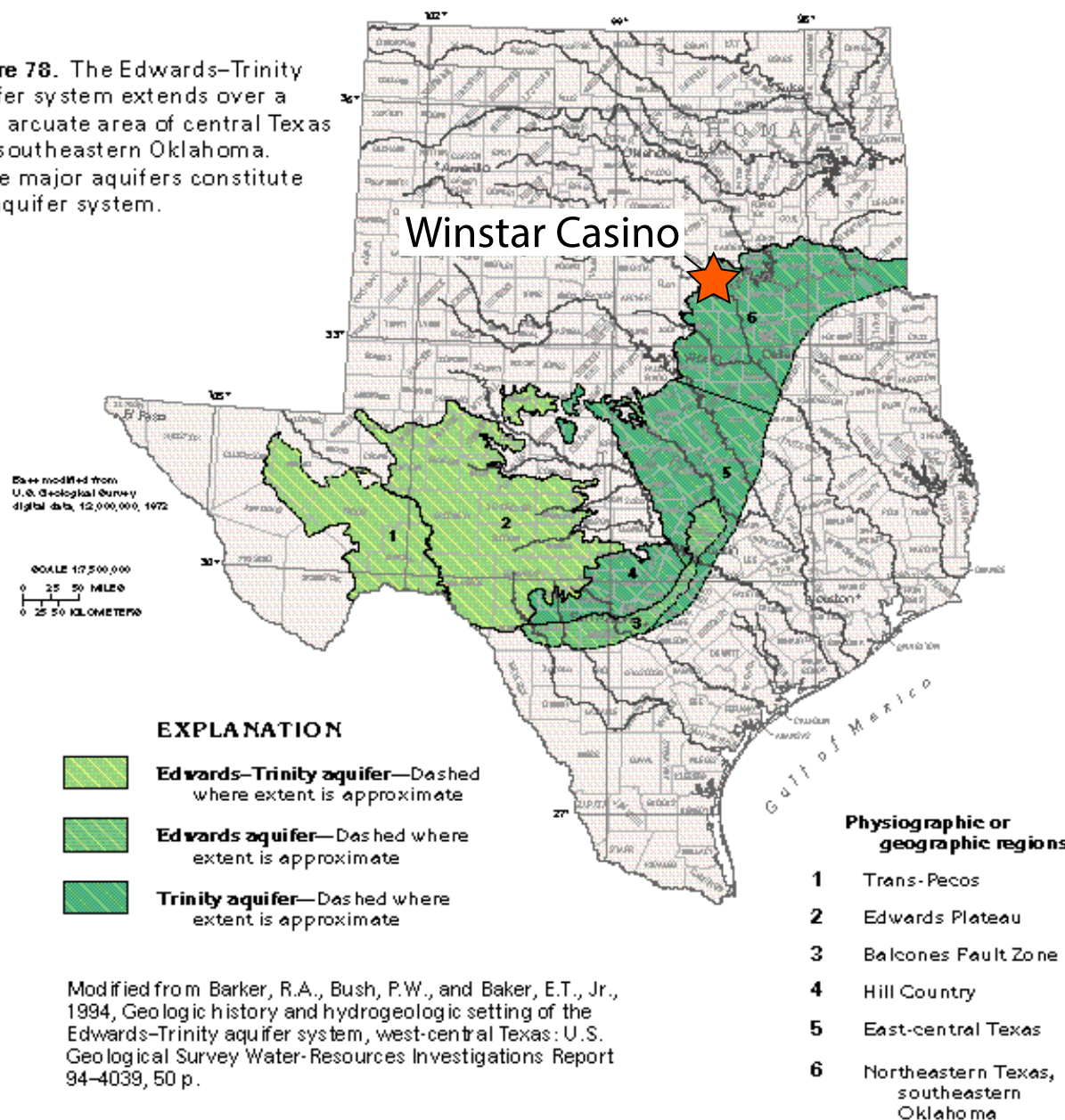


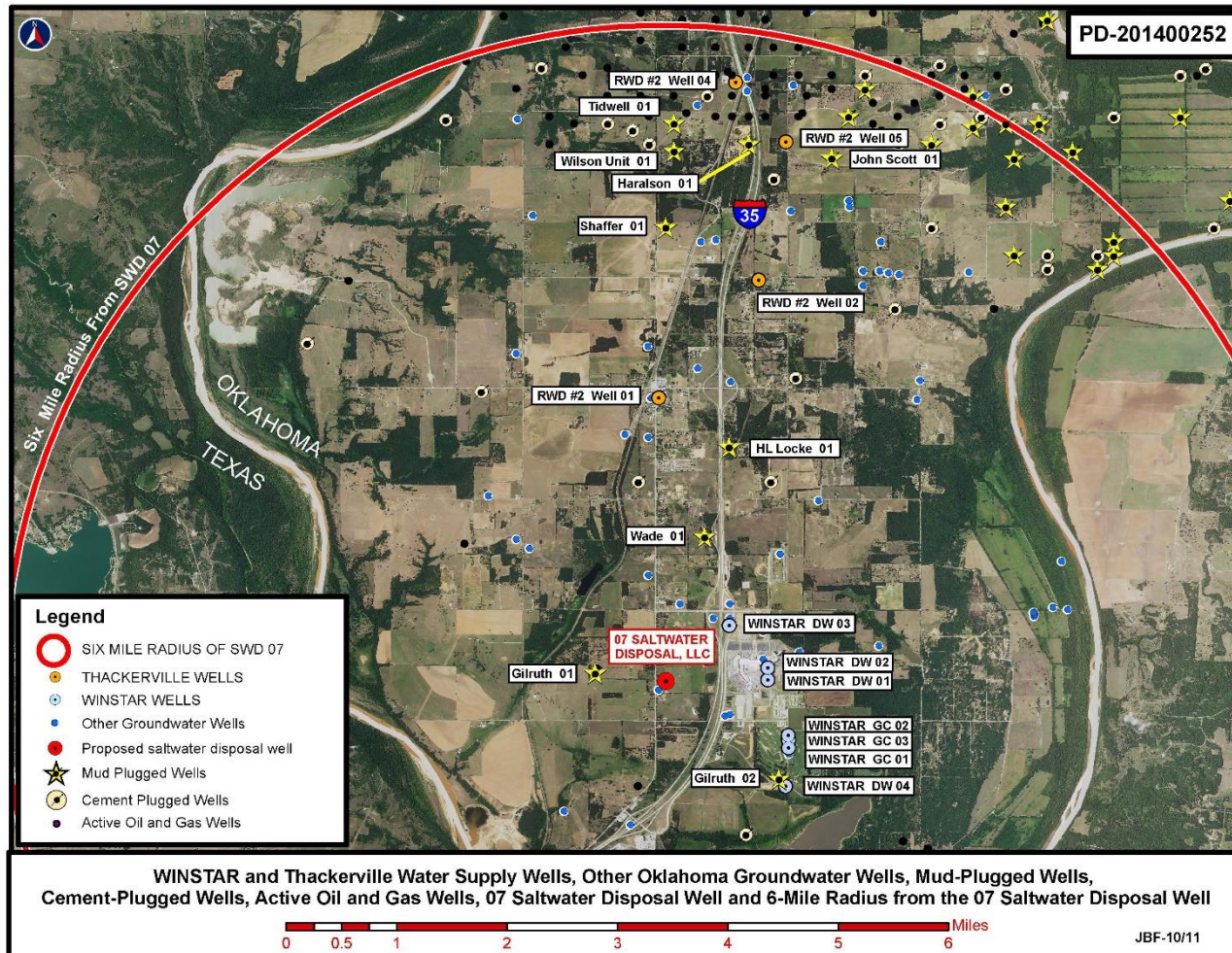
Figure 78. The Edwards–Trinity aquifer system extends over a wide arcuate area of central Texas and southeastern Oklahoma.

- Three major aquifers constitute the aquifer system.



Issues cont'd

- Nearby Oil, Gas, Water Wells
 - Abandoned or mud-plugged wells
 - Reaction under active injection



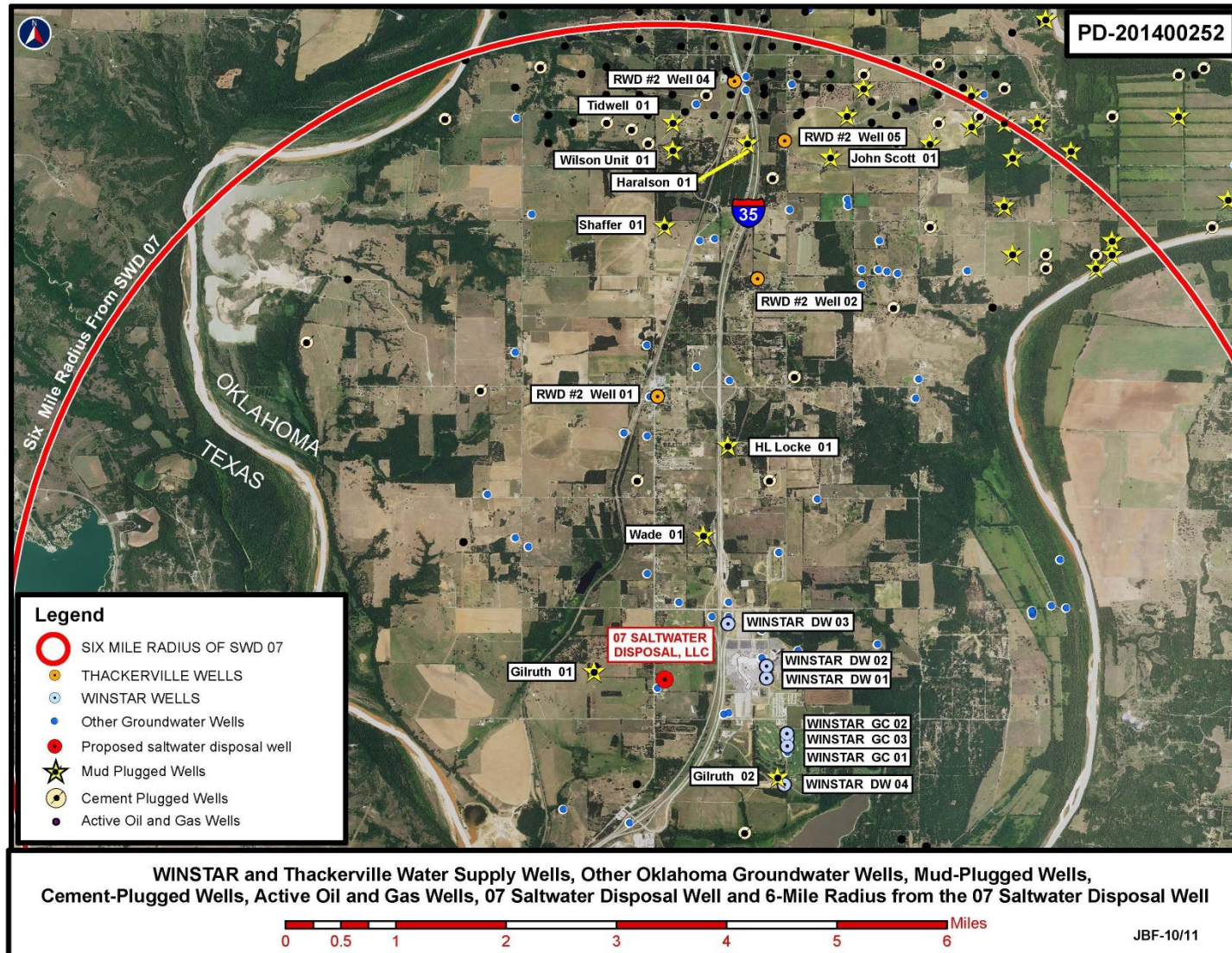
Proposed Solutions

- Critical look at water wells servicing WGC
 - Inventory active/inactive/newly drilled
 - Recommendations of previous SWAP report
- Site-specific geology and hydrogeology
 - Accurate portrayal of existing conditions
 - Challenge or accept USGS determination that aquifer is confined surrounding WGC
- Electric well logs and relevant test data from surrounding oil, gas, and water wells
 - Hundreds of pages of well logs
 - More detailed representation
 - Identifying barriers and conduits for fluid movement within geologic column

Proposed Solutions cont.

- Analysis of proposed saltwater disposal well (SWDW)
 - SWDW not new, saltwater commonly co-produced with oil and gas
 - In 2014, 10,500+ Class II UIC disposal wells in OK (Oklahoma Corporation Commission, 2015)
 - 101 SWDW in Love County
 - Total injected volume of 4,029,020 bbls (2014)
 - 07 Saltwater Disposal, LLC
 - 16,000 barrels per day
 - 5,840,000 barrels per year
 - If allowed to operate, 45% more wastewater than injected in all 101 SWDW in Love Co. in 2014
 - Larger than all but 41 SWDW in the State of Oklahoma

Proposed Solutions cont.



Wrap-up

- WPP serve communities by ensuring protective measures taken to safeguard PWS from contamination
- Living, iterative documents meant to be periodically updated as information becomes available
- Recent approval of high-volume SWDW near WGC, CWPP needs to be modernized
 - Additional potential source of contamination
 - Site-specific geology and hydrogeology

Thank You!

- Further questions can be directed to curt.dikes@okstate.edu
 - Special thanks to my committee members:
 - Dr. J. Berton Fisher
 - *Adjunct Professor, Environmental Science Graduate Program*
 - Dr. Scott H. Stoodley
 - *Director, Environmental Science Graduate Program*
 - Dr. Jason Vogel
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