Main Issues

1. Groundwater level decline
2. Nutrients
3. Sedimentation
4. Flooding
5. Arbuckle
Aquifer declines 1996 - 2017

Water Technology Farms
LEMA/WCA

- GMD 4 District Wide LEMA
- Wichita County LEMA Proposal
- WCA’s Increasing
  - More than 86,000 acres enrolled
  - Almost Half in 2019

Tech Farms/WCA Results

- Roth - Garden City
  - Yield – 241 bu. on 5”
  - Neighbor’s yields
    - 233 bu. on 14”
    - 222 bu. on 13.5”
  - Soil moisture probes made the difference
Nutrients in Surface Water

Milford Lake RCPP
Nutrients in Groundwater

Sedimentation Impacting Water Supply
Water Injection Dredging (WID)
2019 Flood Impacts

- 31 counties declared disaster declaration
- 8% of storage in Tuttle Creek (estimated to have been lost to sediment in 2019)
- 165 million cubic feet of sediment
- 2019 Flood Storage Filled

- 2019 Peak
- Pre-2019 Record

- Graph showing percent full for different reservoirs (e.g., Kansas, Wilson, Tuttle Creek, etc.)
What is the Arbuckle Group?

- Thick sequence of sedimentary rocks
  - directly above basement (granite) rocks
  - highly permeable in intervals
  - vital to many industries in Kansas
- There is a lot we don’t know
  - large number of unmapped faults
  - highly variable zones/areas
    - karst, highly localized dissolution
    - some zones more favorable for disposal
    - knowing could help place new wells
  - water chemistry (in situ and disposal fluids)
  - fluid flow
Uses of the Arbuckle Group

- Oil and gas (KCC)
  - production
  - oilfield brine disposal
- Industrial waste disposal (KDHE)
  - hazardous and non-hazardous
  - oil refining
  - product storage
  - chemical manufacturing
  - food production
- Drinking water (KDHE)
  - municipal water treatment
  - freshwater source
- CO₂ sequestration (EPA)

Arbuckle Disposal

- Class I wells: 49
  - industrial and municipal waste
  - gravity feed
  - monitored and tested
- Class II wells: > 2,000
  - oilfield brine (extracted during production)
  - pressurized
  - less monitoring/testing
- Oil and gas development in south-central Kansas
  - 2011 to 2015
  - tenfold increase (Harper Co)
Implications and Hypothetical Scenarios

- Loss of gravity feed
  1. **Existing facilities**
     - could lose use of disposal wells
     - would require cost-prohibitive measures
  2. Hypothetical facility
     - freshwater can’t enter Arbuckle
     - sits in wellbore
- Drinking water contamination
  - fluid level above water source
  - inadequately plugged wells
  - reality of leaks: sinkholes
- The possibility is real within 20 years or less

Questions?

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