

CENTRALIZED WATER TREATING FACILITY IN THE BAKKEN SHALE

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BAKKEN SYSTEM

- **Geology & Geography**

WILLISTON BASIN

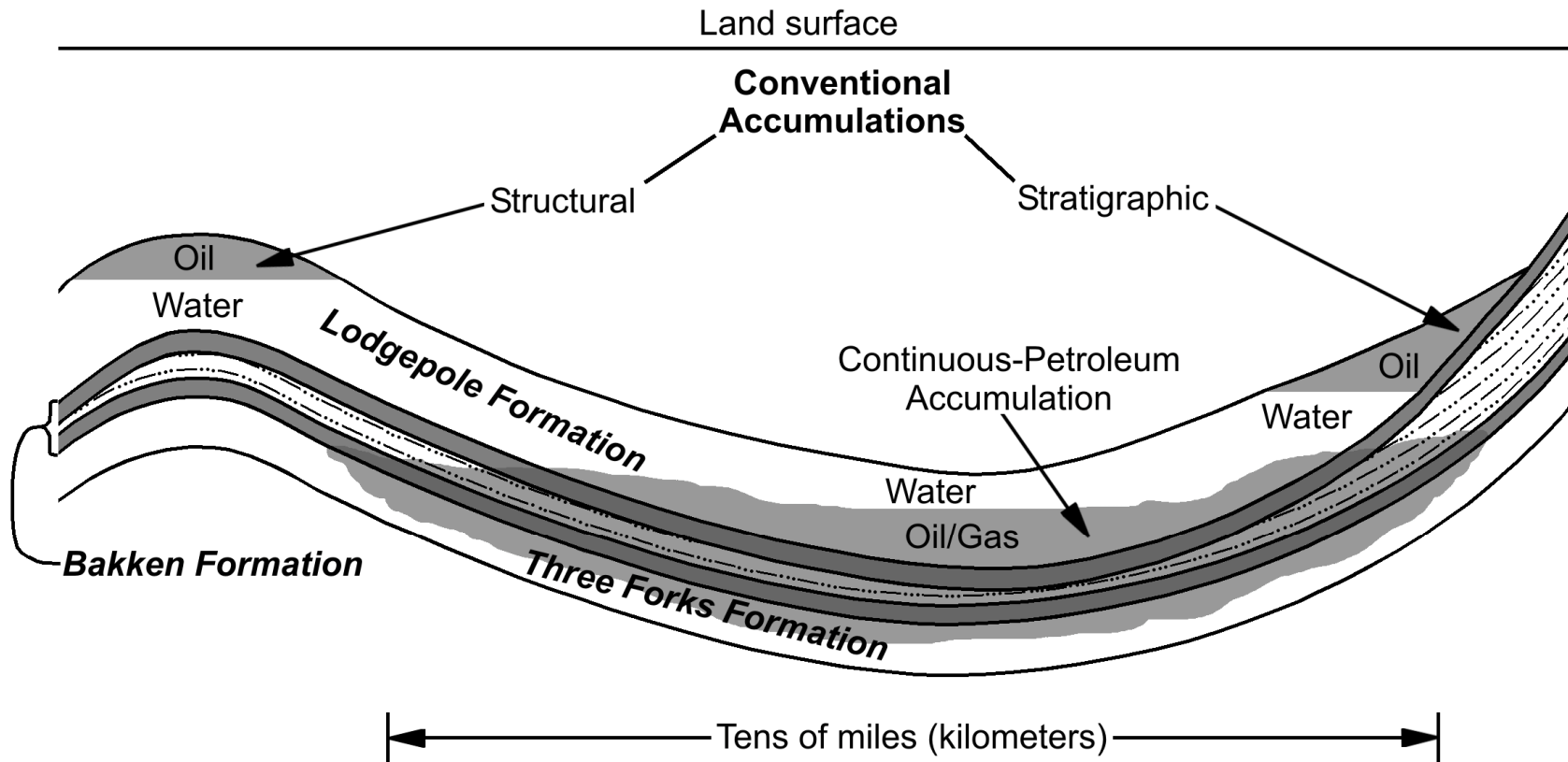


SOURCE: U.S. Bureau of Land Management; Bakken Resources Inc.

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GEOLOGY

Continuous Petroleum Accumulation

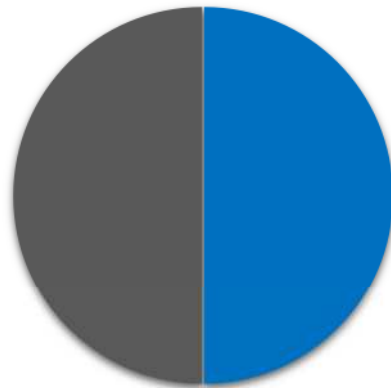


BAKKEN SYSTEM

- **Reserves**
- **Produced Water**

PRODUCED WATER

PERMIAN WEST TX

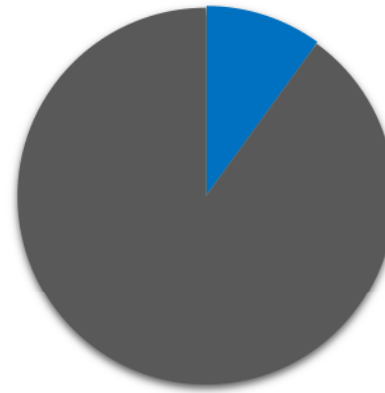


WATER : OIL
~9:1

PRODUCED WATER
>4 Billion bbl (2015)

DISPOSED WATER
50%

BAKKEN



WATER : OIL
~2:1

PRODUCED WATER
>470 Million bbl (2015)

DISPOSED WATER
90%

ADVANCES IN TECHNOLOGY

- **Longer Laterals**
- **Infilling**
- **Decreased Well Spacing**
- **Stacked Fracks**
- **Fat Fracks**
- **Higher Proppant Loading**
- **More Water/Frack**
- **Salt-Tolerant Frack Fluid and Friction Reducer Systems**

AVERAGE WATER REQUIREMENT

- **DRILLING: 8,000 –9,000 BBL/WELL**
- **FRACKING: 60,000 –180,000 BBL/WELL**
- **MAINTENANCE: 7,500 –15,000 BBL/WELL/YR**

Water

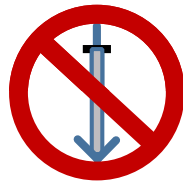
- **Sources**
 - **Missouri & Yellowstone Rivers**
 - **Lakes & Reservoirs**
 - **Converted (?) Irrigation Wells**
 - **Municipalities**

SOS



SOS – What We Are

- Fresh Water Depot
- SWD (salt water disposal)



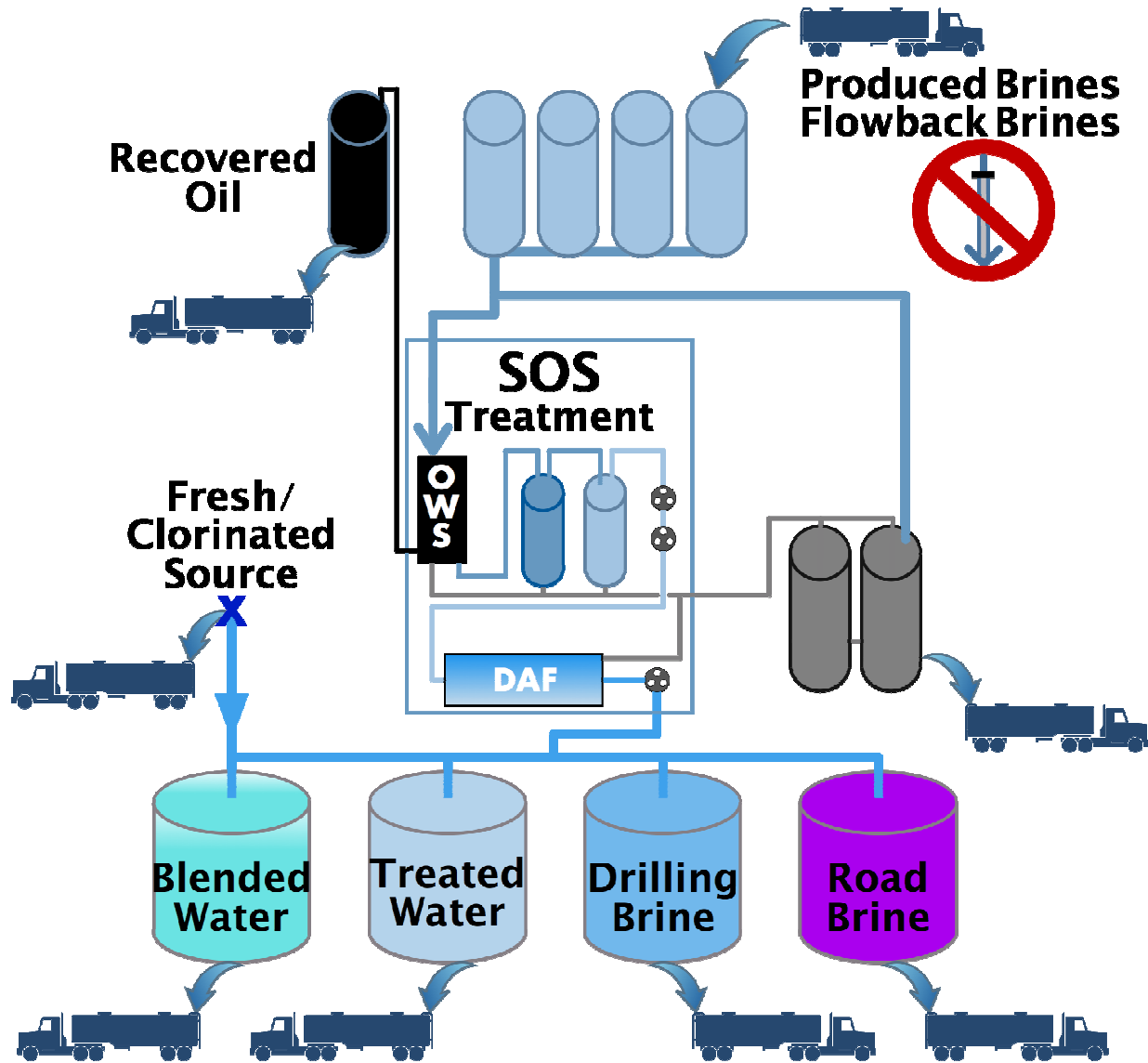
SOS – What We Do

- **Fresh Water**
 - Municipal
 - Well
- **Brine Reclamation**
 - Remove TSS & TDS except NaCl

SOS – What We Provide

- Fresh Water (Chlorinated)
- Hot Water (<208 F)
- Drilling Brine (Heavy Water) (**Hot** & **Cold**)
- Blended Water (**Hot** & **Cold**)
- Fracking Water (**Hot** & **Cold**)
- Road Brine (**Hot** & **Cold**)

SOS CULBERTSON

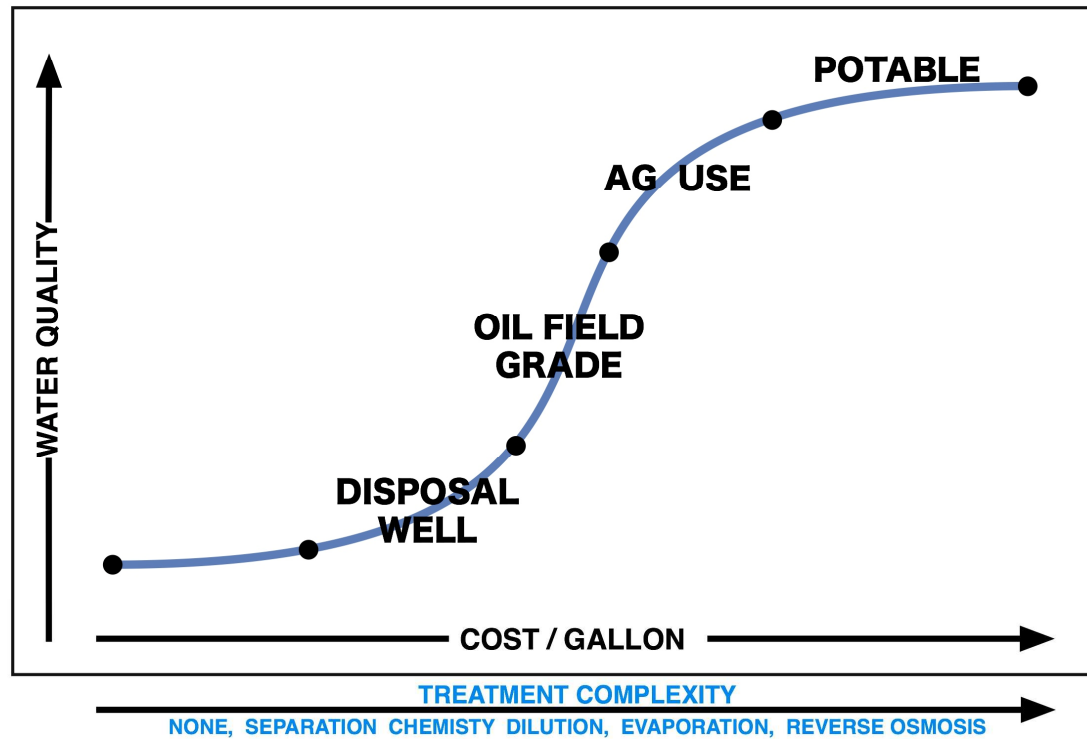


IN and OUT



Quality vs Cost

THE RIGHT PLACE ON THE CURVE *IS* CUSTOMER SPECIFIC







BAKKEN BOTTOM-LINE

- **Decades of reserves**
- **Overall E&P costs declining per well**
- **Break-even crude price declining**
- **Production increasing per well**
- **Total production increasing over time**
- **Demand for water increasing over time**
- **Water management opportunities are long-term and challenging**