

Deep Well Injection in New Mexico

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Multi State Salinity Coalition
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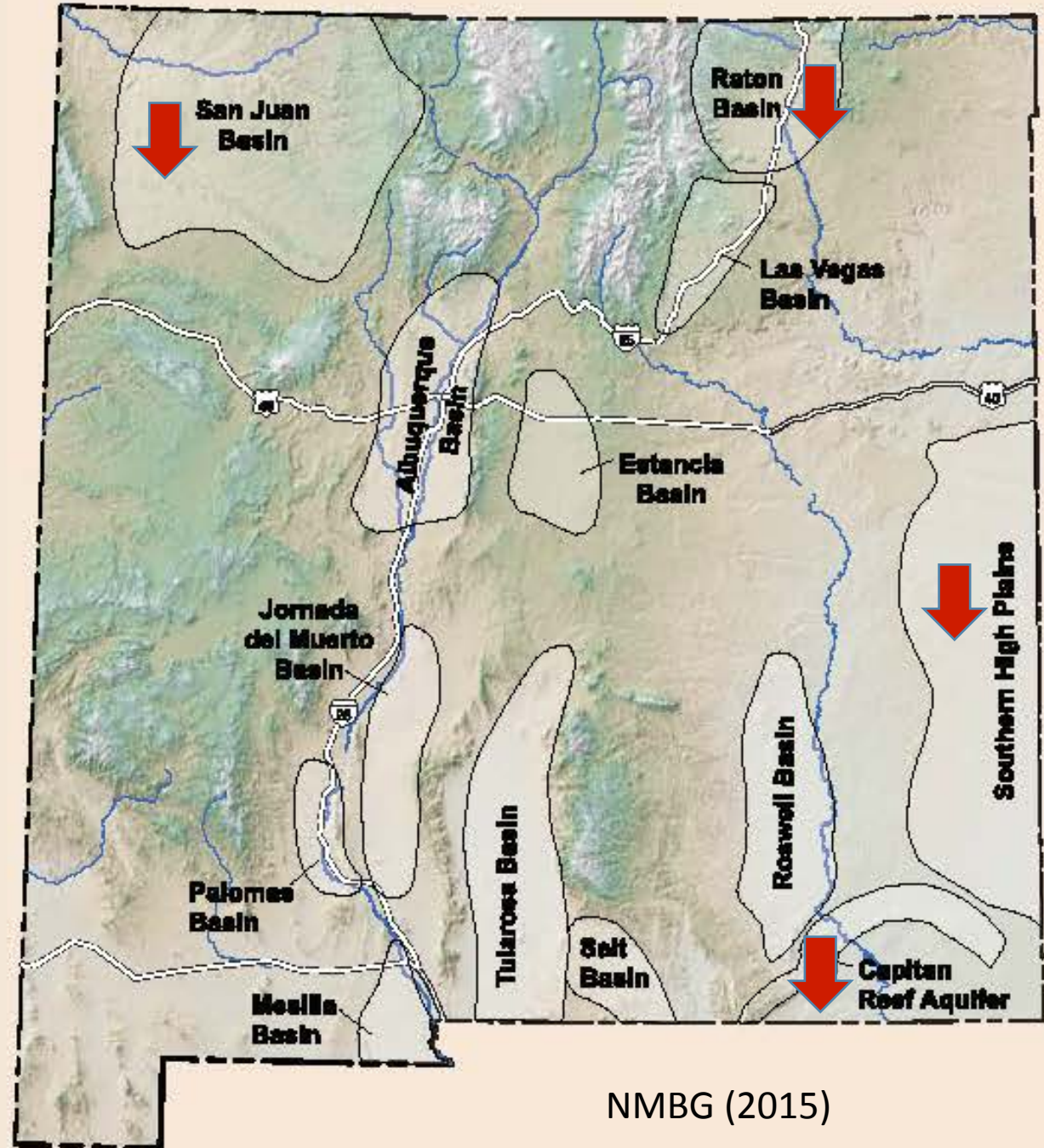
WHERE HAS O&G DEVELOPED SWD WELLS?

San Juan Basin

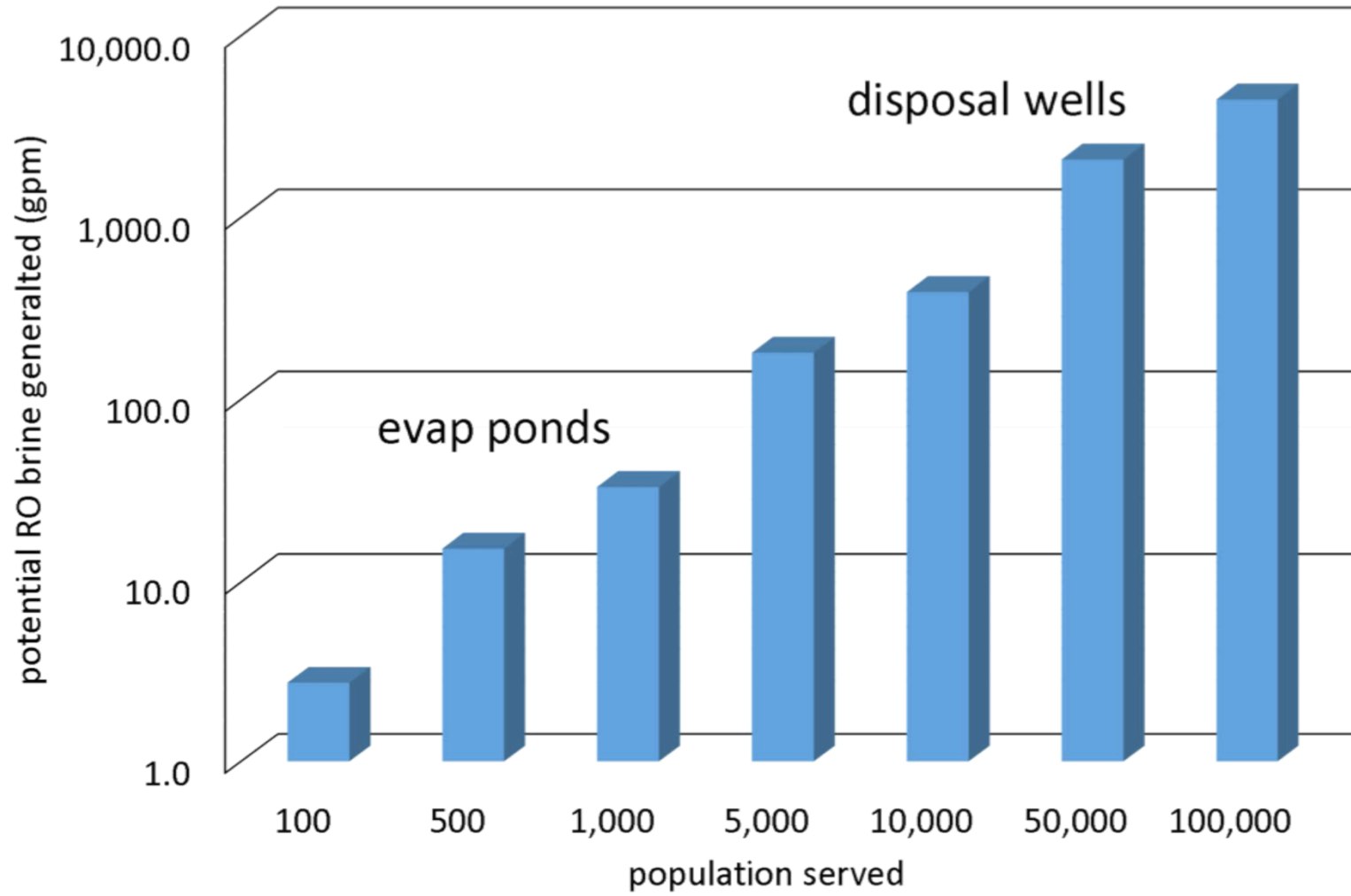
Raton Basin

Midland Basin

Delaware Basin



DISPOSAL FEASIBILITY



population served

REGULATORY OVERVIEW

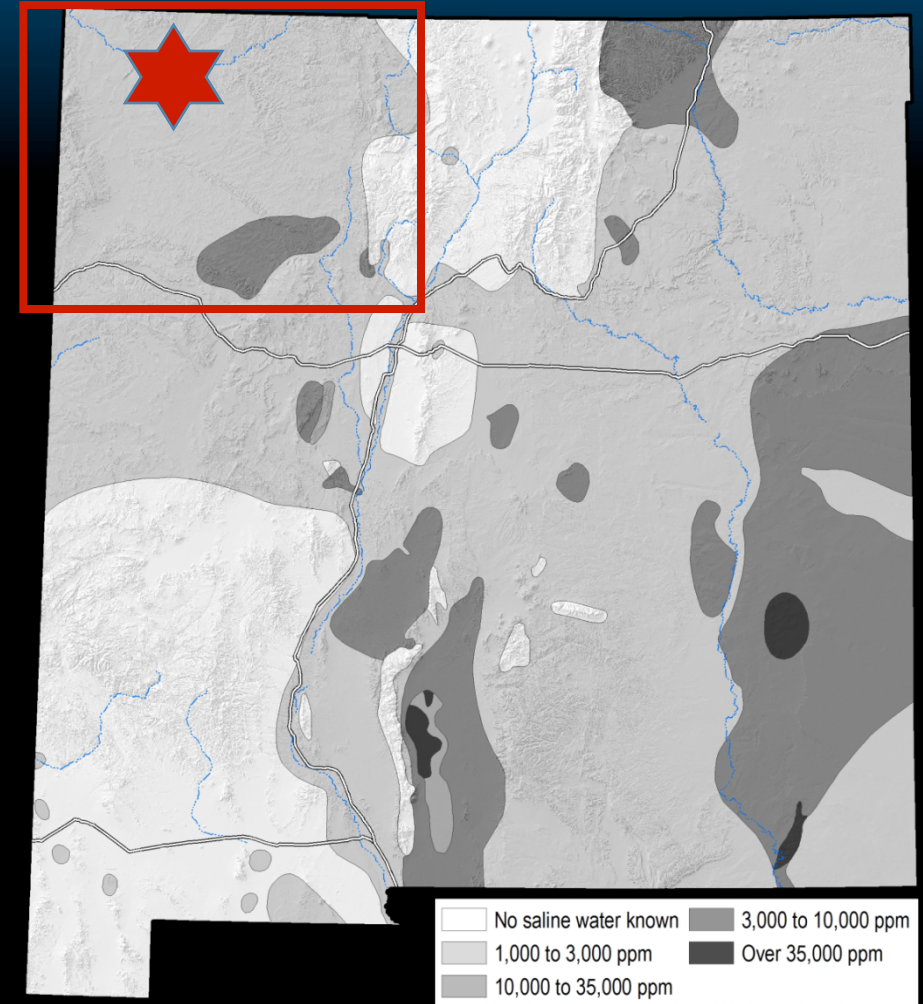
- Class I or Class V wells for Deep Injection of RO brine
- NMED UIC
 - Application similar to DP for discharges to groundwater
 - Must know characteristics of injection zone
 - Analysis to show groundwater less than 10,000 mg/L will NOT be impacted
 - Public Notice subject to protest
- NMOSE
 - Well drilling permit
 - Plan of Operations

HYDROGEOLOGIC CONSIDERATIONS

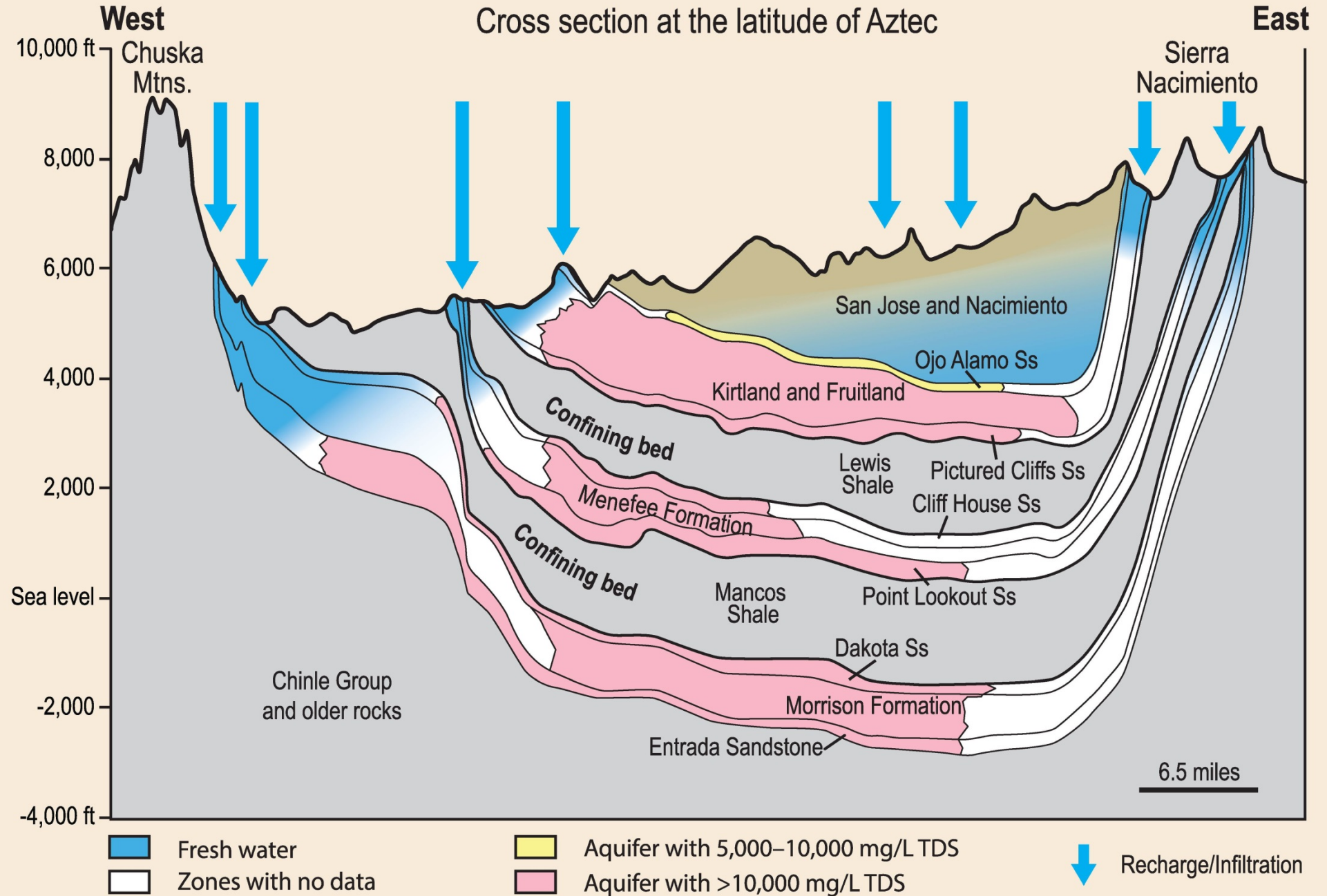
- Type of Injection Zone
 - Sandstone – typically **bad**
 - Carbonate rocks – typically **good**
- Regional setting and overburden characteristics have many challenges
- Demonstrating containment of injected fluids may be costly if multiple wells are required for injection and monitoring
- Existing issues from O&G operations will be magnified

NW NEW MEXICO - SAN JUAN BASIN

- Farmington-Aztec-Bloomington
- Reliant mostly on surface water
- Could benefit from drought-resistant brackish groundwater source

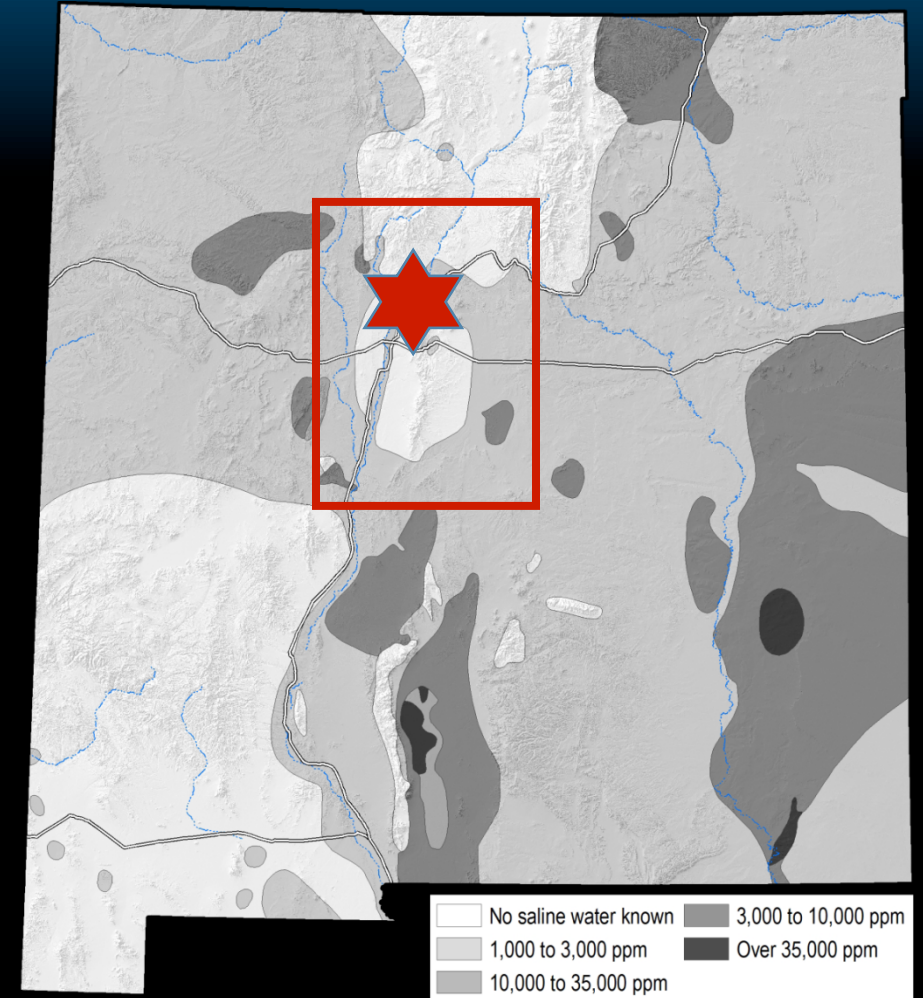


SAN JUAN BASIN



NORTH CENTRAL NEW MEXICO – RIO GRANDE RIFT

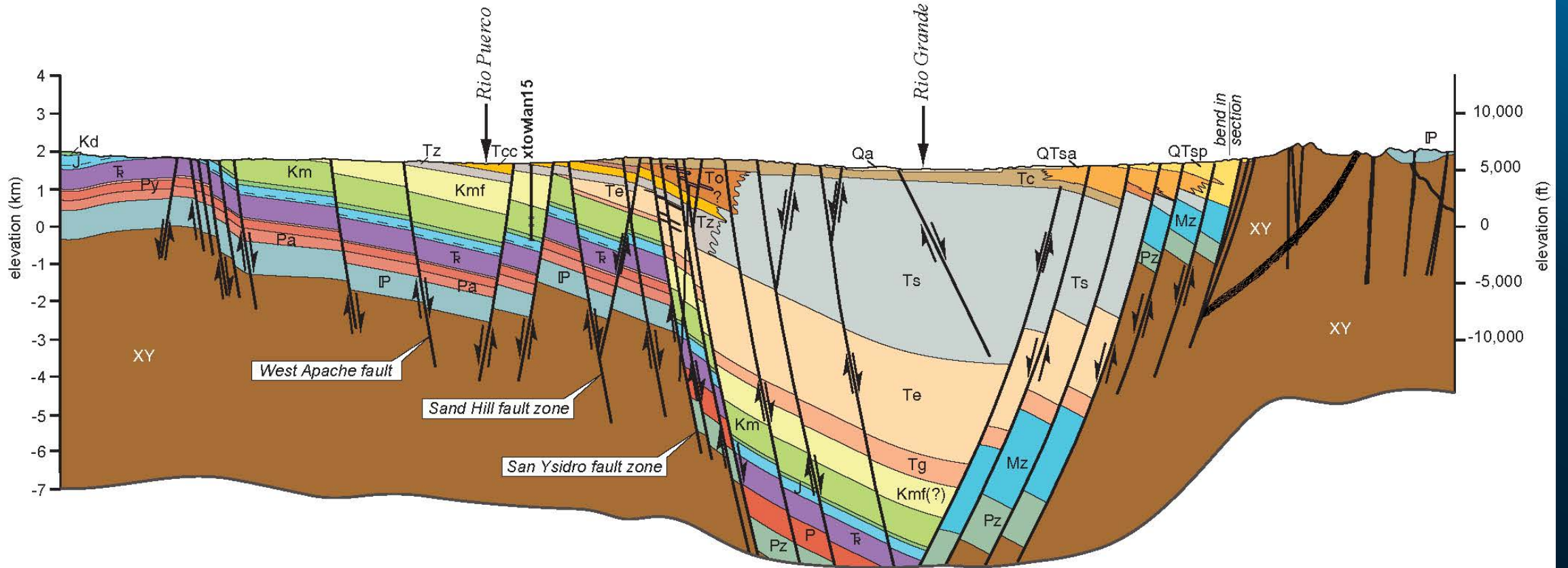
- Albuquerque-Rio Rancho-Santa Fe
- Reliant on fresh surface water and groundwater
- Could benefit from drought-resistant brackish groundwater source



C
WEST

C'
EAST

Albuquerque Basin Deep Aquifer



vertically exaggerated = 2x

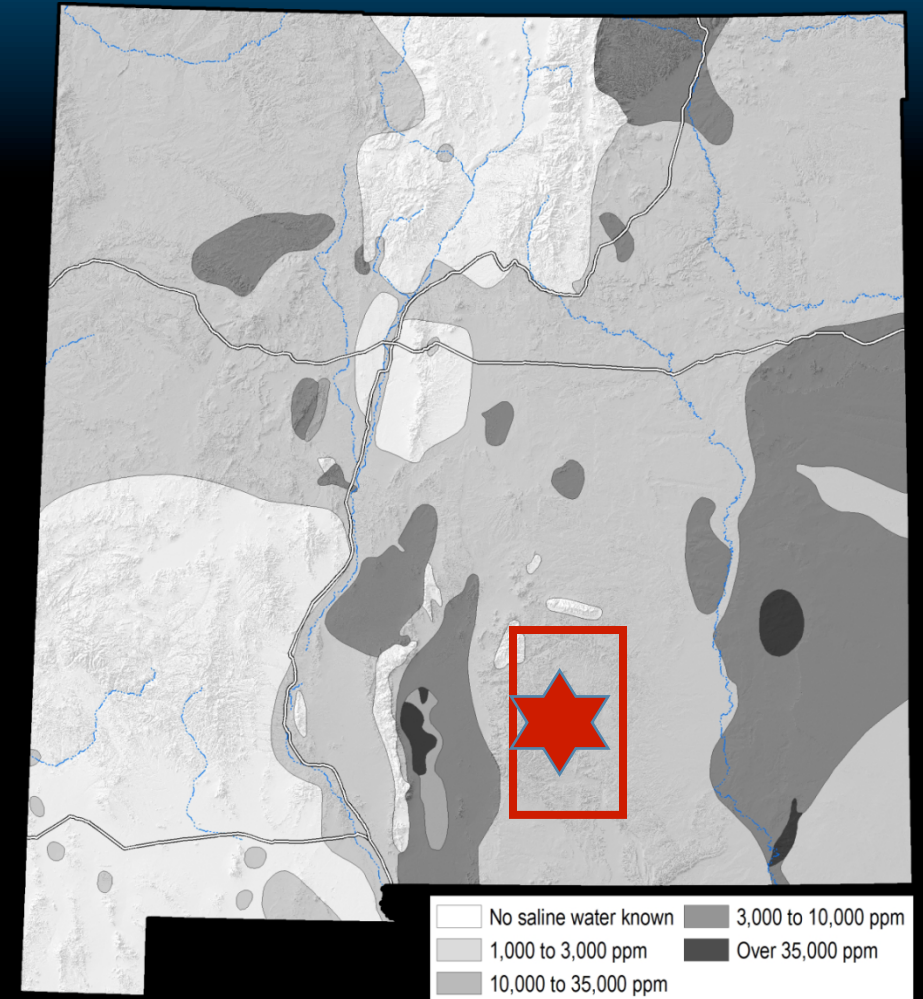
Wells projected onto west-east plane.

Source: OFR-539, Connell 2011.

0 5 10 miles
horizontal scale

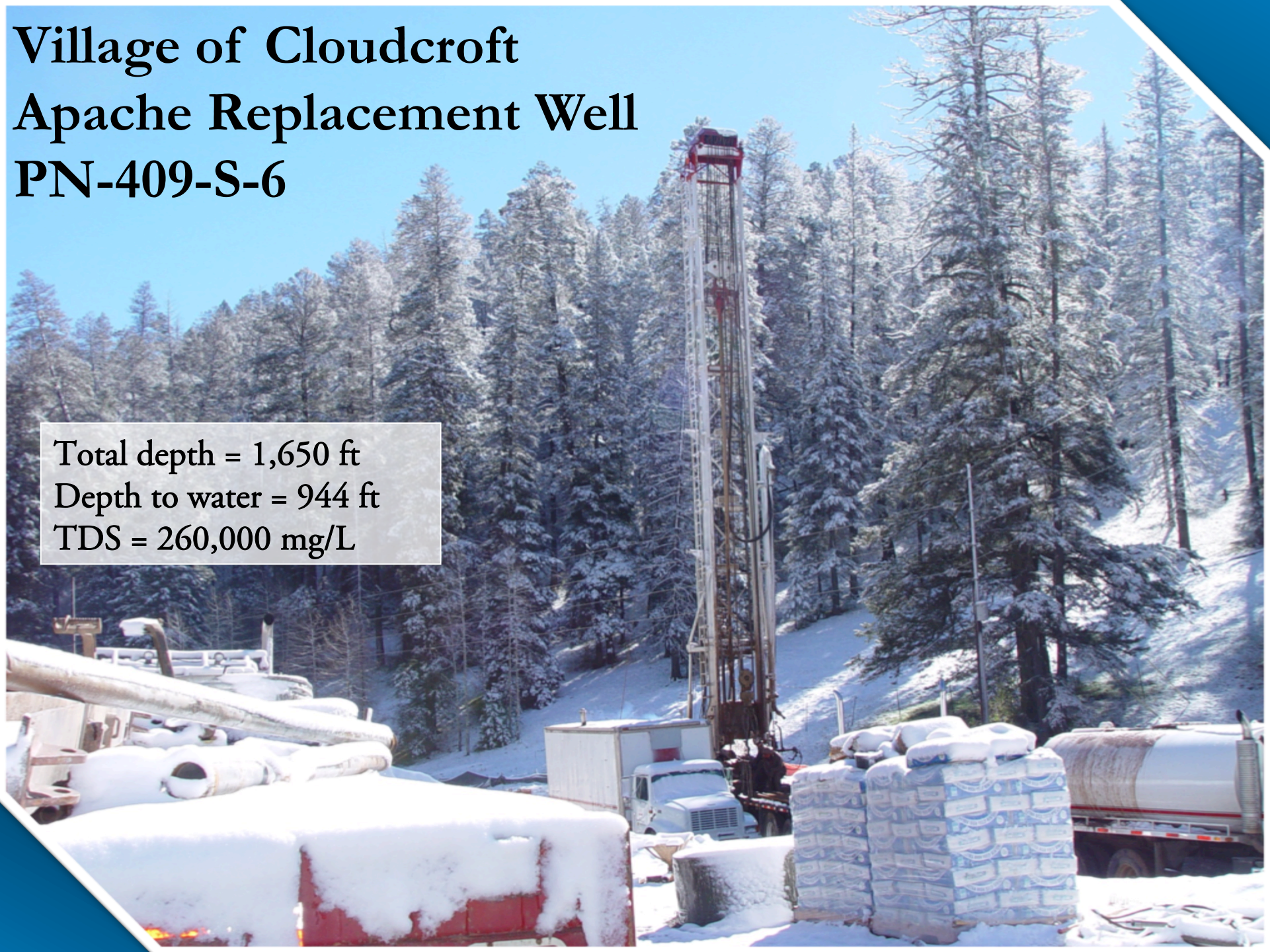
CLOUDCROFT – TOP OF THE MOUNTAIN

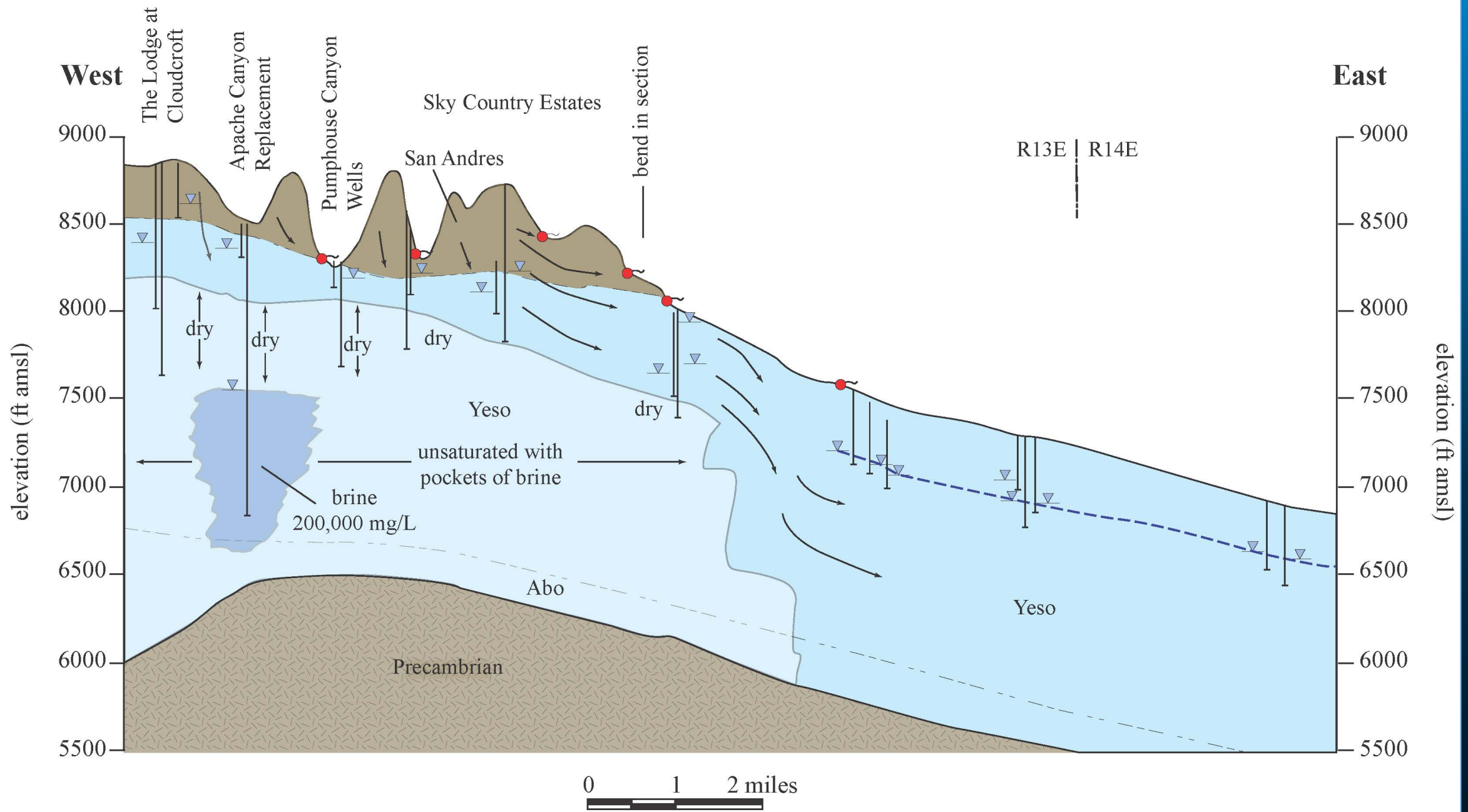
- Direct reuse system in need of disposal well – not suitable environment for evaporation pond(s)
- Class V well for RO concentrate disposal?
- Existing well exempt from design requirements?
- Monitoring plan
- Low volume non hazardous fluids?



Village of Cloudcroft Apache Replacement Well PN-409-S-6

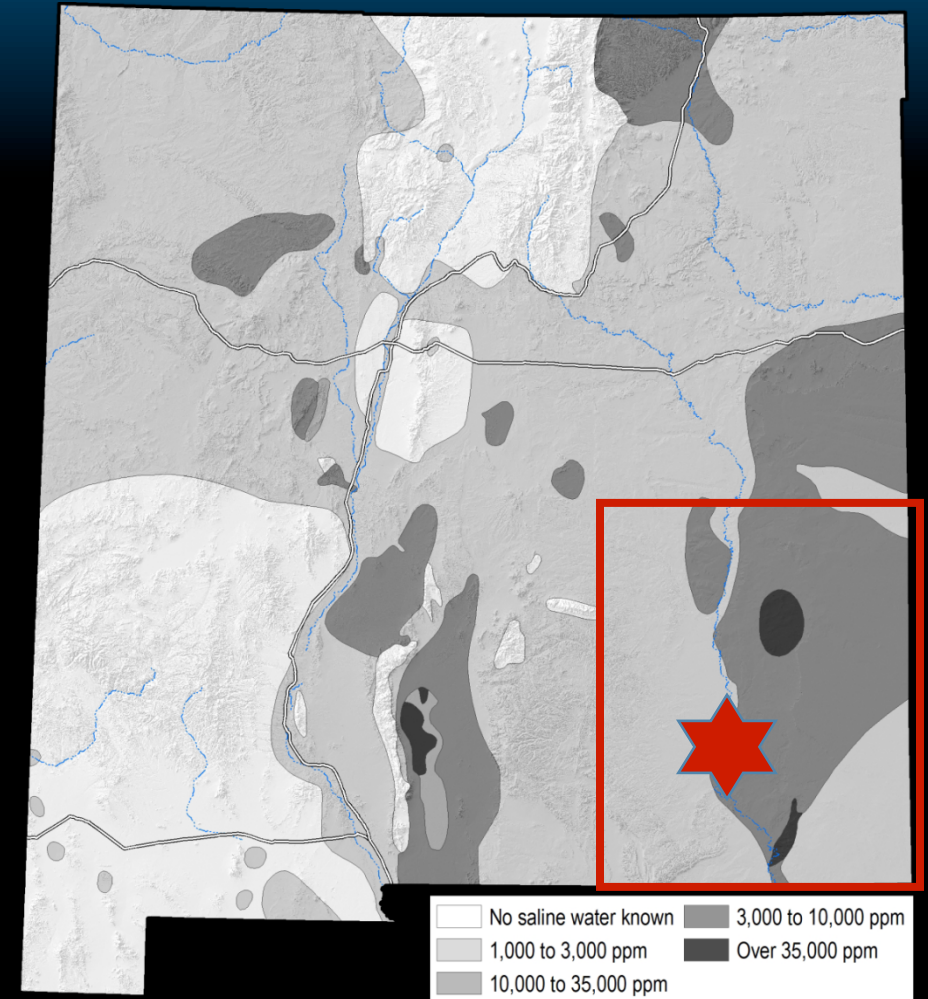
Total depth = 1,650 ft
Depth to water = 944 ft
TDS = 260,000 mg/L





SOUTHEAST NEW MEXICO - PERMIAN BASIN

- Roswell-Artesia-Carlsbad-Hobbs
- Overlying salt formations as confining beds - bad
- Carlsbad sinkhole – creates bad perception of geologic dangers



¼ mile grid



(B) Postsinkhole Development

(A) Jim's Water Service (BW-5) Site near Artesia, New Mexico



Carlsbad Sink

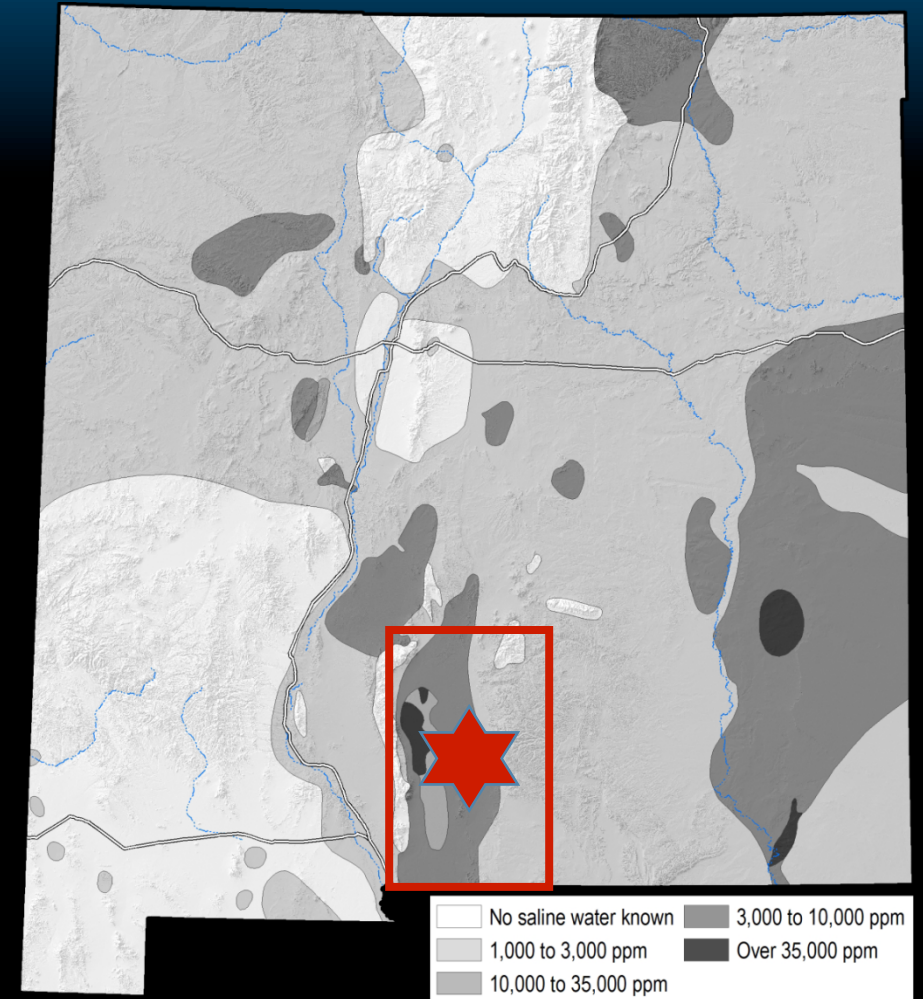
deep injection wells

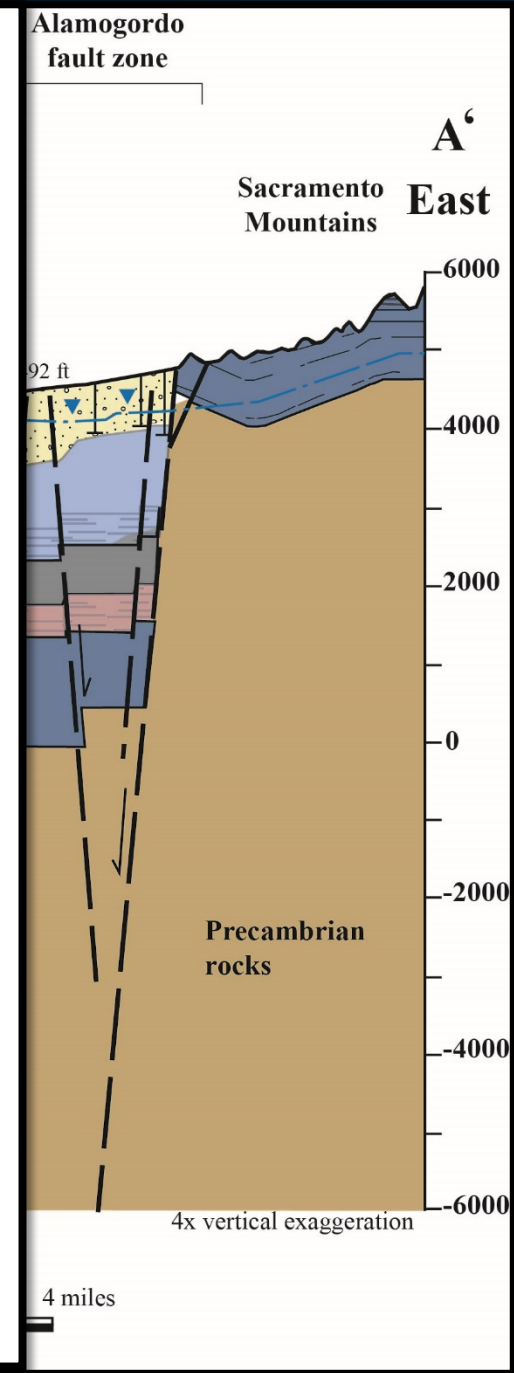
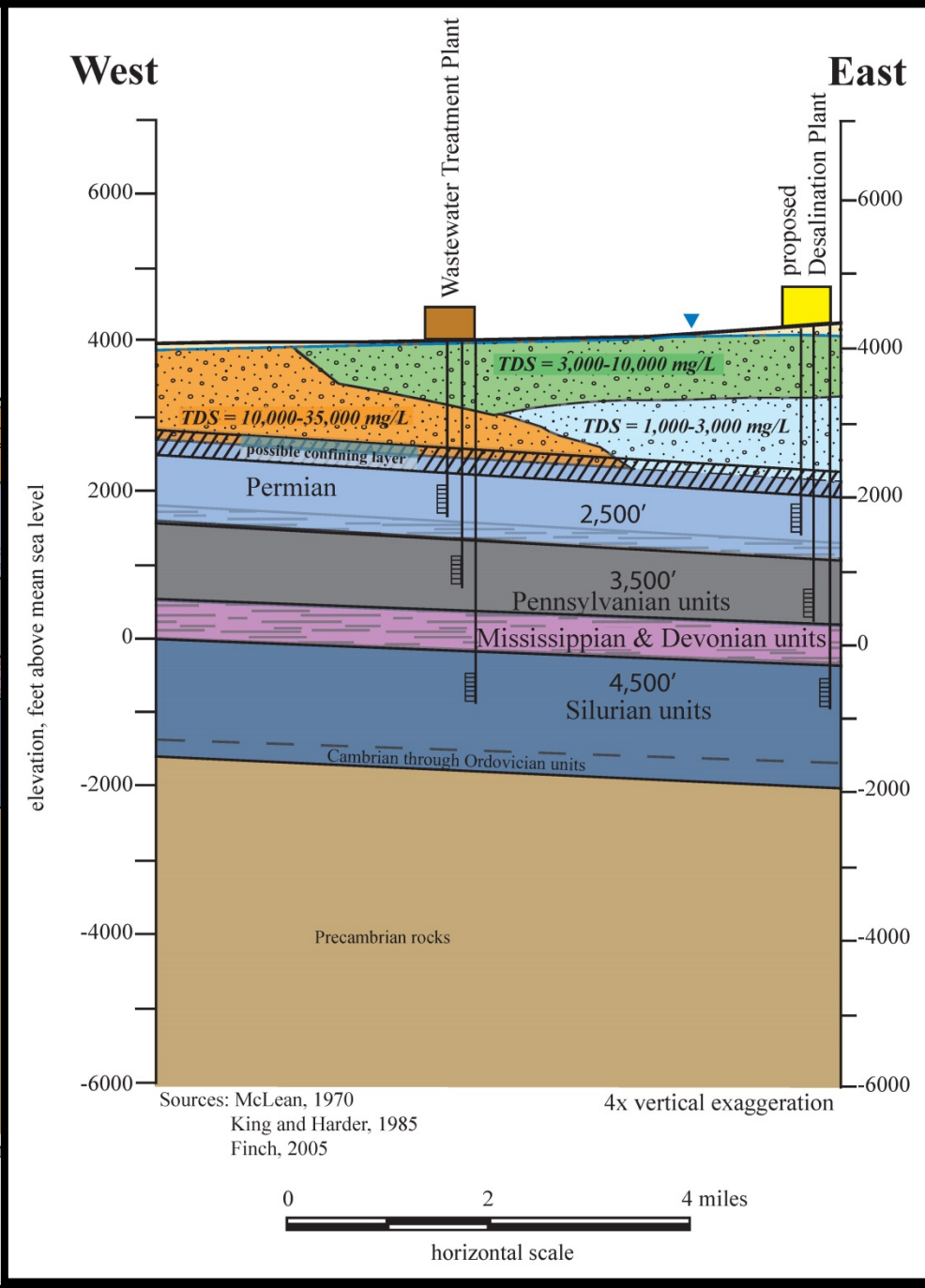
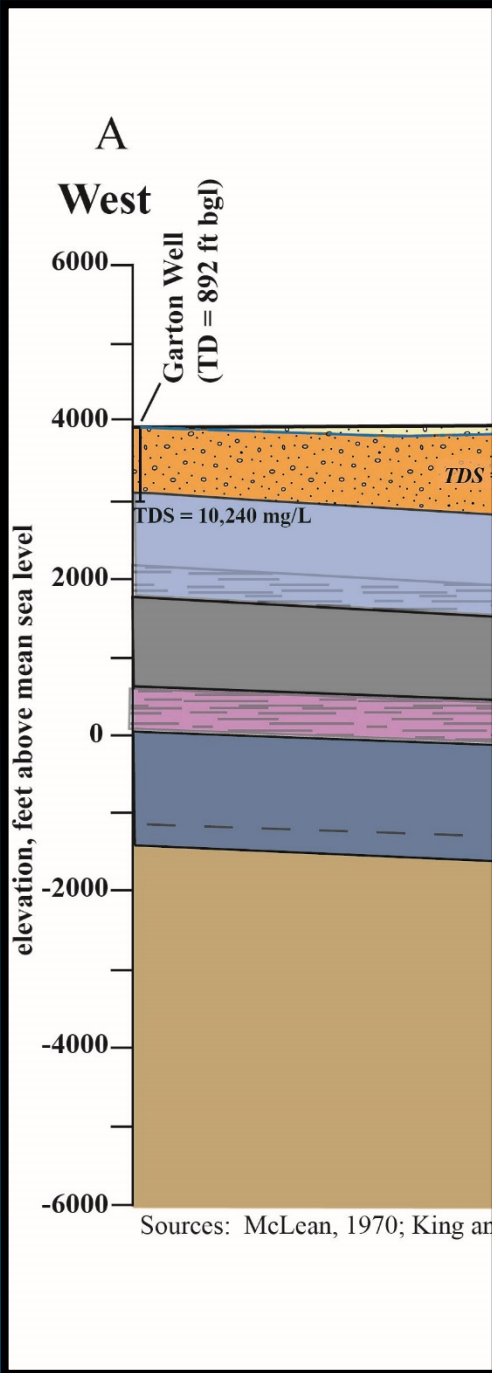


Carlsbad
Sink
area of
subsidence and
potential
collapse

SOUTH CENTRAL NEW MEXICO - ALAMOGORDO

- Use El Paso as example – similar geologic conditions
- Existing monitoring wells may be used
- Limiting factor may be formation head
- White Sands replenishment plan







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