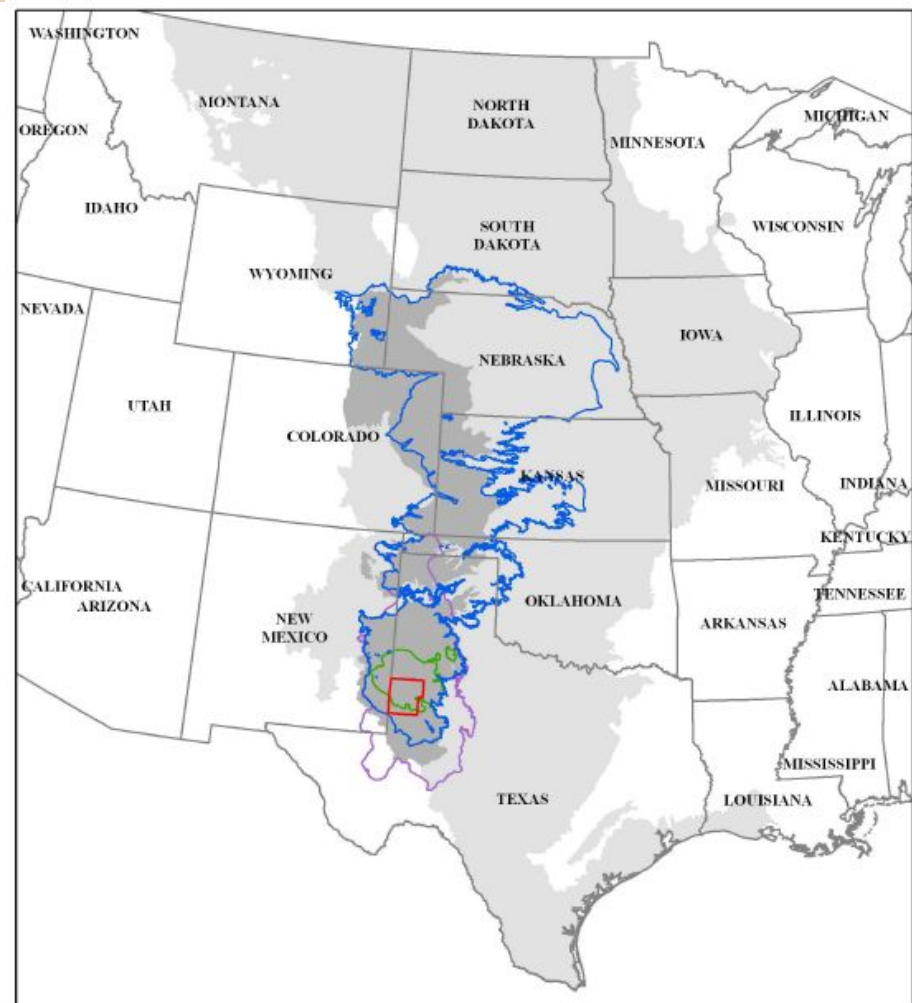
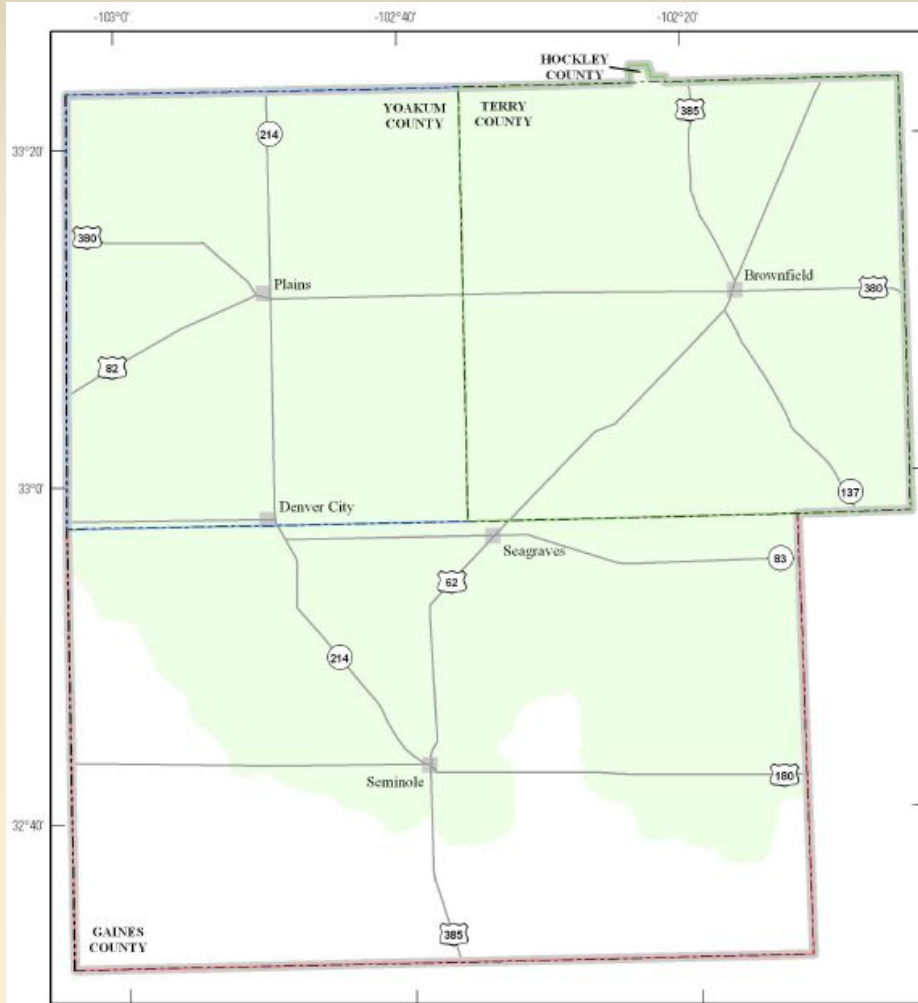


In cooperation with Llano Estacado Underground Water Conservation District, Sandy Land Underground Water Conservation District, and South Plains Underground Water Conservation District

Geophysics Used for the Hydrogeologic Framework of the Ogallala and Edwards-Trinity (High Plains) Aquifers in Gaines, Yoakum, and Terry Counties, Texas.

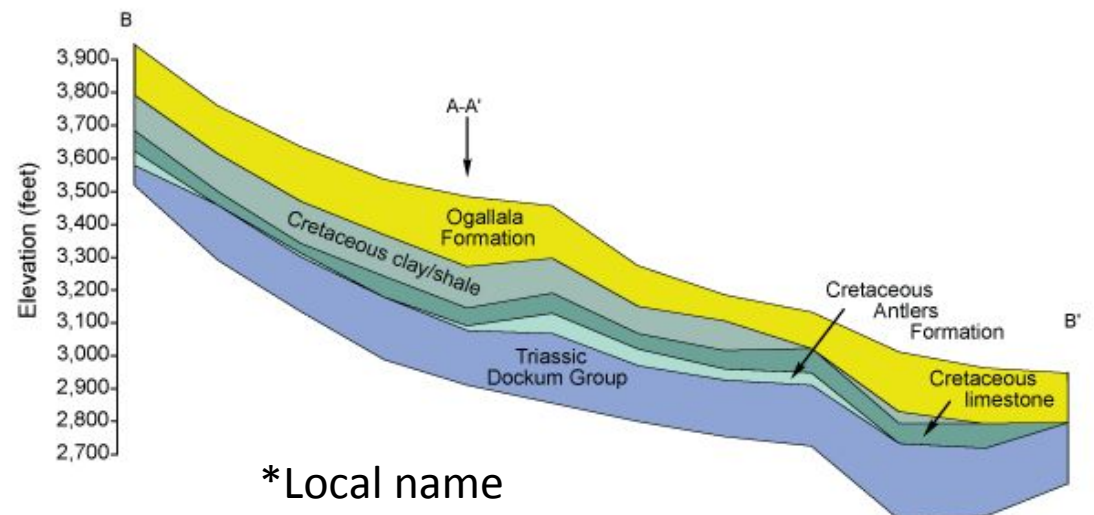
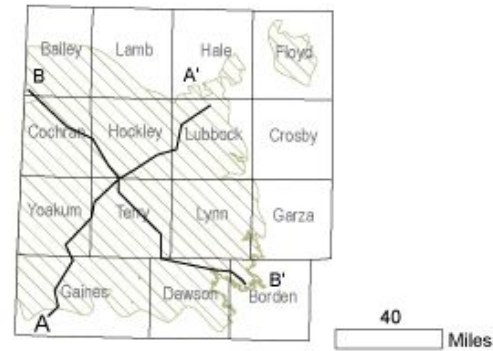
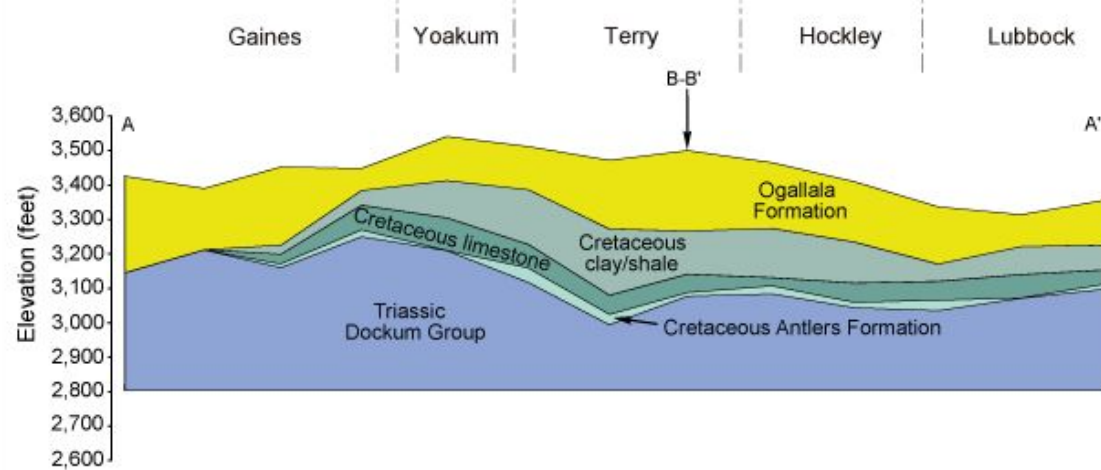
*Andrew P. Teeple
Layne Marlow*

Location Maps



Hydrogeologic Setting

- Ogallala Formation
 - Quaternary- to Tertiary-age unit
- Edwards-Trinity (High Plains)
 - Cretaceous-age unit
 - Fredericksburg Group (upper part)
 - Clay and shale
 - Limestone
 - Trinity Group (lower part)
 - Antlers Formation
- Dockum Group
 - Triassic-age unit



*Local name

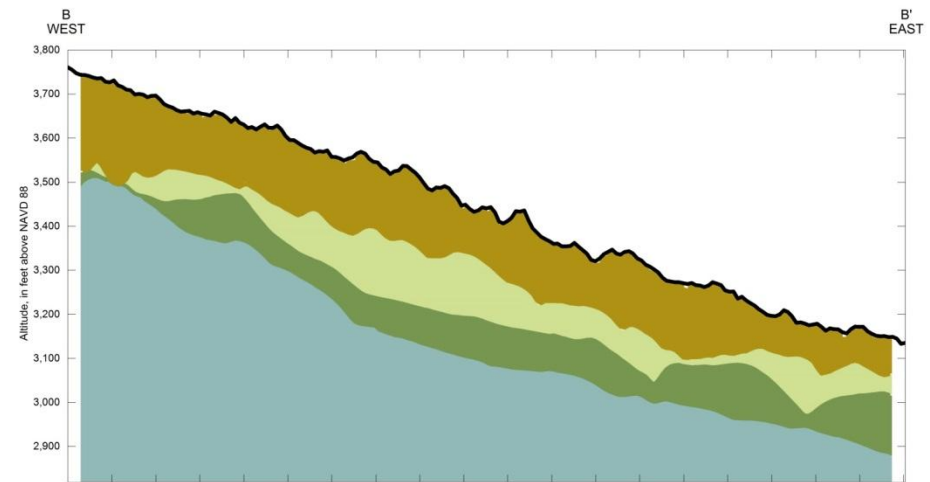
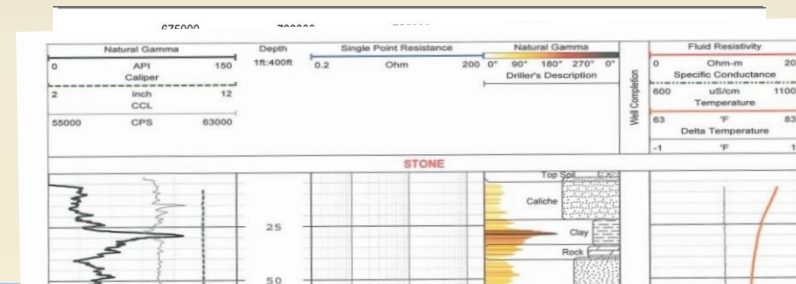
Modified from Blandford and others, 2008

Requests from Cooperators

- Request 1
 - Determine total formation thickness and estimate saturated thickness of the Ogallala and Edwards-Trinity (High Plains) aquifer system.
- Request 2
 - Develop values of specific yield for the aquifers on results of Request 1.
- Request 3
 - Collect and analyze geochemical samples from selected wells of the Ogallala and Edwards-Trinity (High Plains) aquifer system.
- Provide associated databases, geographic information system (GIS) layers, and report.

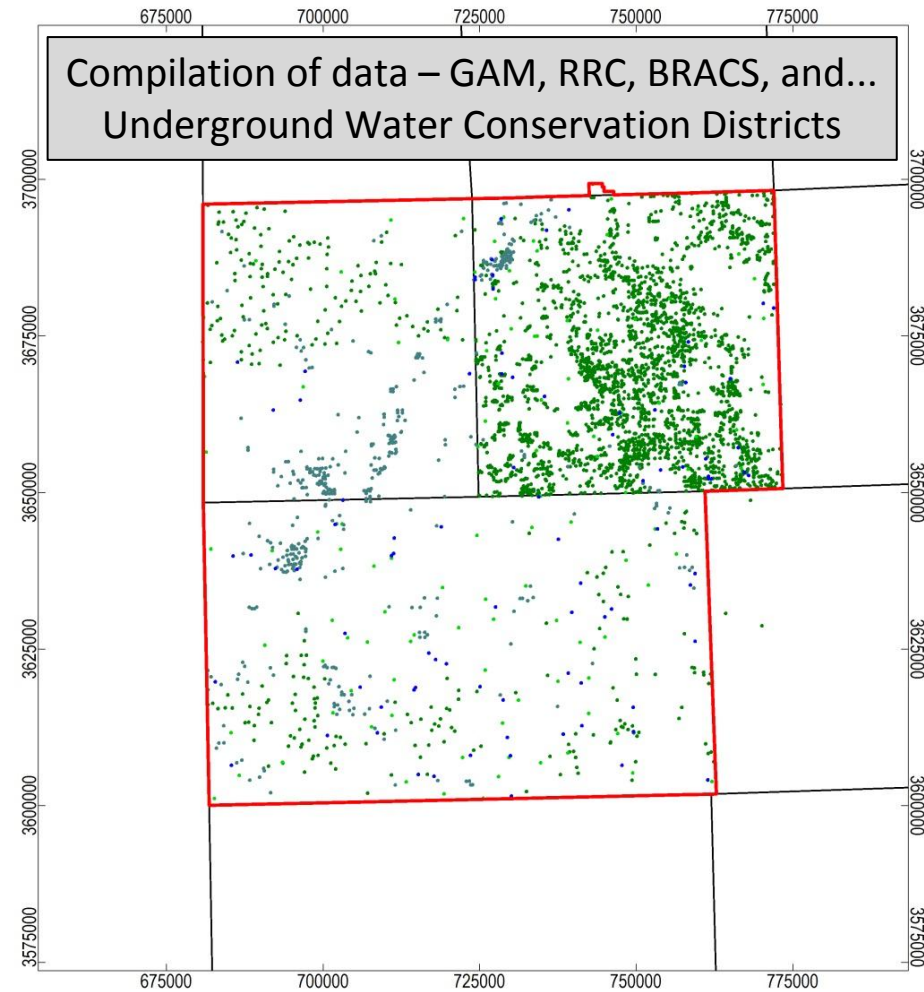
Components of the Hydrogeologic Framework

- Hydrogeology
 - Geophysical and lithologic logs
 - Determine tops and bases of aquifer units (“picks”)
- Structure
 - Delineate geologic structure
 - Interpolate picks to create surfaces of the tops and bases
 - Calculate unit thicknesses
- Aquifer properties
 - Update historical pump-test data
 - Aquifer specific yield and/or transmissivity

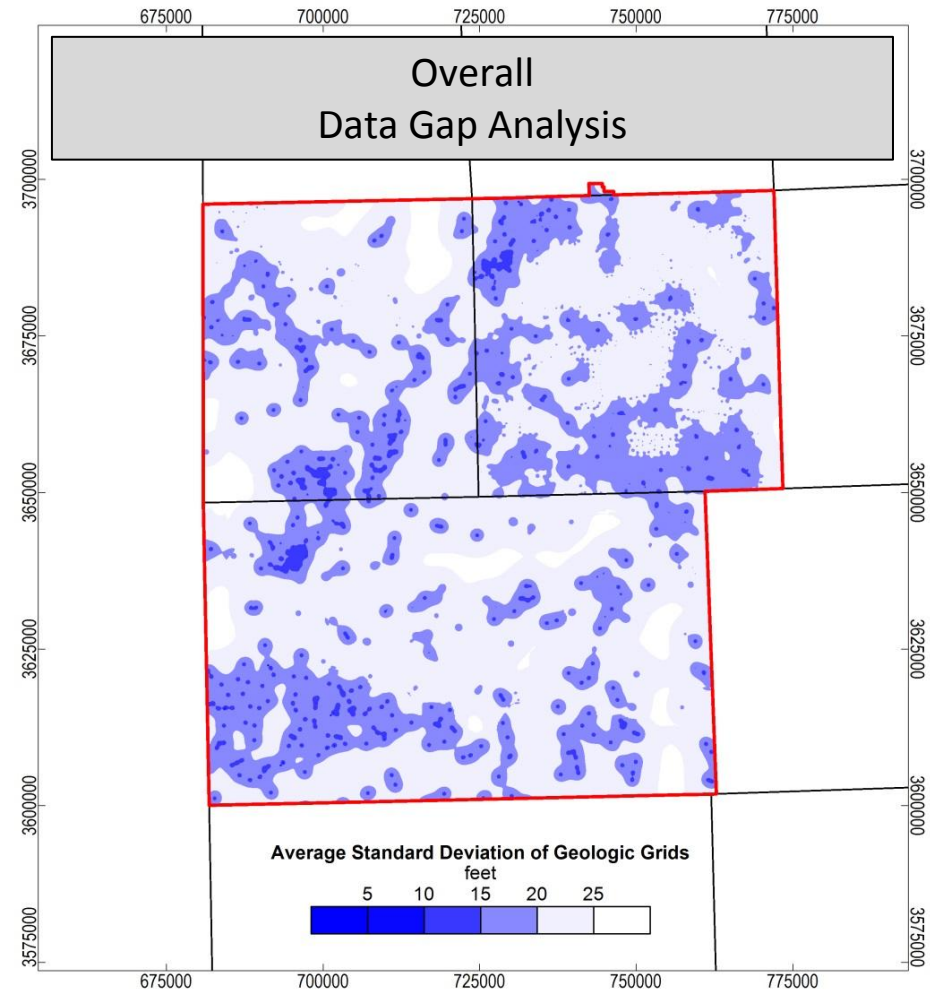


Early Framework Analysis

Compilation of data – GAM, RRC, BRACS, and...
Underground Water Conservation Districts



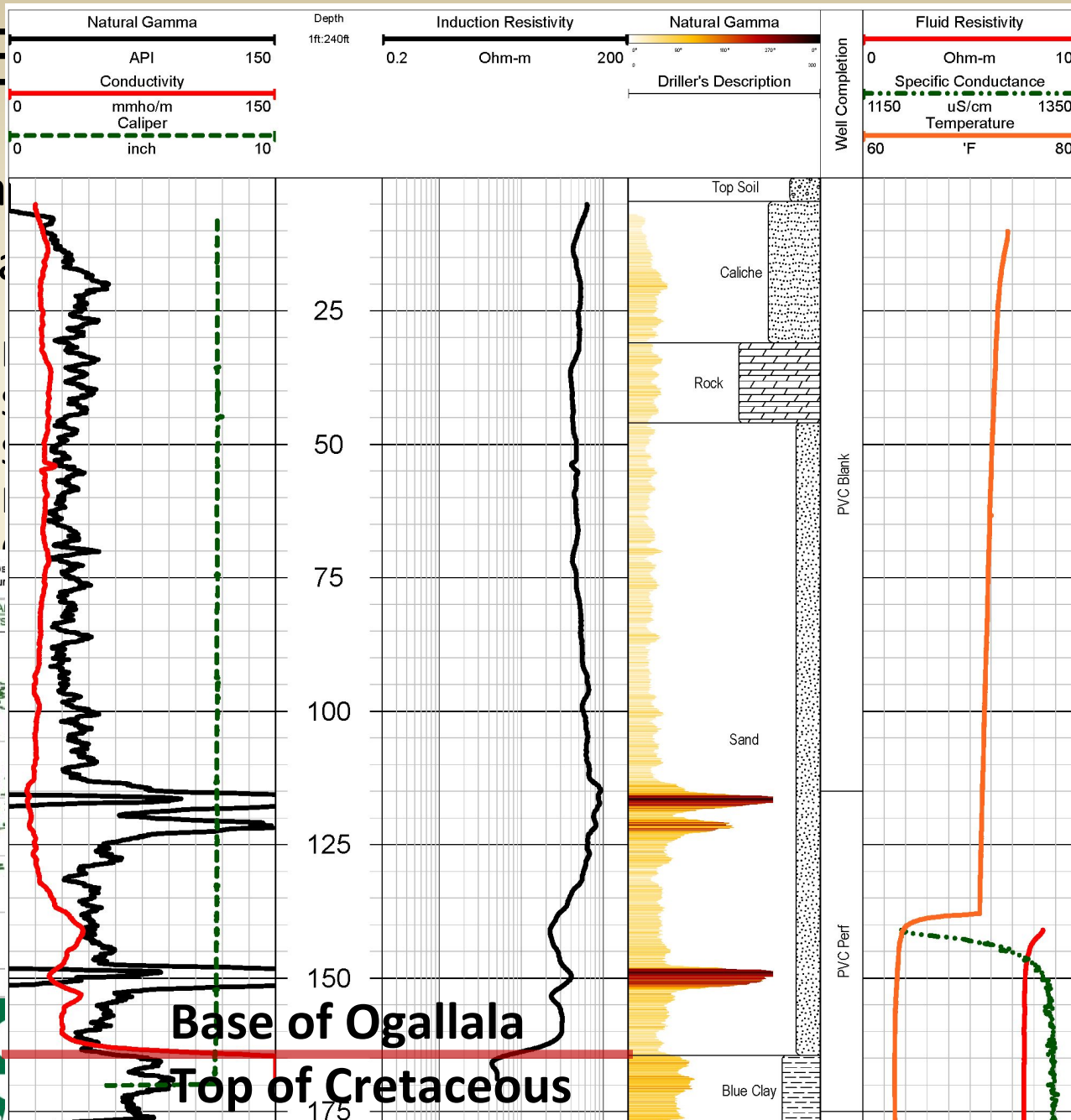
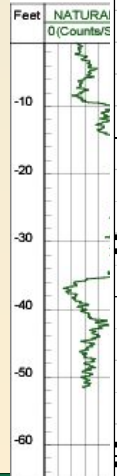
Overall
Data Gap Analysis



ue

- Strat
- Data

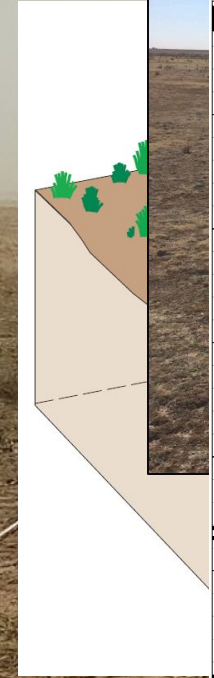
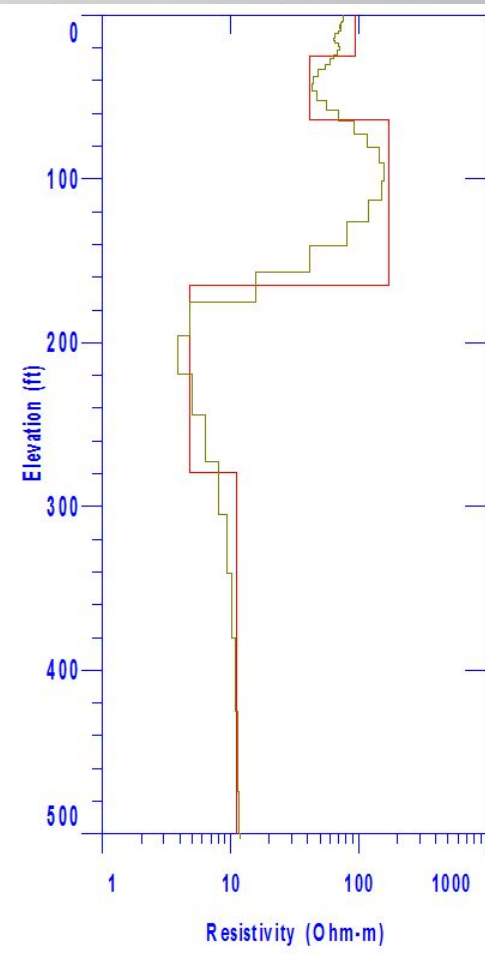
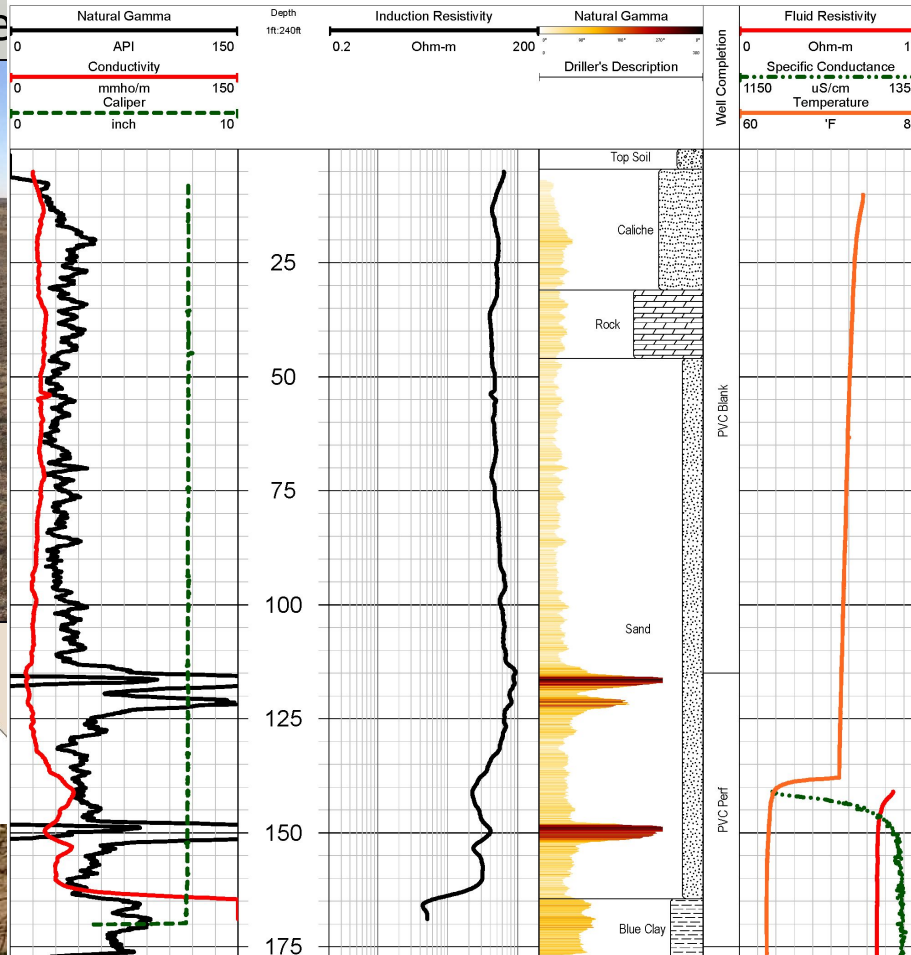
Well 1D
Location: Stamps
Reference: Ground



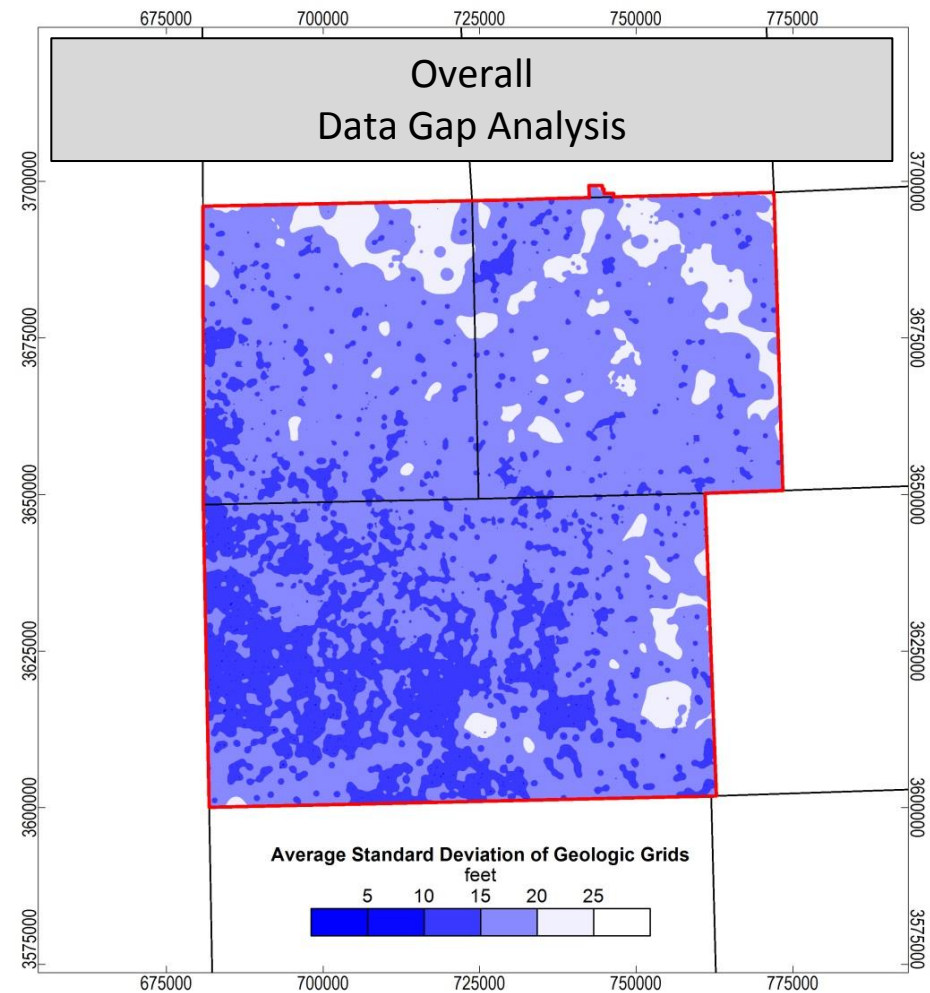
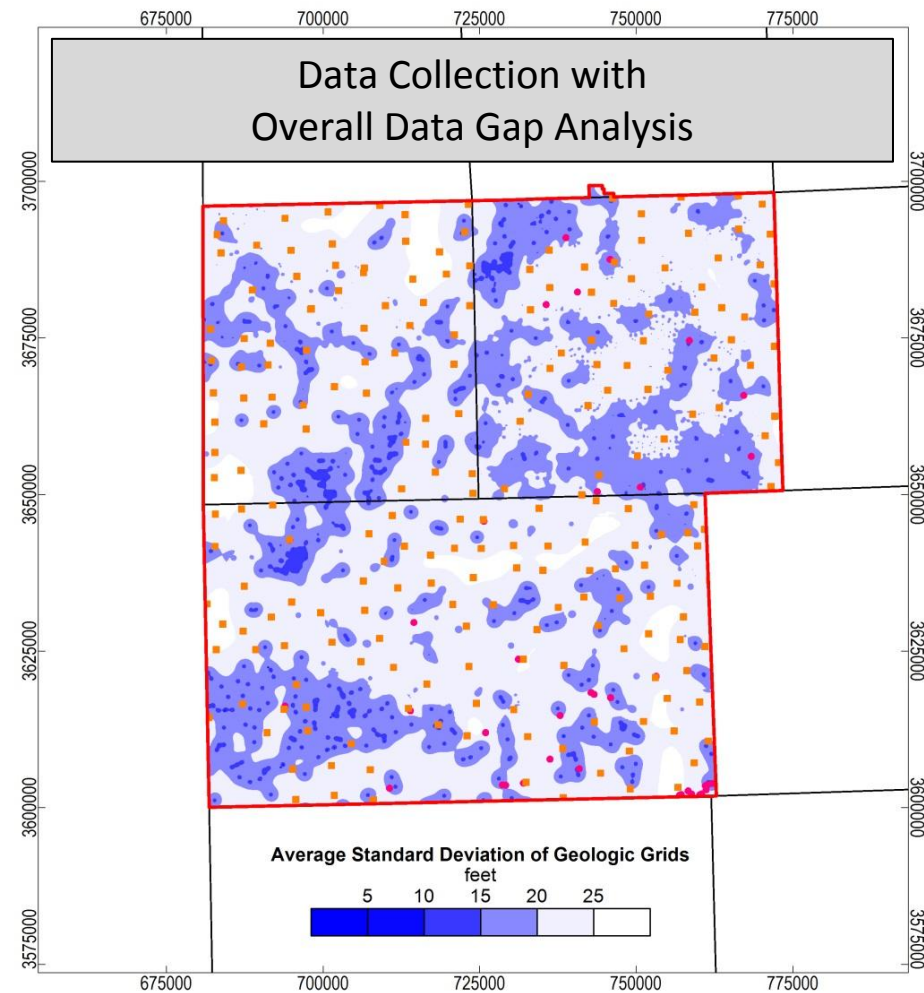
DESCRIPTION
(Meyers, 2001)
WITH SOME GRAVEL
CLAY
LAY
LAY
NET SILTY SAND

Time-Domain Electromagnetic Technique

• Me

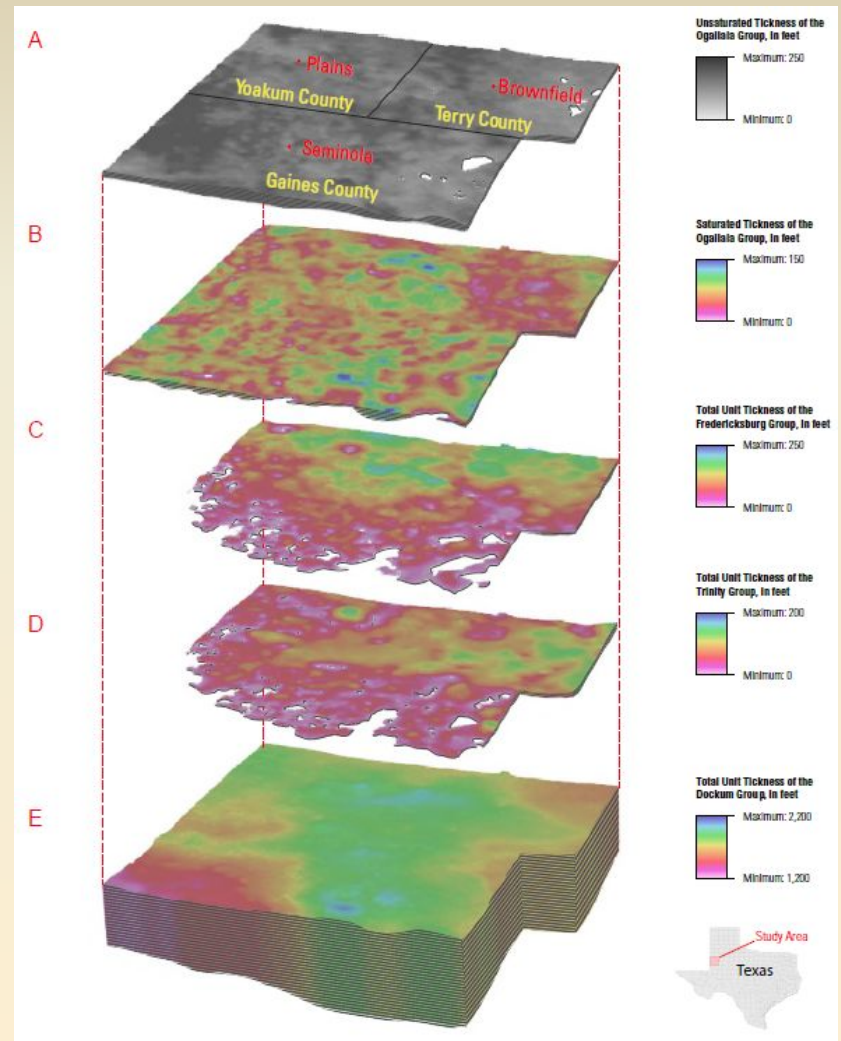


Geophysical Data Collection

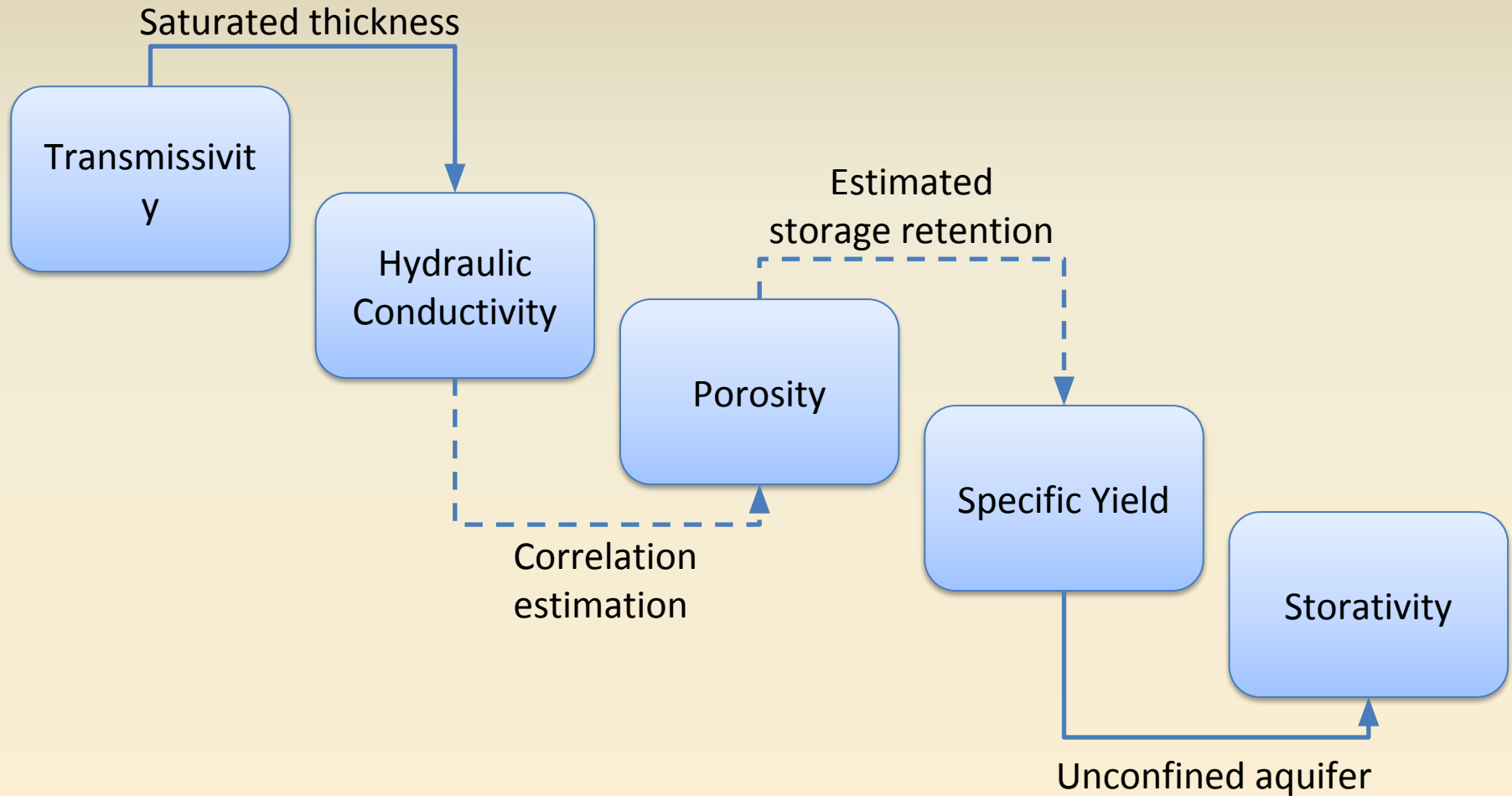


Hydrogeologic Framework

- Developed contact layers
 - Compiled geophysical logs and driller's descriptions
 - Collected surface and borehole geophysics to develop contact layers
- Estimated thickness based on contact layers
- Saturated thickness estimated from most recent water table and the base of Ogallala.

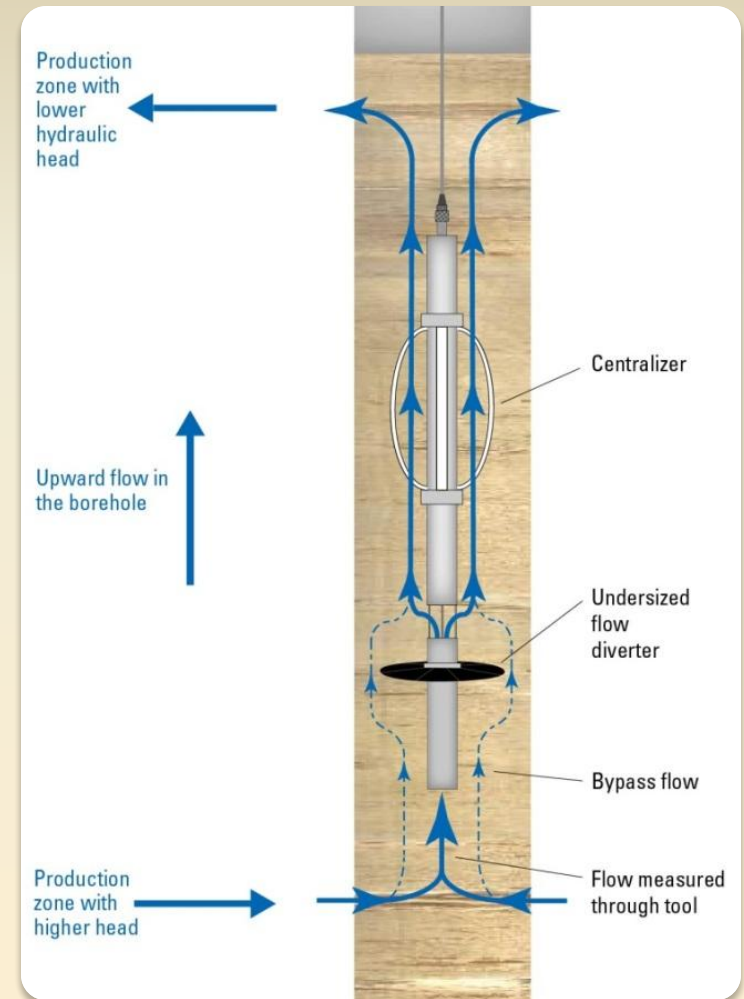


Aquifer Hydraulic Properties

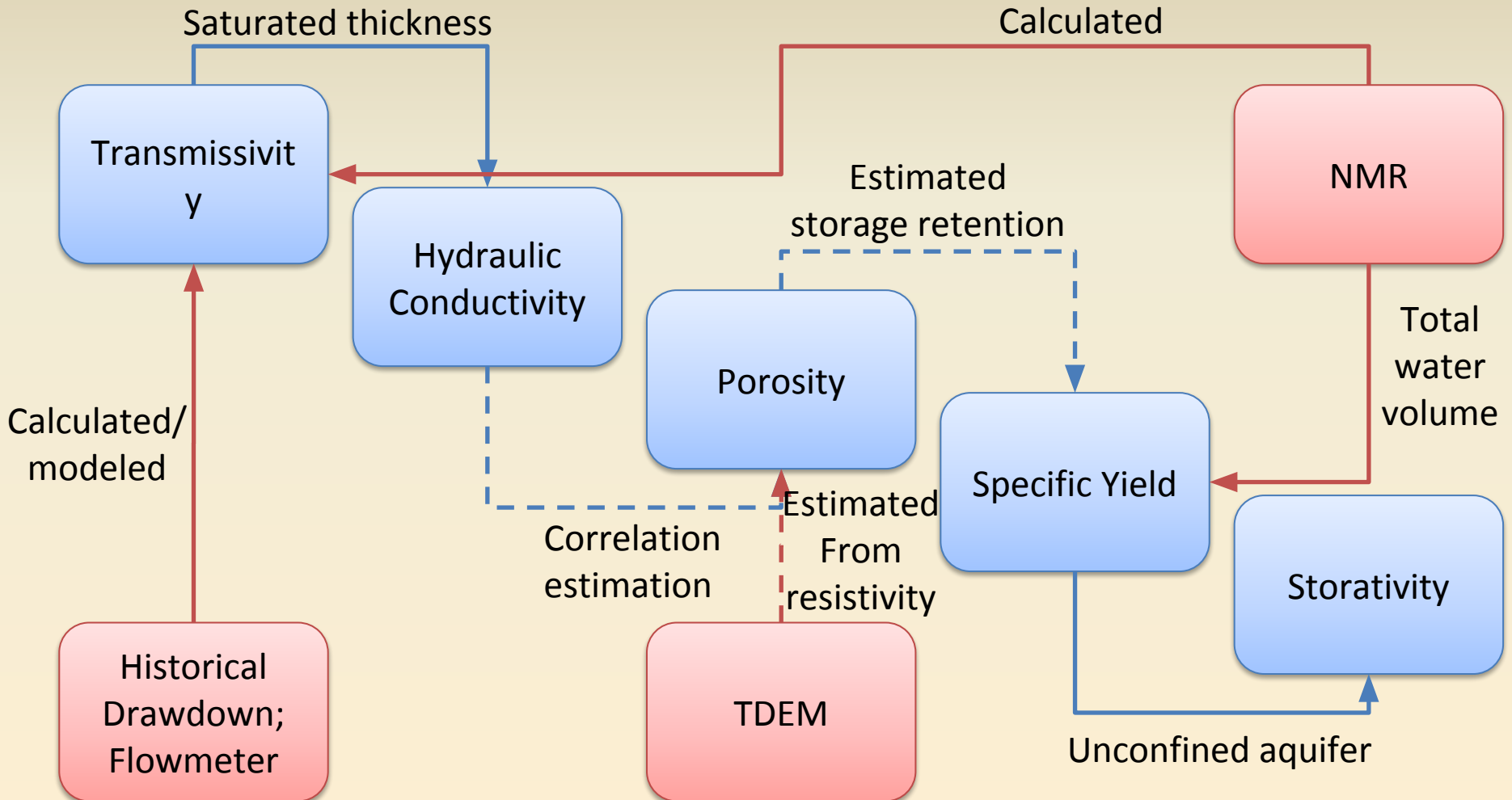


Aquifer Hydraulic Properties Testing

- Historical pump-test data
- Aquifer specific yield and/or transmissivity
- Flowmeter surveys can be used to evaluate the hydraulic conductivity and transmissivity of the aquifer
- Nuclear magnetic resonance

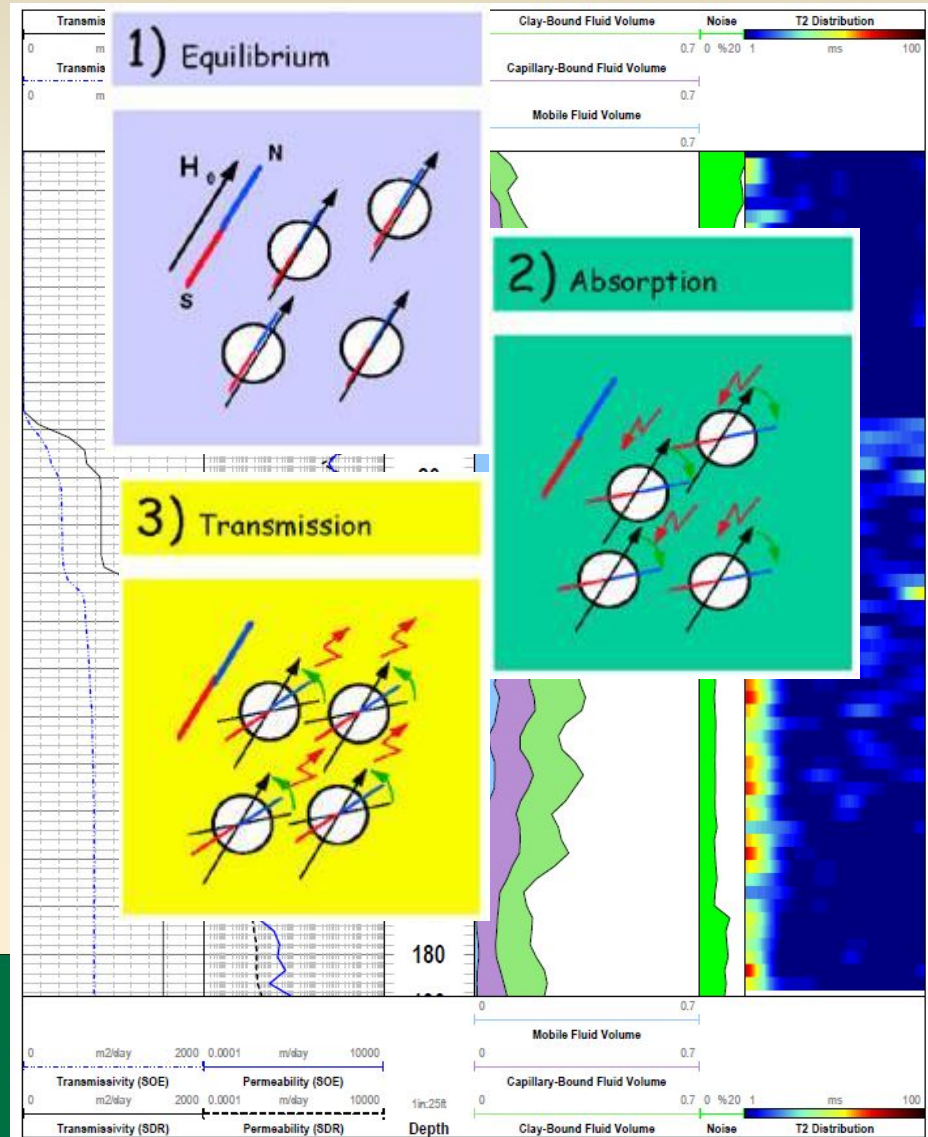


Aquifer Hydraulic Properties

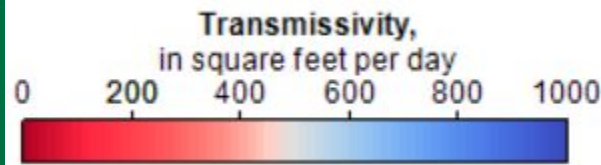
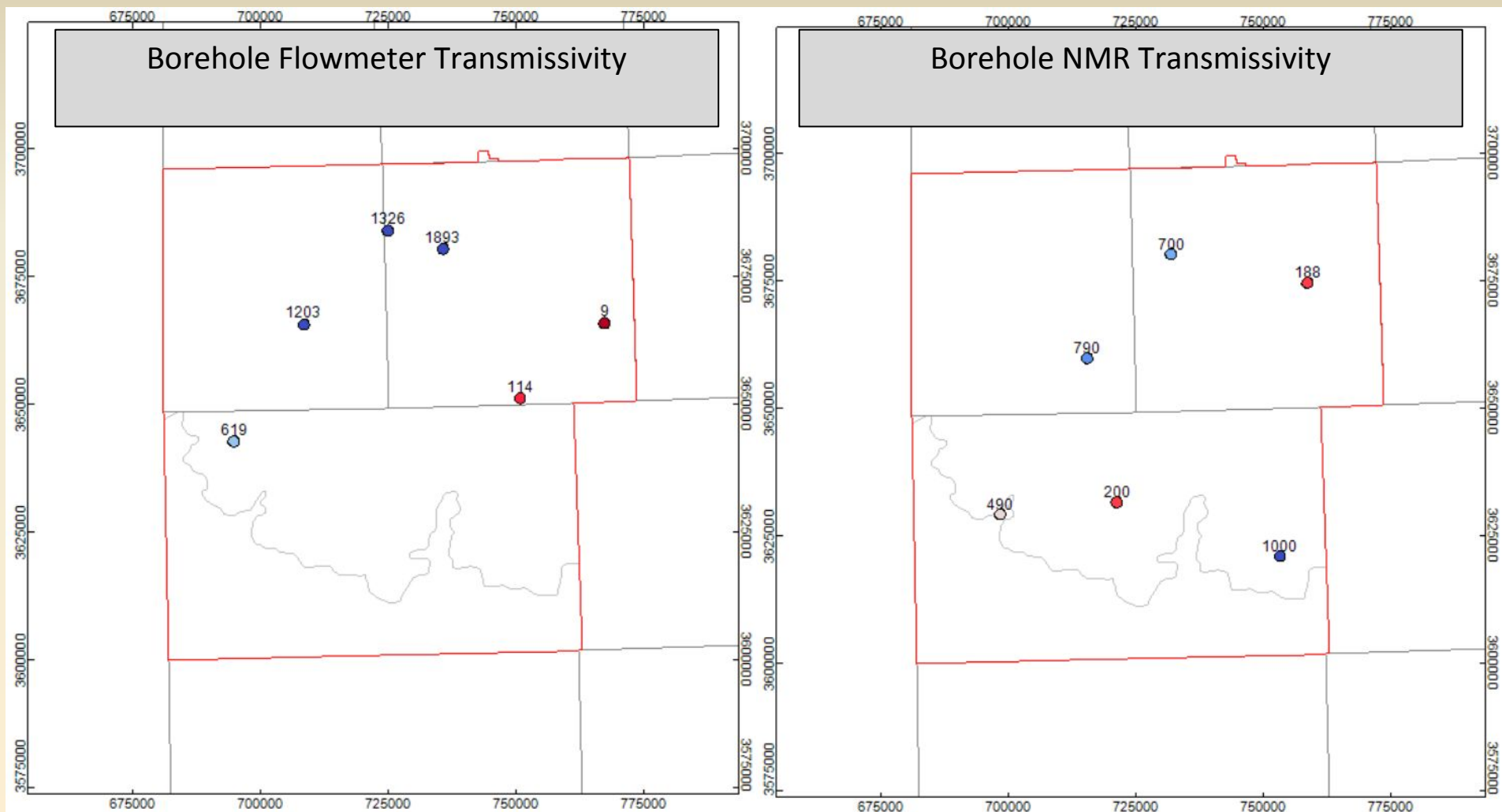


Nuclear Magnetic Resonance

- Magnetic resonance directly measures the response from hydrogen atoms
- Great tool to measure direct response from water molecule

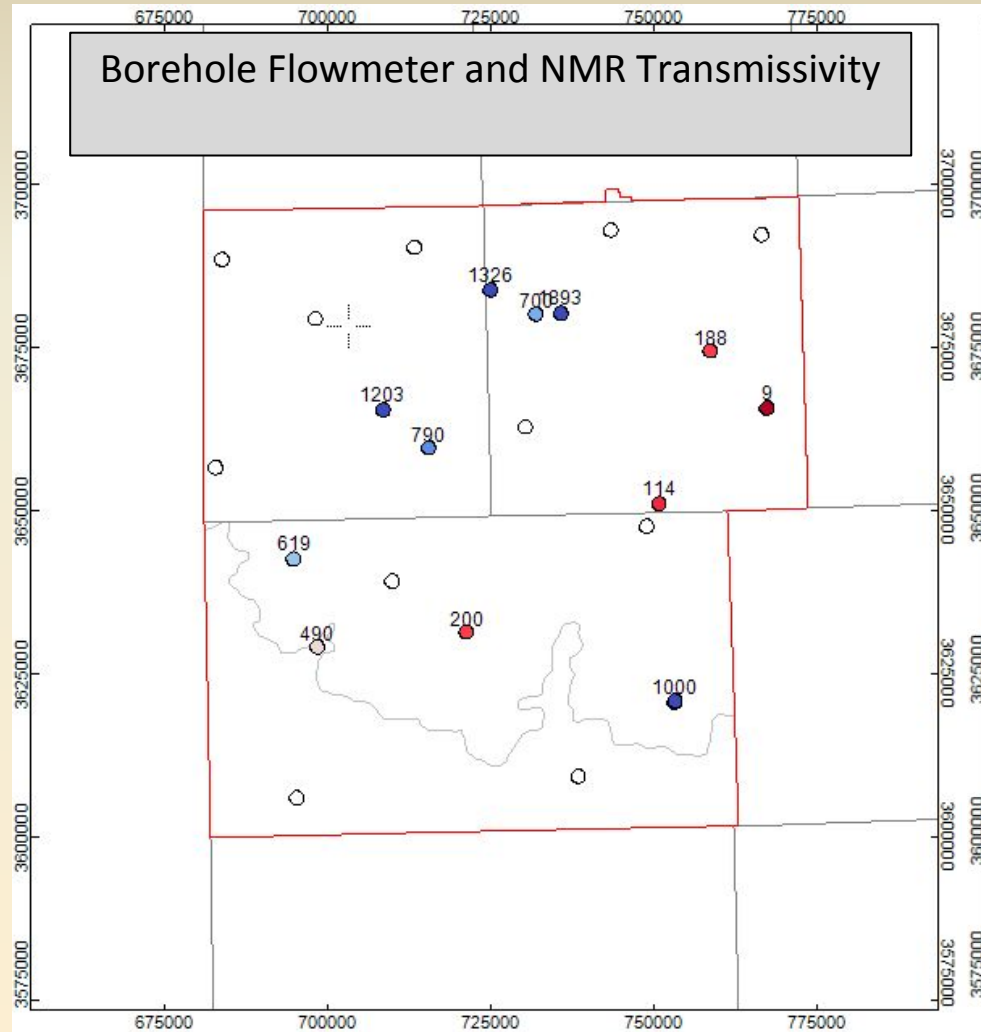


Collected Aquifer Hydraulic Properties

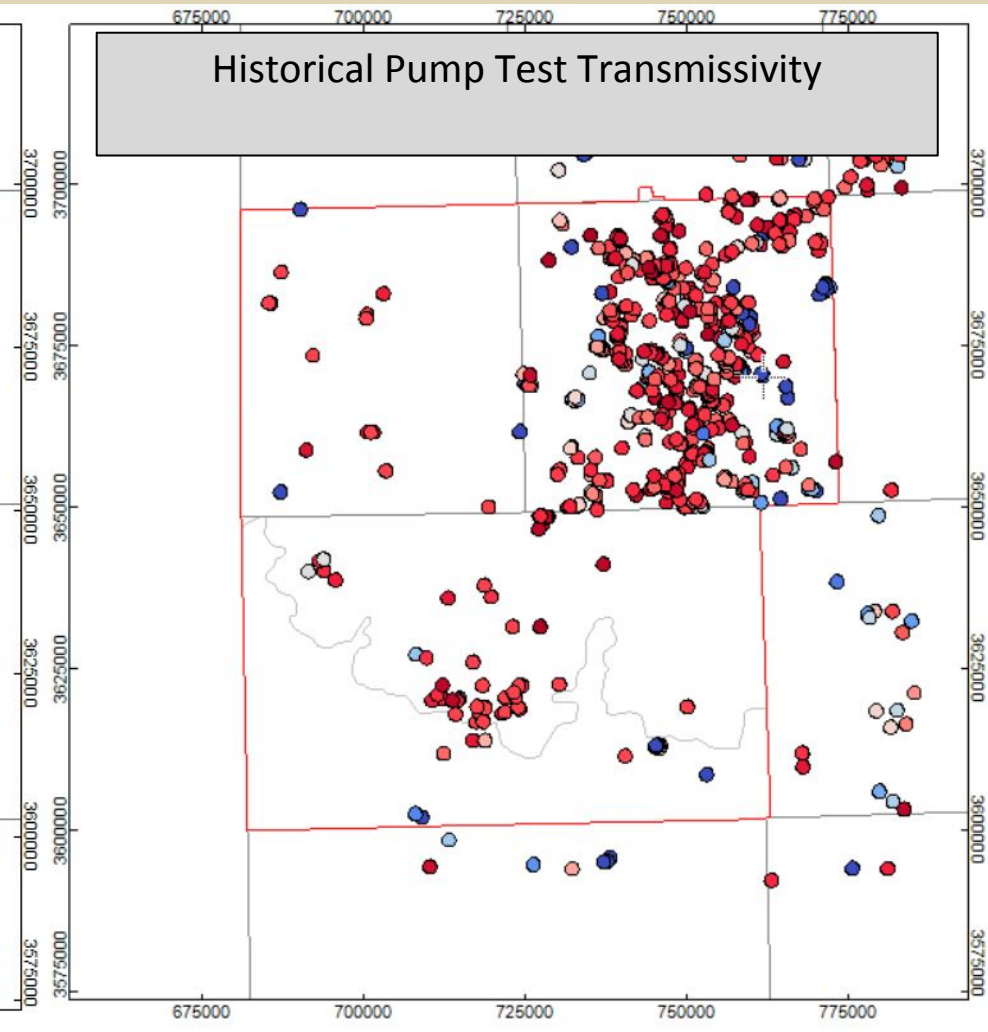


All Aquifer Hydraulic Properties

Borehole Flowmeter and NMR Transmissivity



Historical Pump Test Transmissivity



Web Application

USGS - Hydrogeologic D. x Andy Teeple

Secure | https://webapps.usgs.gov/HDE/southernhighplains/

USGS science for a changing world

Column Layers Legend

Search for a place

Click the map within the study area to display a hydrogeologic column at the location

Scale Units Year Help

Zoom Map Print Clear

	Altitude* (feet NAVD88)	Depth* (feet BLS)
Land Surface		
Base of Ogallala Formation		
Base of Fredericksburg Group		
Base of Trinity Group		
Base of Dockum Group		
Ogallala Formation Saturated Zone (0")		
Top		
Base		
Thickness		

[NAVD88, above North American Vertical Datum of 1988; BLS, below land surface; --, layer is not present.]

* Hydrogeologic contacts presented in the hydrogeologic column are interpolated between points and are not an exact representation of the

Clear Map Quick Start About

Hydrogeologic Data Explorer: Southern High Plains

- 1 Click the **Column** tab to build a hydrogeologic column.
- 2 Click the **Layers** tab to display geographic data and identify map features.
- 3 Click the **Legend** tab to view an explanation of what is shown in the map.

Got It - Go to the Explorer!

The diagram shows a hydrogeologic column with altitude on the left (feet above NAVD88) and depth on the right (feet below land surface). The layers from top to bottom are: Land Surface (0 to 0), Ogallala Formation (0 to 128), Base of Fredericksburg Group (128 to 179), Base of Trinity Group (179 to 244), Base of Dockum Group (244 to 295), and Base Dockum Group (295 to 328). The total thickness of the Ogallala Formation is 128 feet.

District Representative

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Cell: (512)963-3558

QUESTIONS?

