

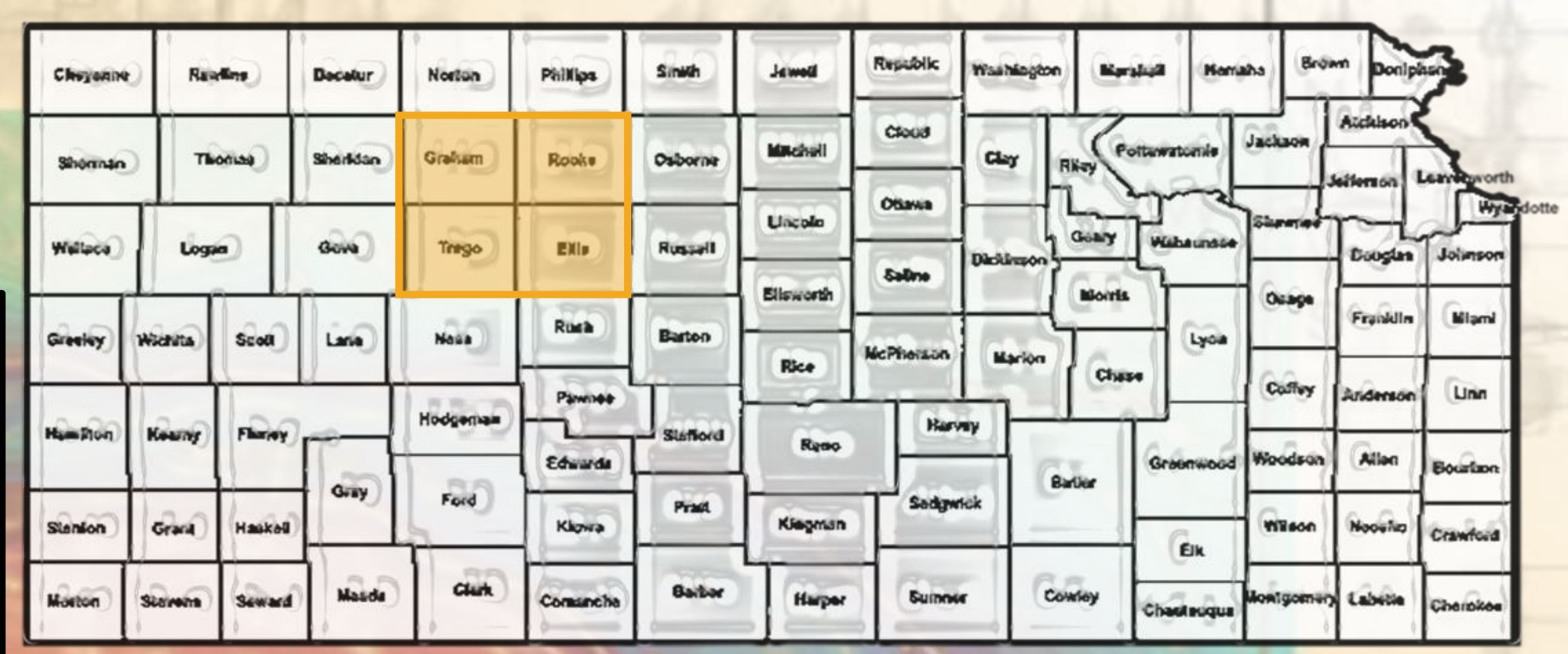
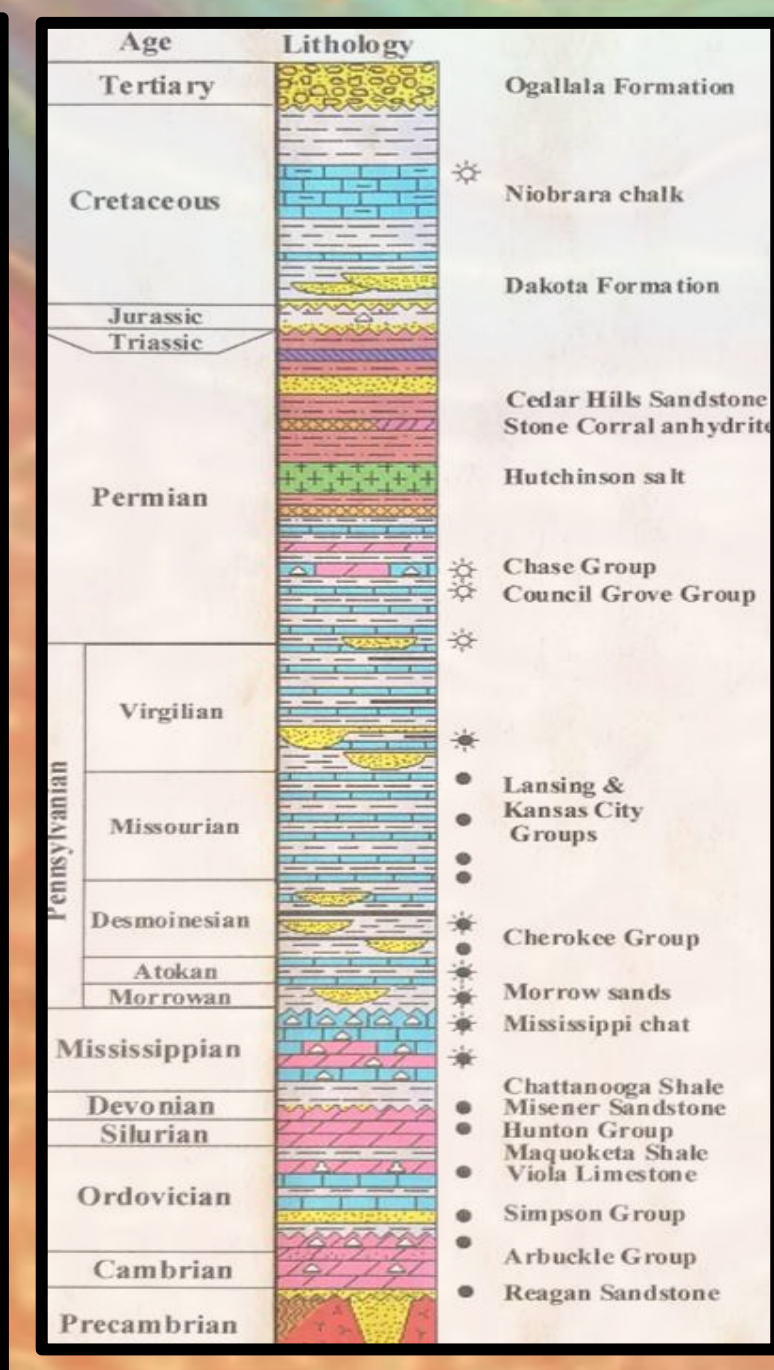
SUBSURFACE MAPPING OF INTRA-ARBUCKLE SHALE IN NORTH-WEST KANSAS USING WELL LOG DATA

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LOCATING IAS

- Well Logs are electronically generated measurements taken by lowering a special instrument down into a bore hole.
- The **KGS (Kansas Geological Survey)** makes many KS well logs available for public viewing.
- Micro-Resistivity** logs are used to measure fluid resistance in a formation and give us insight into the permeability of specific zones.
- Gamma Ray** logs measure the radioactivity of rocks in a bore hole to help geologists identify the lithology of formations.

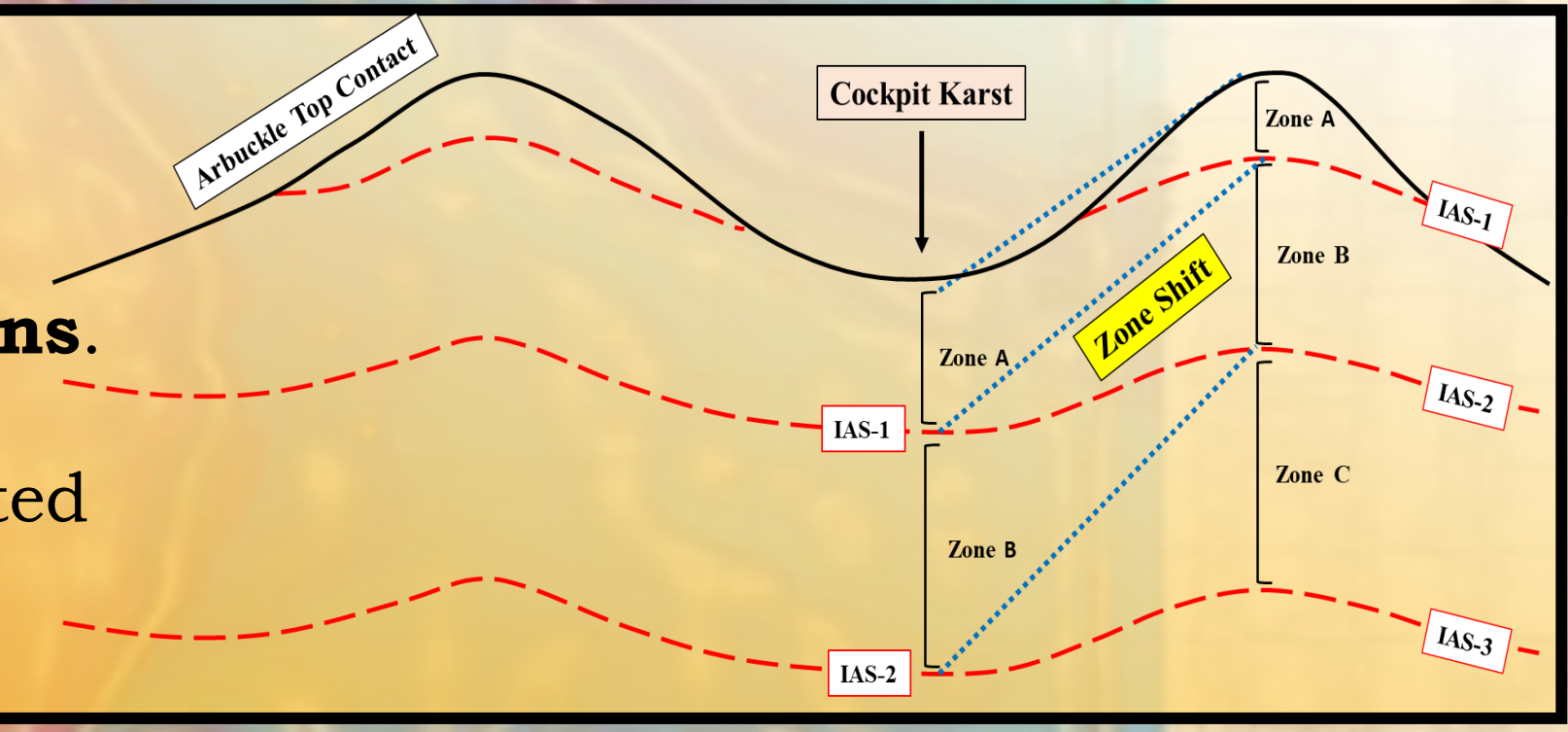


ARBUCKLE FORMATION

- Discovered in the early 1900's and located throughout the central US.
- Cambrian and Ordovician in age (541-480 million years ago), and mostly made up of **Dolomite and Limestone** at **500 ft to 6000 ft**
- Arguably the most important formation to the Kansas oil industry having produced **35-40 % of all KS oil**.
- Lacks up to date **Maps and Well Log Studies**.

IAS STRUCTURE HYPOTHESIS:

- Deposited as **horizons**.
- Structurally deformed** and affected by **Paleo-karst**.



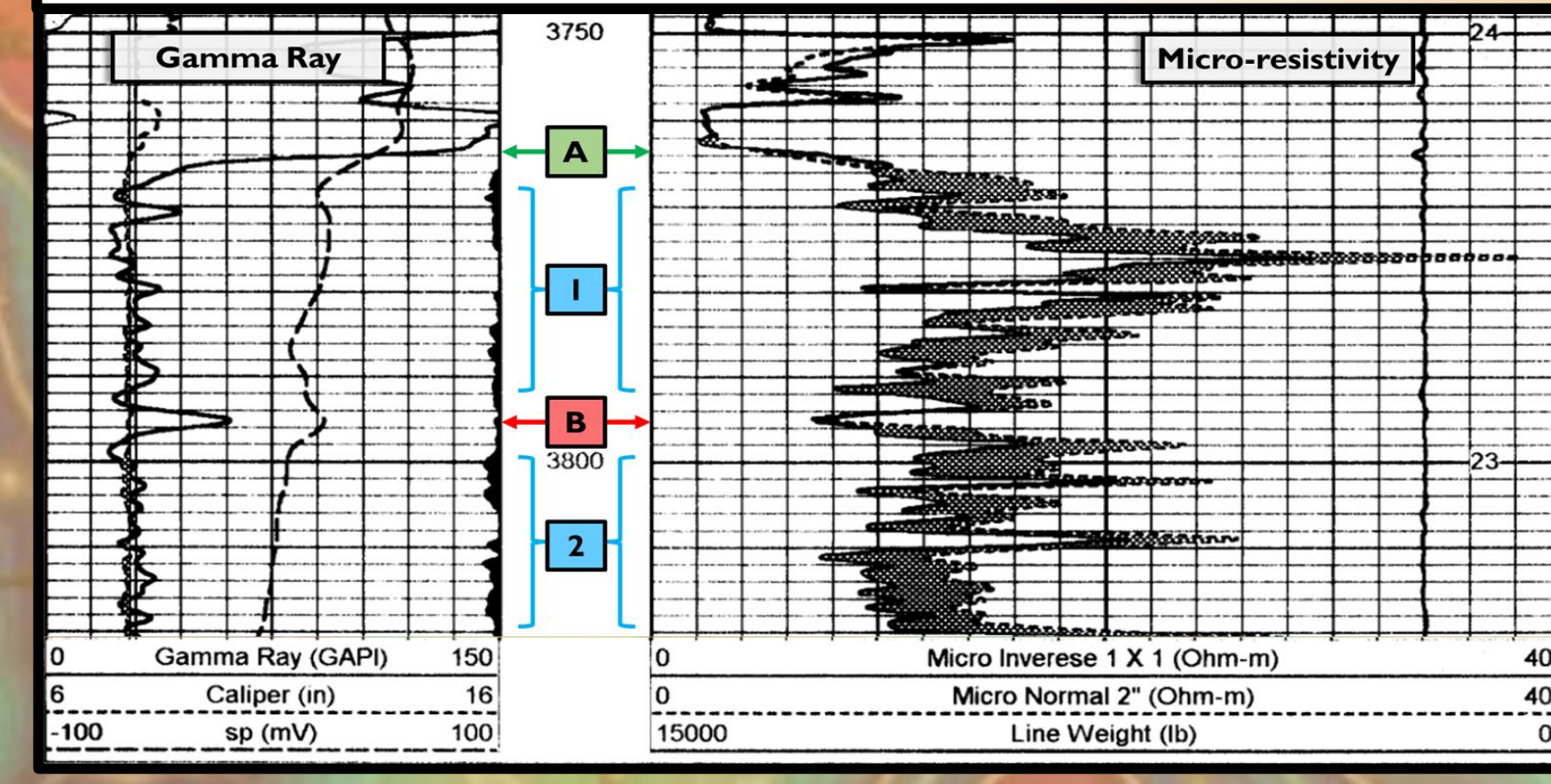
INTRA-ARBUCKLE SHALE (IAS)

- Shale:** sedimentary rock made up of very small grains, mud, and clay.
- Deposited within the Arbutuckle Formation
- Impermeable** and **non-porous**.
- Act as **barriers** to hydrocarbon flow throughout KS.
- Compartmentalizes** Arbutuckle reservoirs, potentially storing economically substantial quantities of hydrocarbons beneath them.

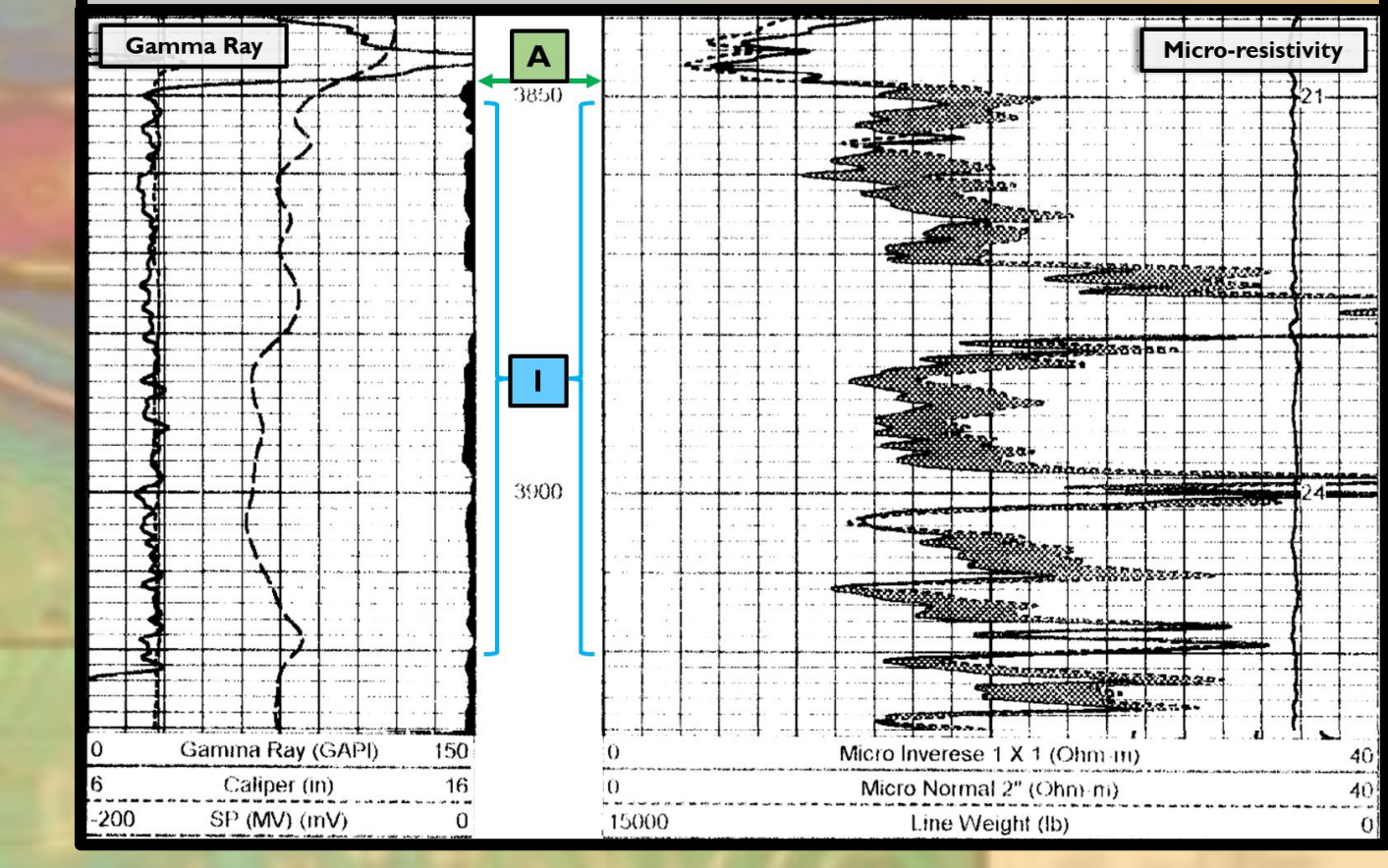
CORRELATING IAS

- Correlation:** describes a relationship between stratigraphy and/or lithology
- Deterministic Shale:** Shale that can be correlated from one well to another.
- Stochastic Shale:** Shale that cannot be correlated from one well to another.
- IAS was correlated using gamma ray logs and corresponding geologist reports.

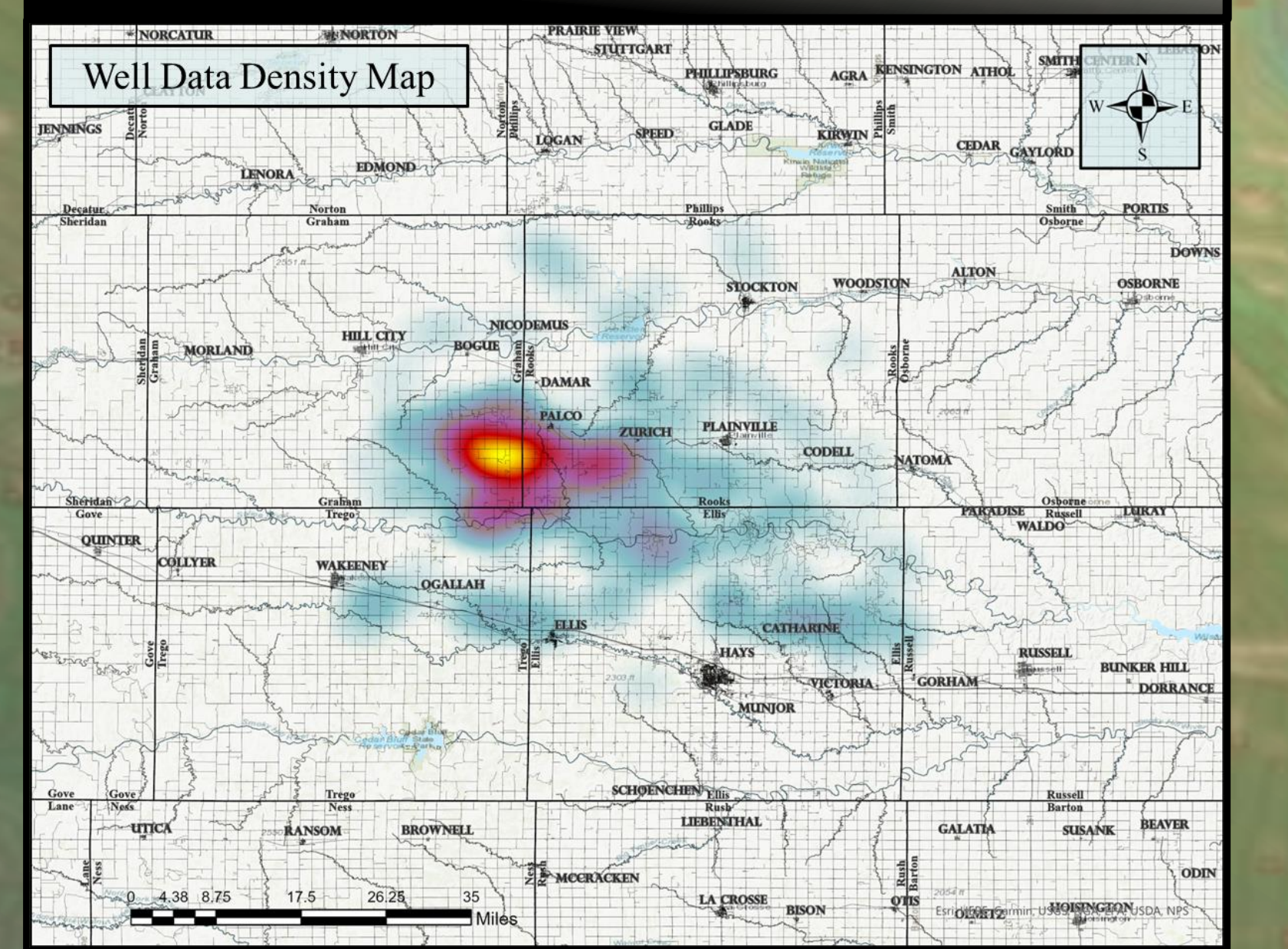
IAS (Intercepted)



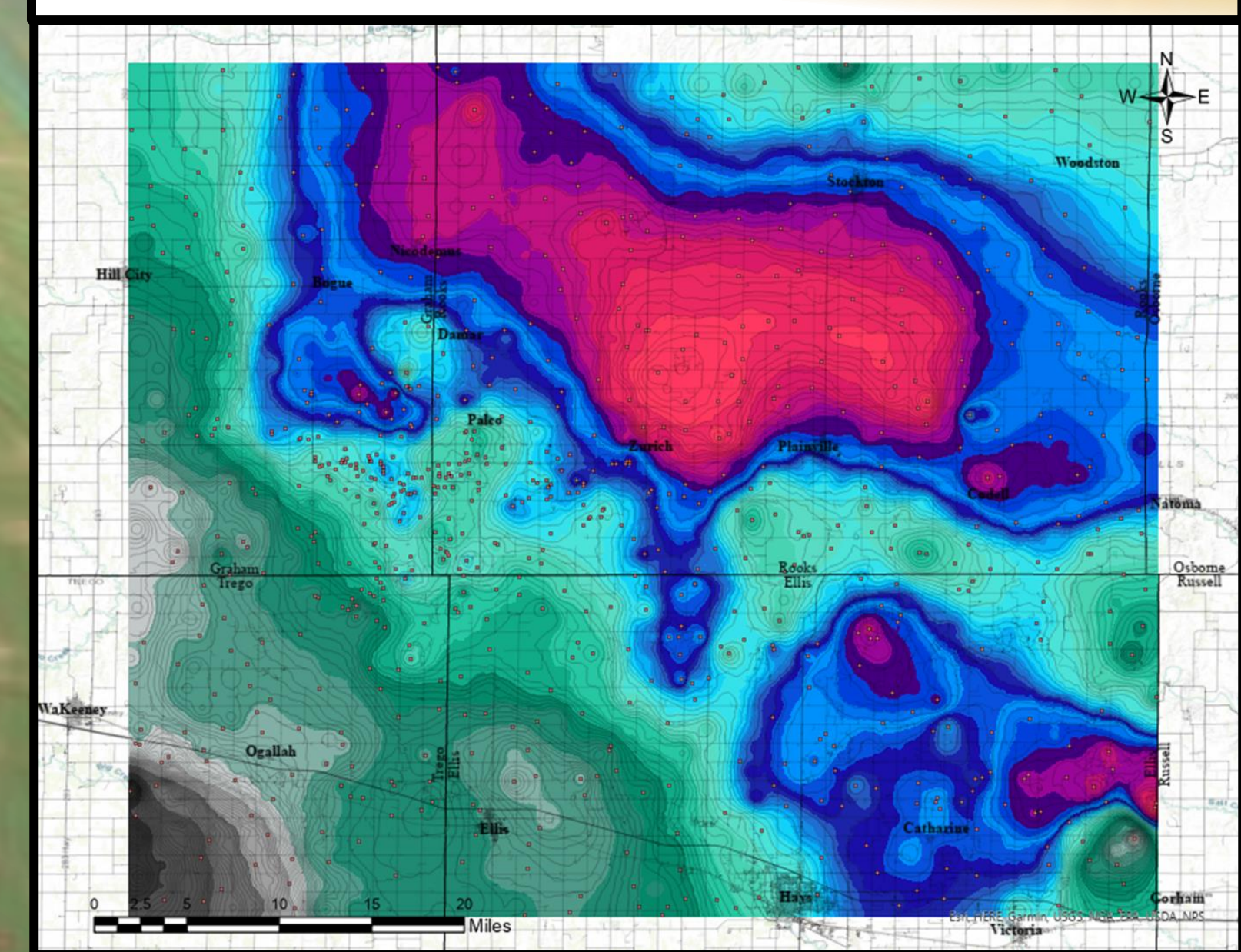
IAS (Not Intercepted)



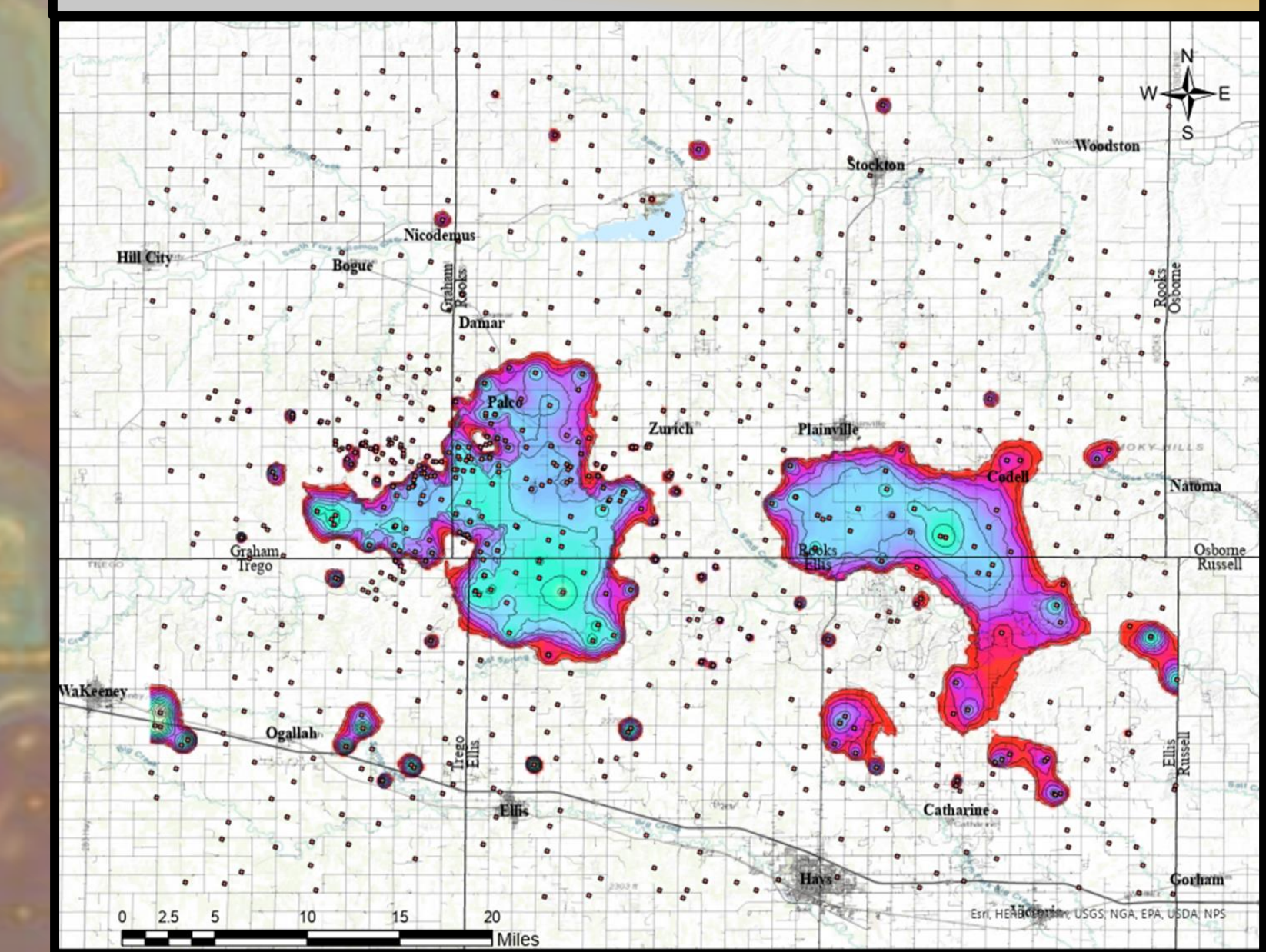
ARBUCKLE TOP CONTACT



ARBUCKLE TOP CONTACT



IAS DISTRIBUTION



MAPPING IAS

- KGS Interactive Oil and Gas Map** was used to locate and collect well log data.
- Microsoft Excel** was used to gather and organize well data.
 - KB, Arbutuckle depth, Arbutuckle sea-level, IAS depth, IAS sea-level, IAS GAPI, Lat/Long, API#, # of barriers
- ArcGIS Pro 2.7.0** was used to map well log data.
- Inverse Distance Weighted (IDW) spatial analyst** was the technique used to map IAS and Arbutuckle top contact.