Reservoir Characterization of the Shannon Sandstone, Southwestern Powder River Basin, Wyoming

Rebekah Parks

M.S. Geology, May 2023

COLORADO SCHOOL OF MINES
MUDTOC

Presentation Outline

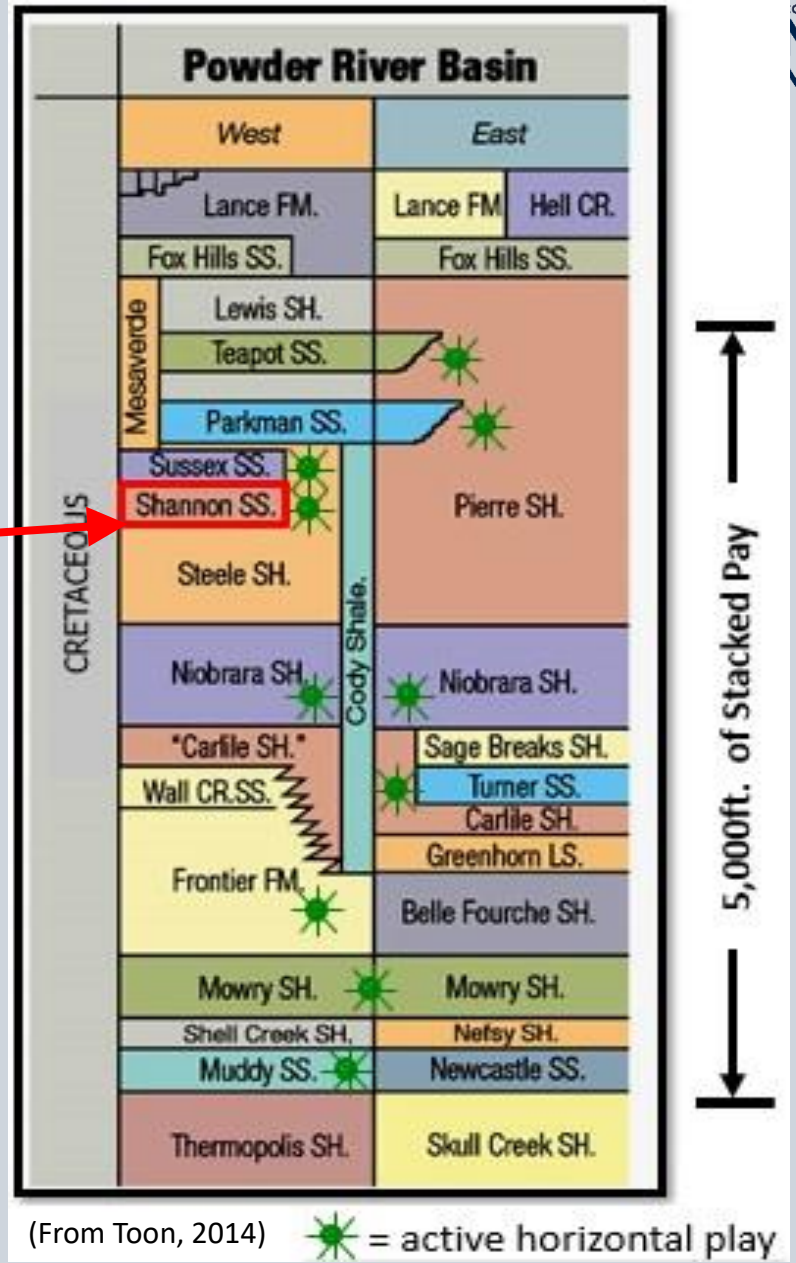
- Purpose & Objectives
- Introduction & Regional Geology
- Study Area
- Continued Work
  - Cores at the CRC
  - Shannon production

Purpose & Objectives

- Reservoir Characterization
  - Define Shannon Sandstone
    - Petrographic analysis
    - Petrophysics analysis
  - Geomechanical properties and stratigraphic interpretation
  - Characterization of lateral and vertical variability
  - Assess petroleum potential
    - Maximize efficiency & production

Regional Geology

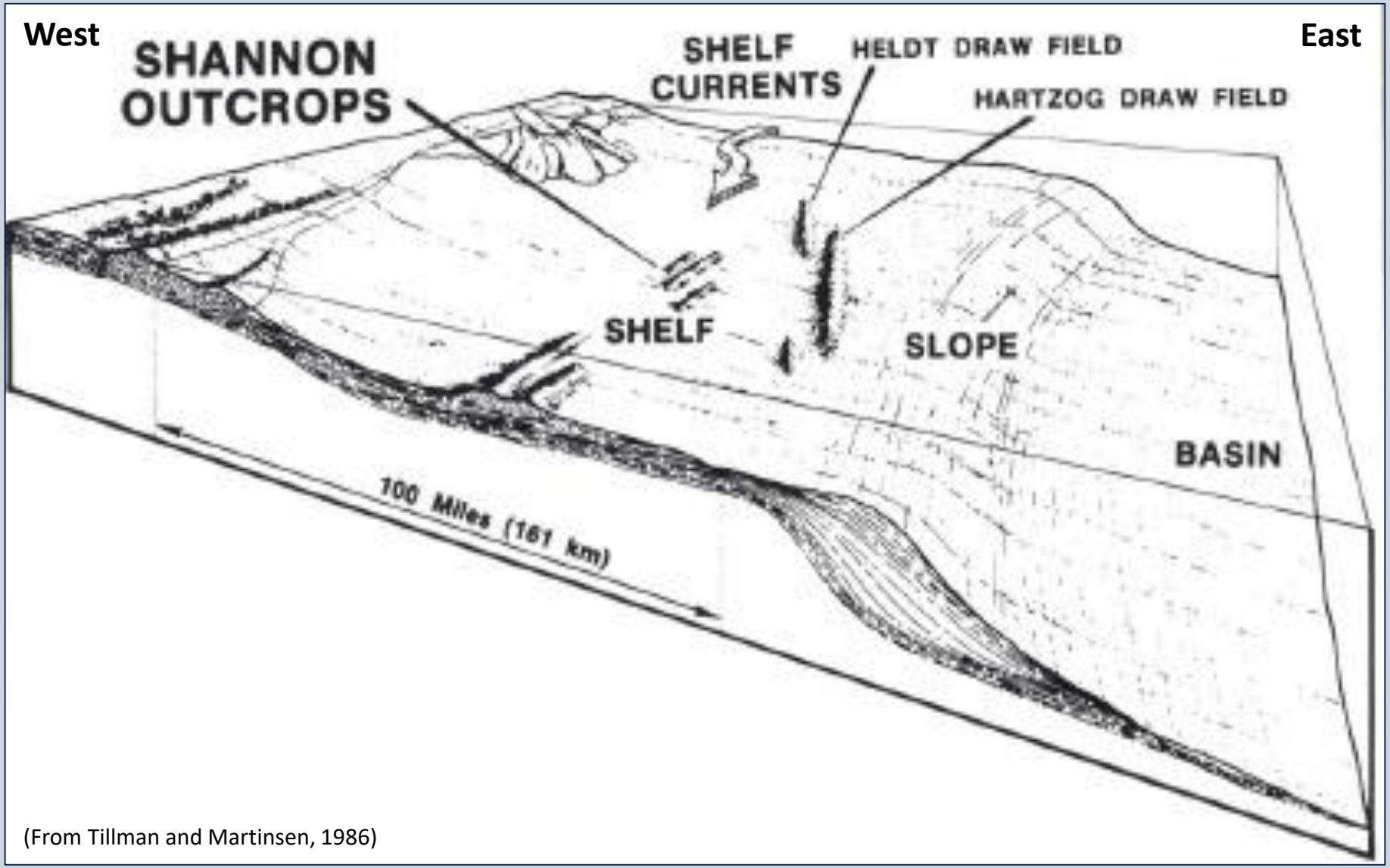
(Blakey, 2014)



(From Toon, 2014)

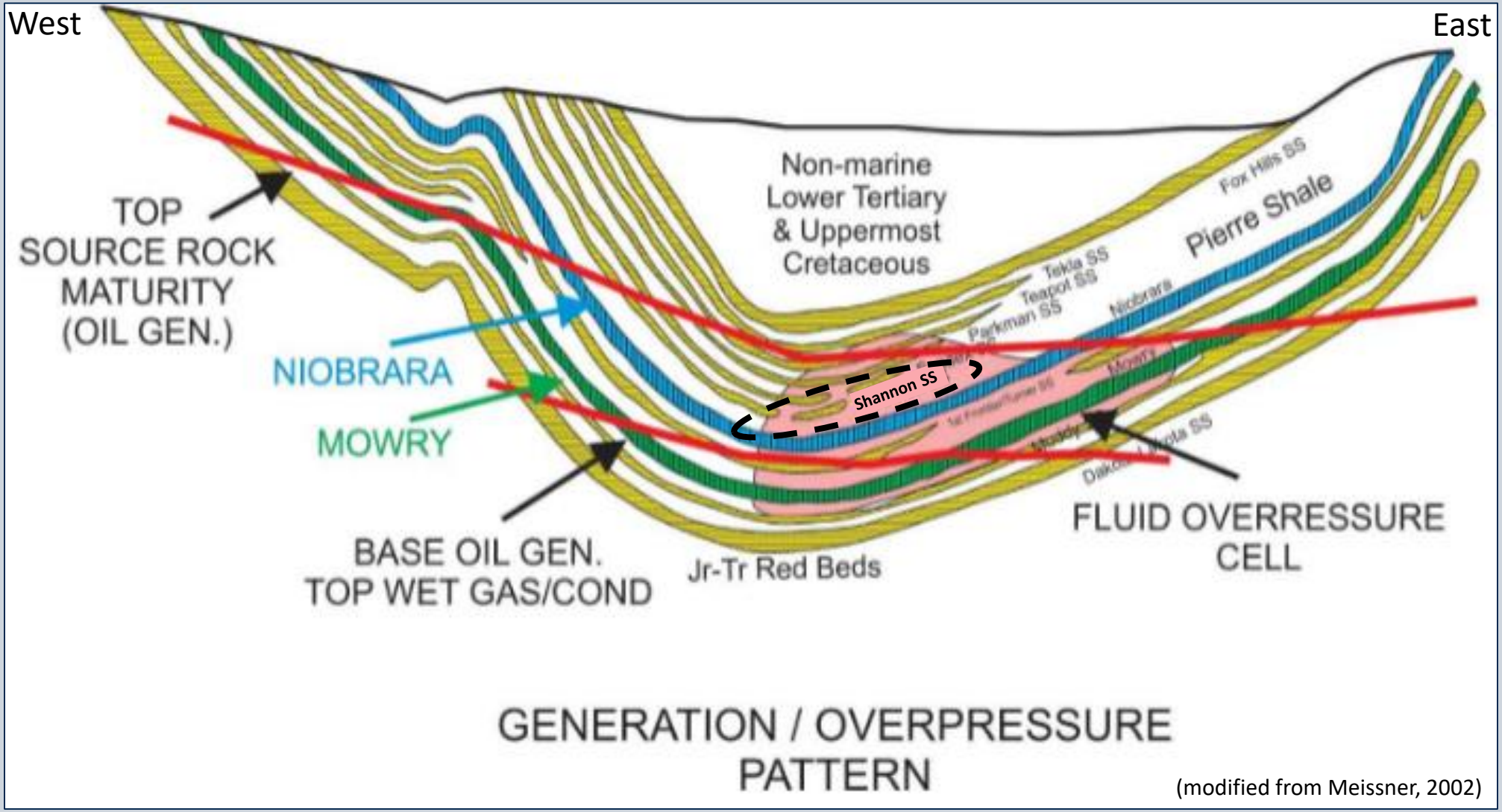
= active horizontal play

Shannon Sandstone



(From Tillman and Martinsen, 1986)

Halo Play

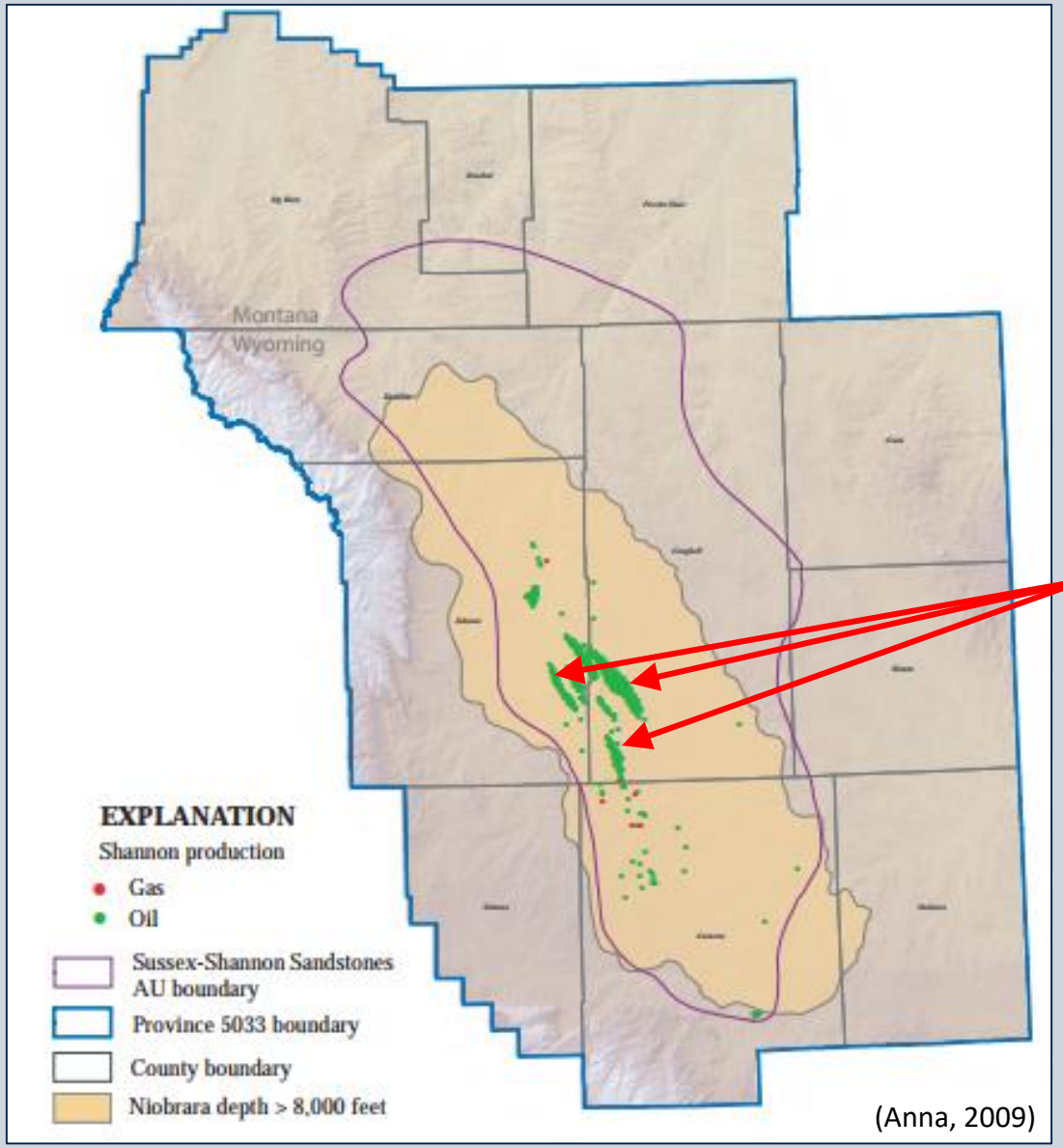


(modified from Meissner, 2002)

φ = ~ 0 to > 20%

k = < 1 to 100 mD, 20 mD avg

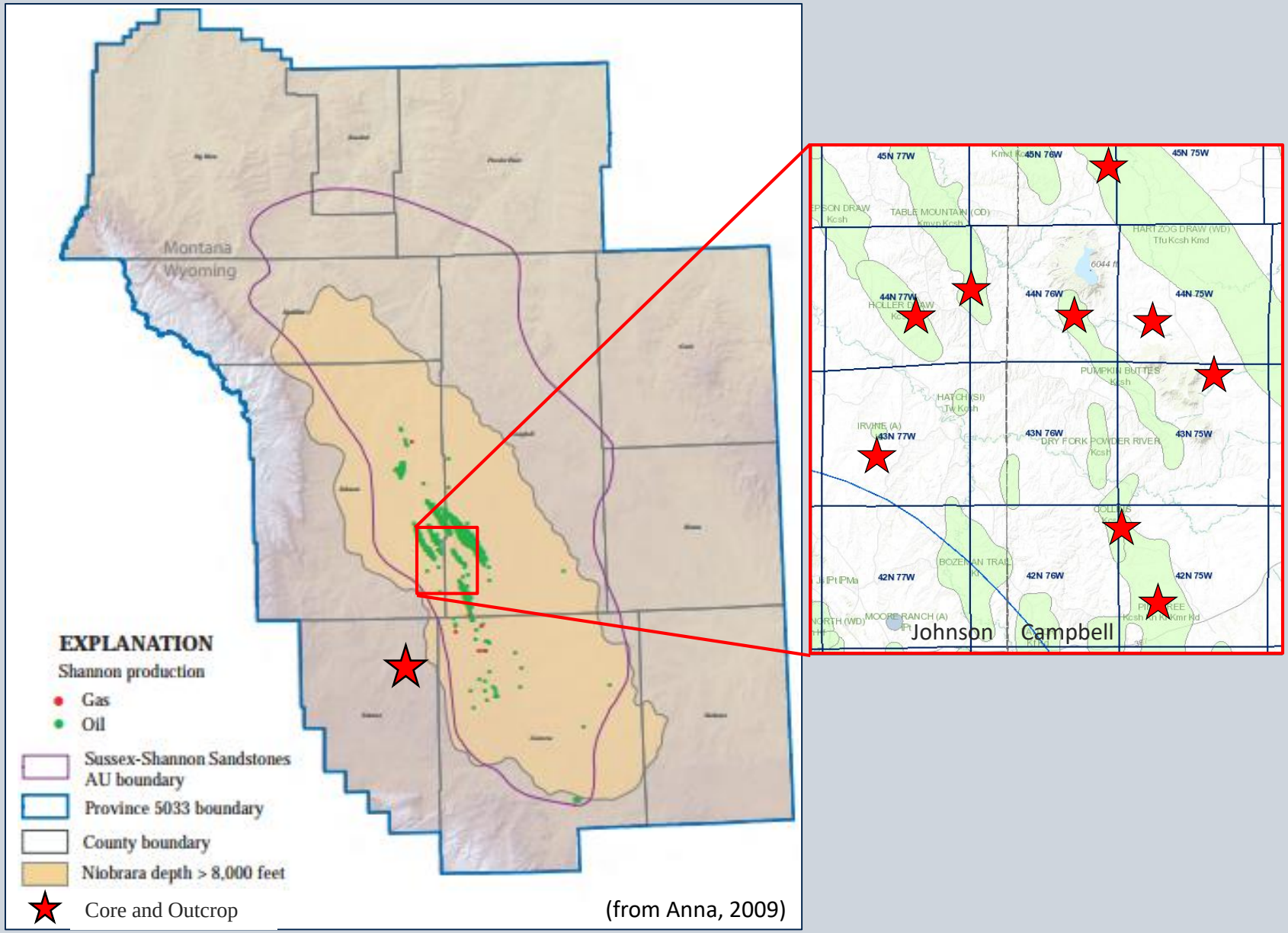
Shannon Production



(Anna, 2009)

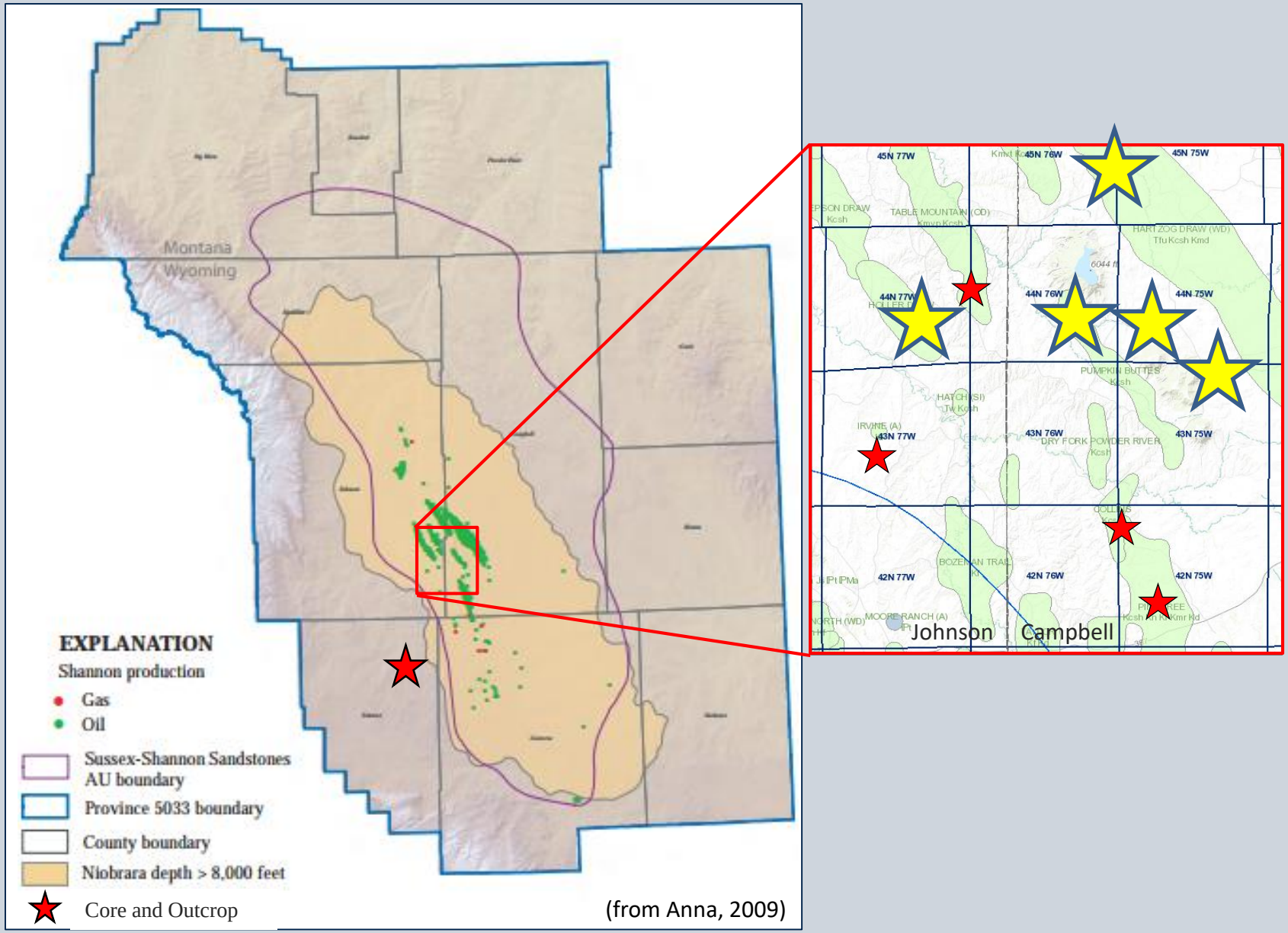
Jepsen-Holler, Hartzog Draw, and Pine Tree fields

Study Area



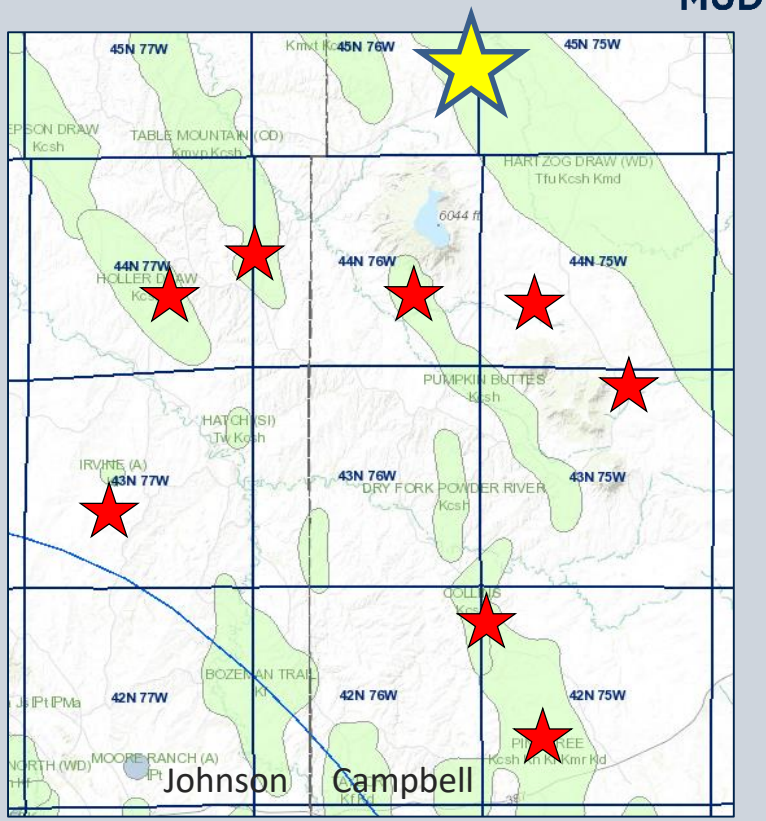
(from Anna, 2009)

Study Area



(from Anna, 2009)

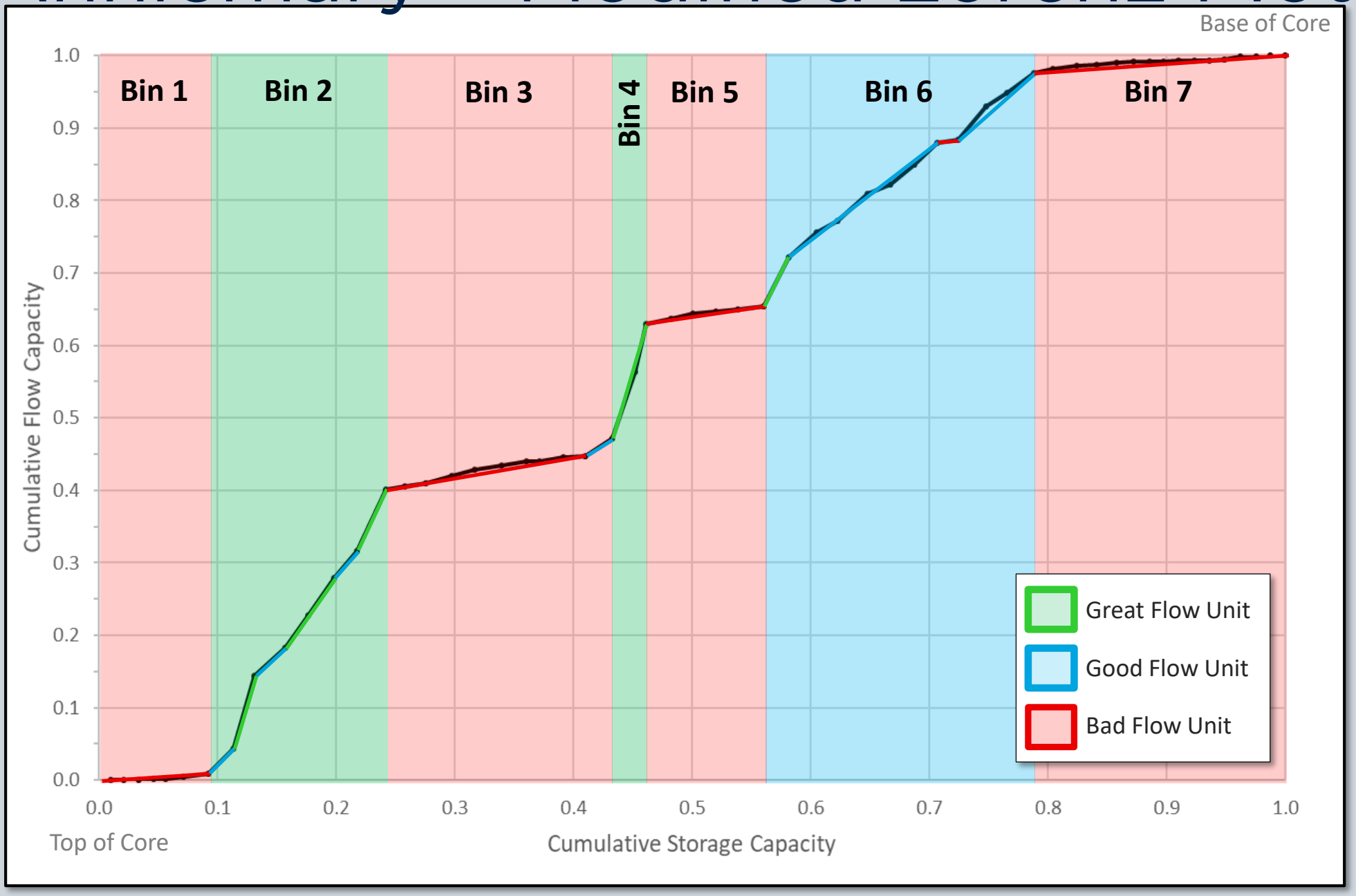
31-24 Anniemary Federal



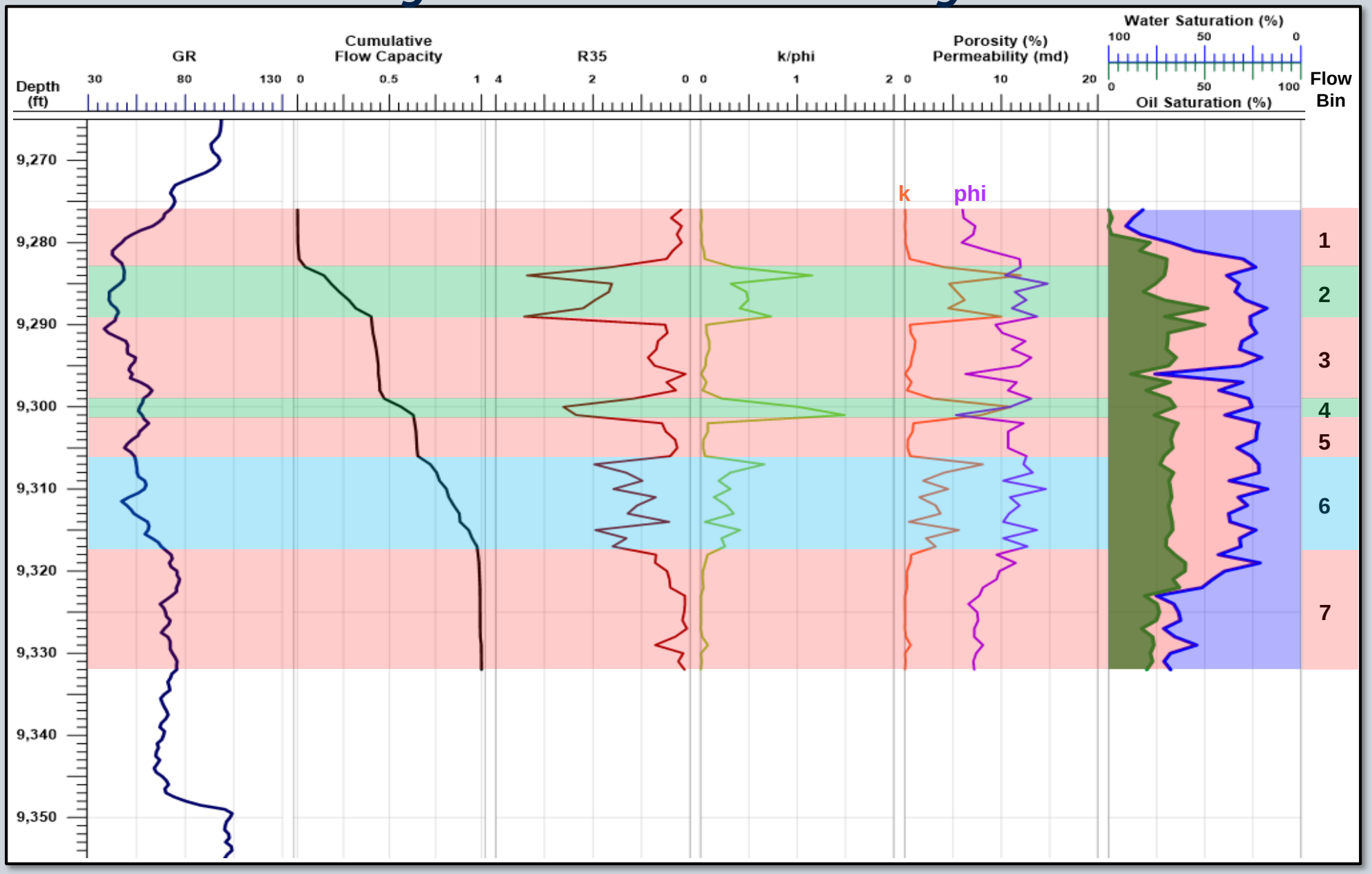
31-24 Anniemary Well

- Northernmost part of the study area
- T45N R76W, Johnson County, section 24
- Available data: XRD, 20 thin sections, and 60’ of core

Anniemary – Modified Lorenz Plot



Anniemary – Core Analysis Plots



Anniemary Facies

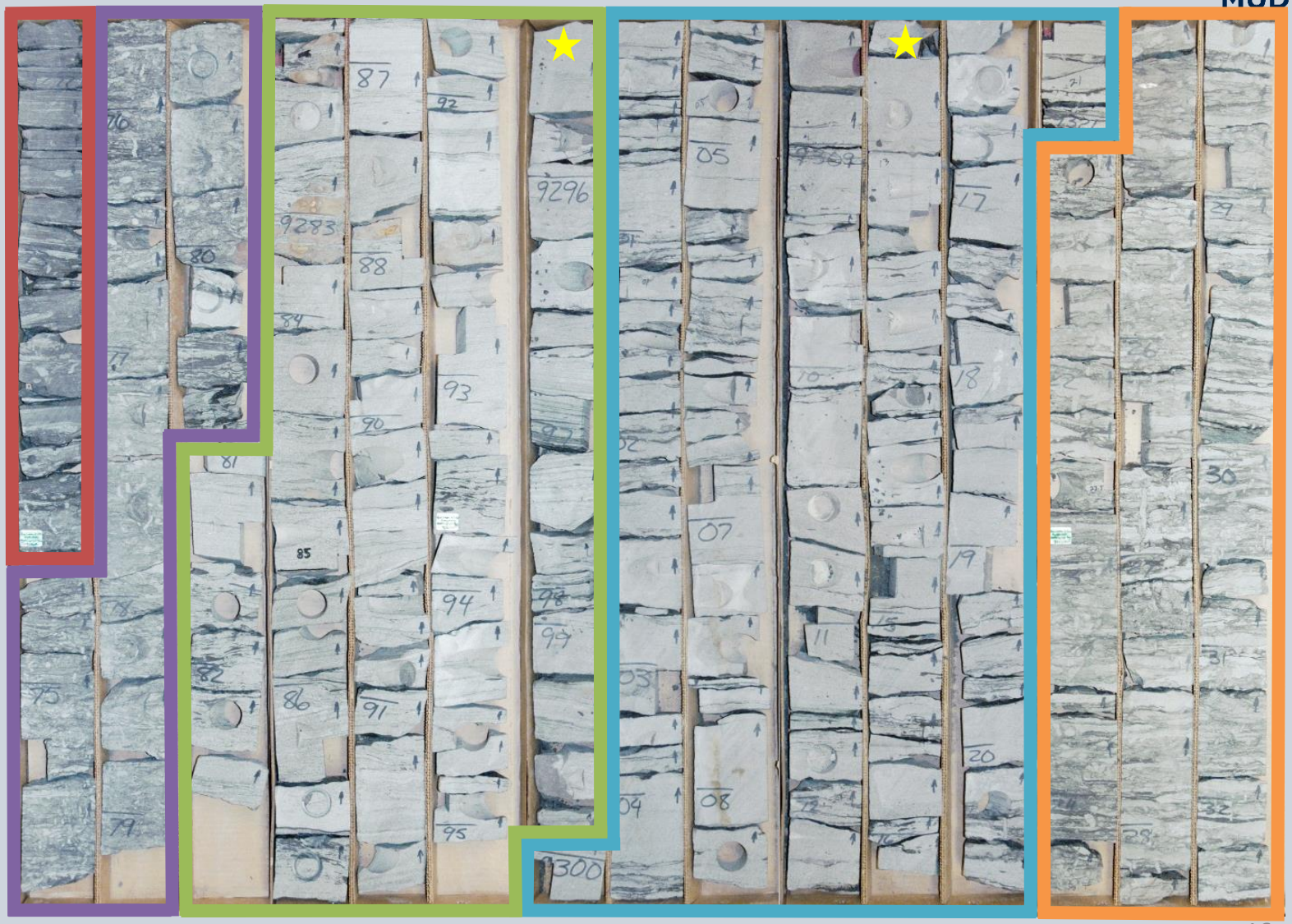
Facies 5: Laminated silty shale

Facies 4: Heavily bioturbated silty sand

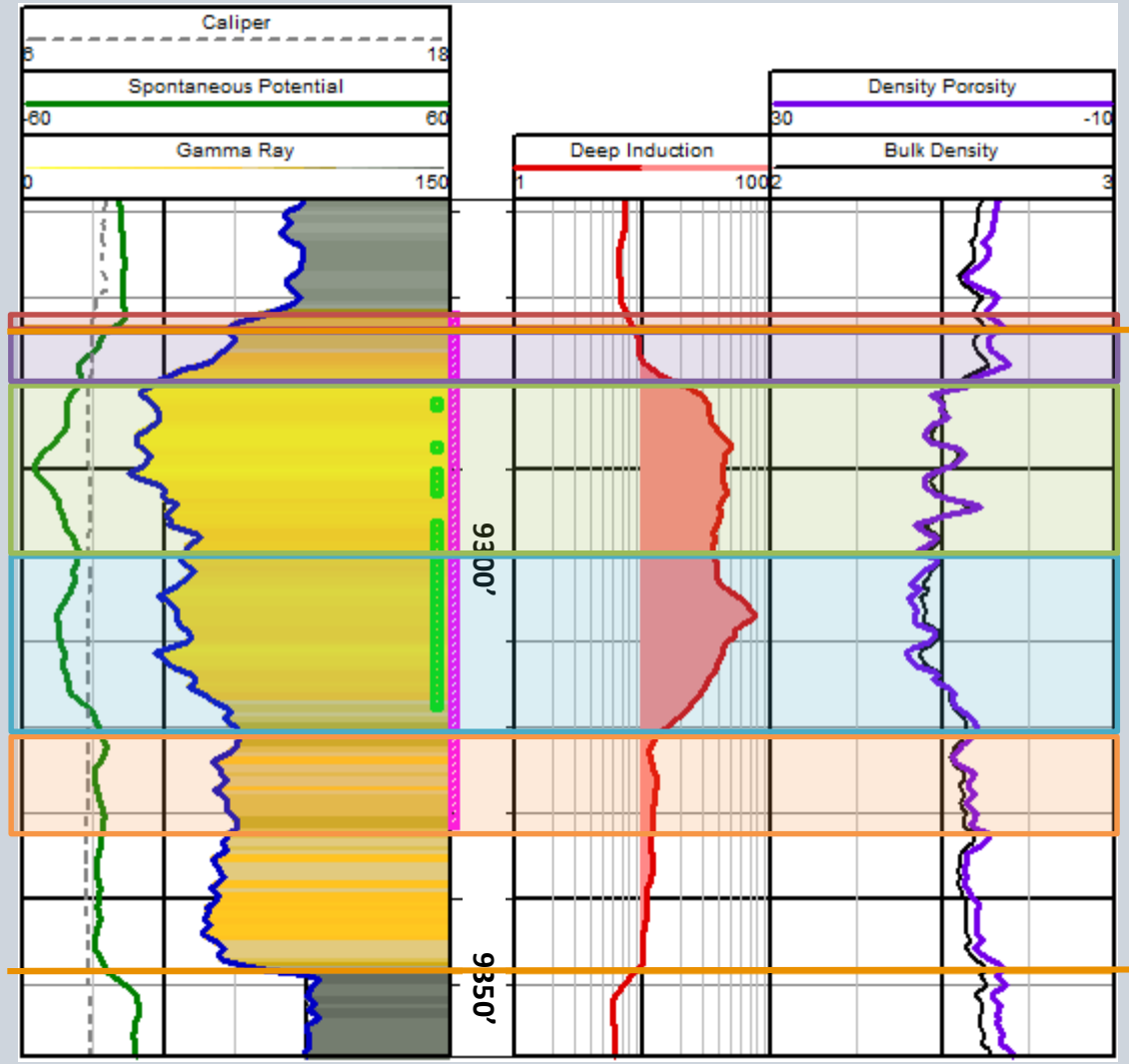
Facies 3: Glauconitic planar to low angle cross-stratified heterolithic sand

Facies 2: Planar to low angle cross-stratified heterolithic sand

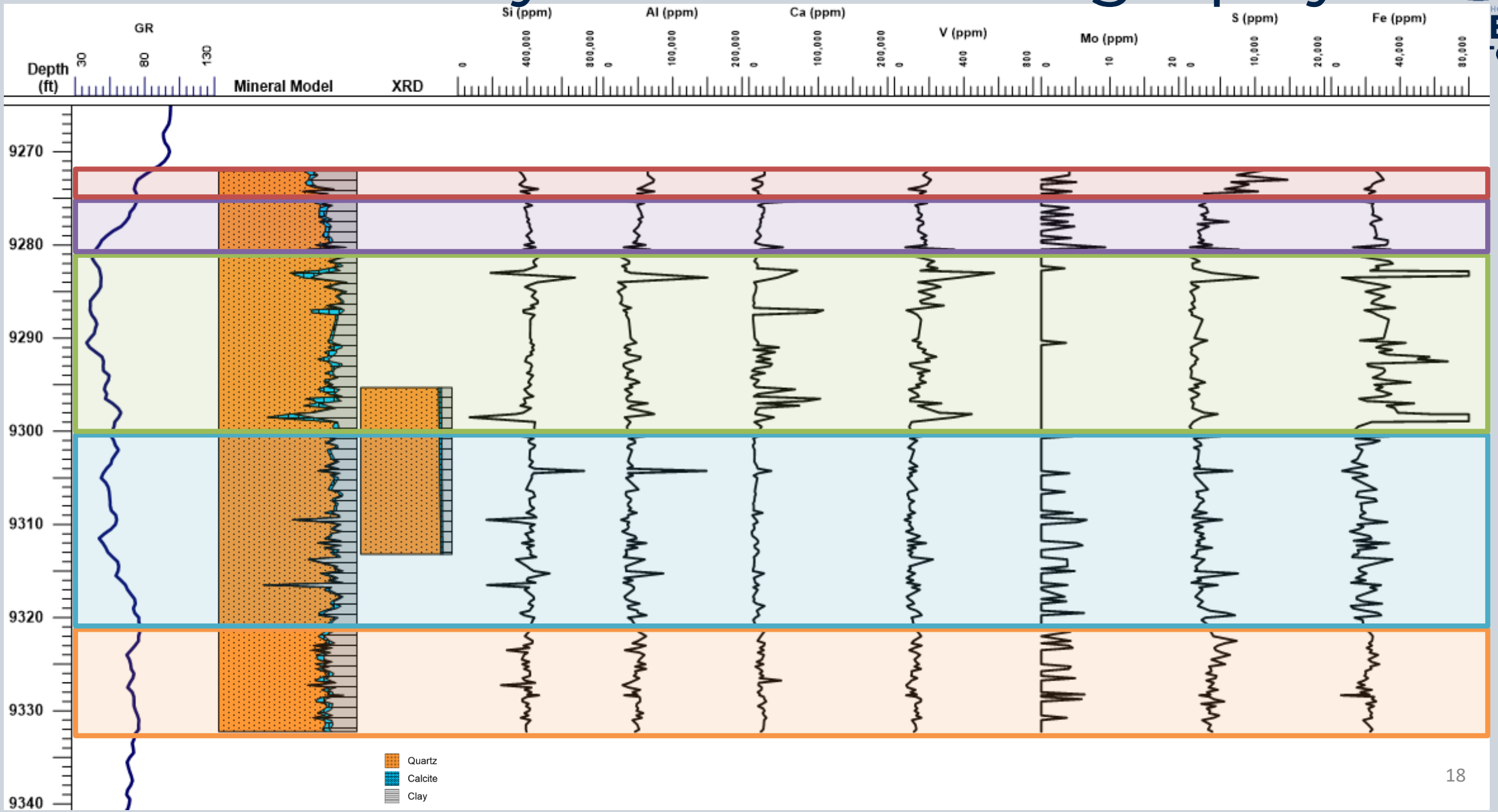
Facies 1: Moderately bioturbated silty sand



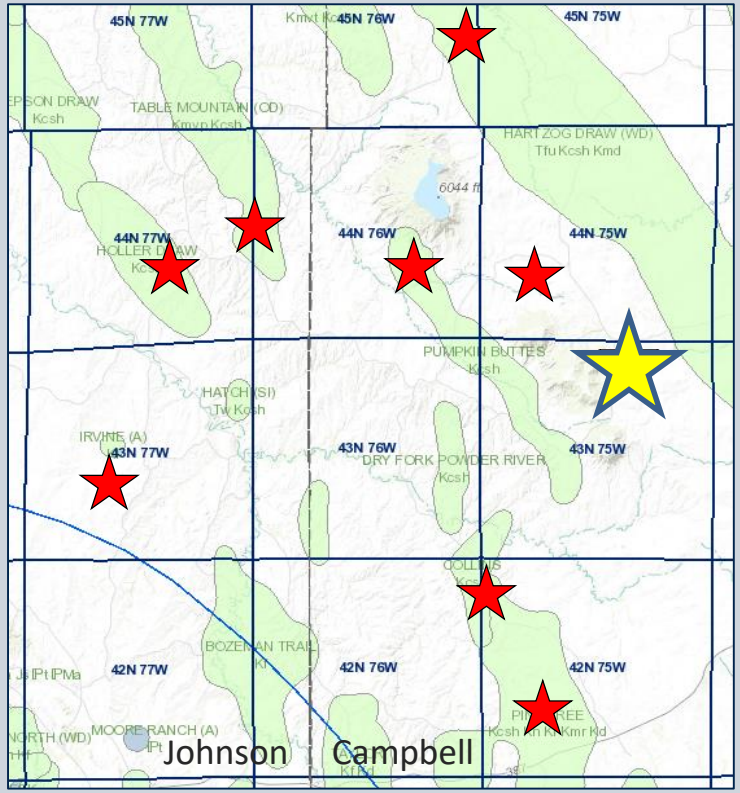
Anniemary Logs



Anniemary – Chemostratigraphy



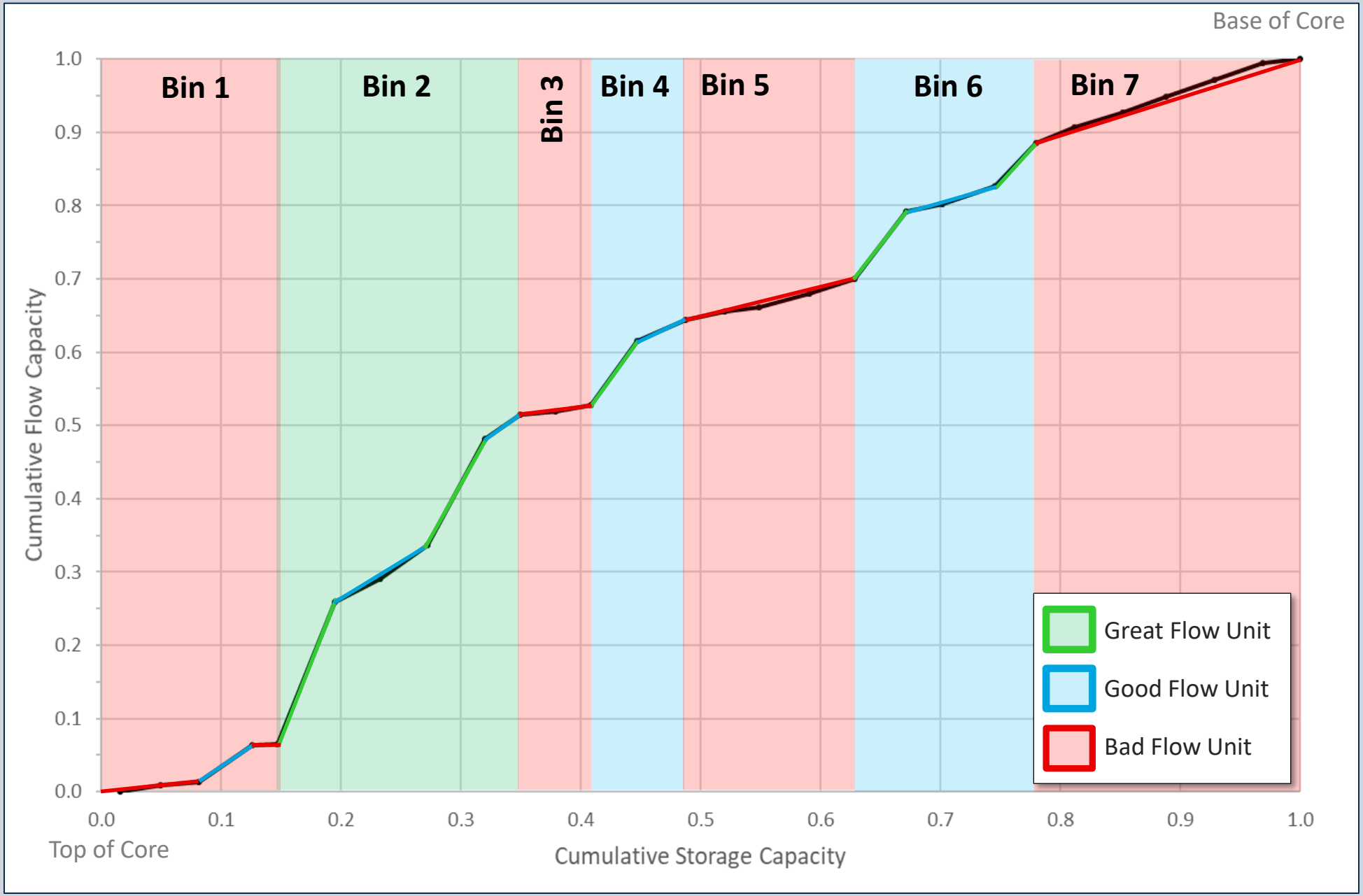
42-3 Cactus Ranch



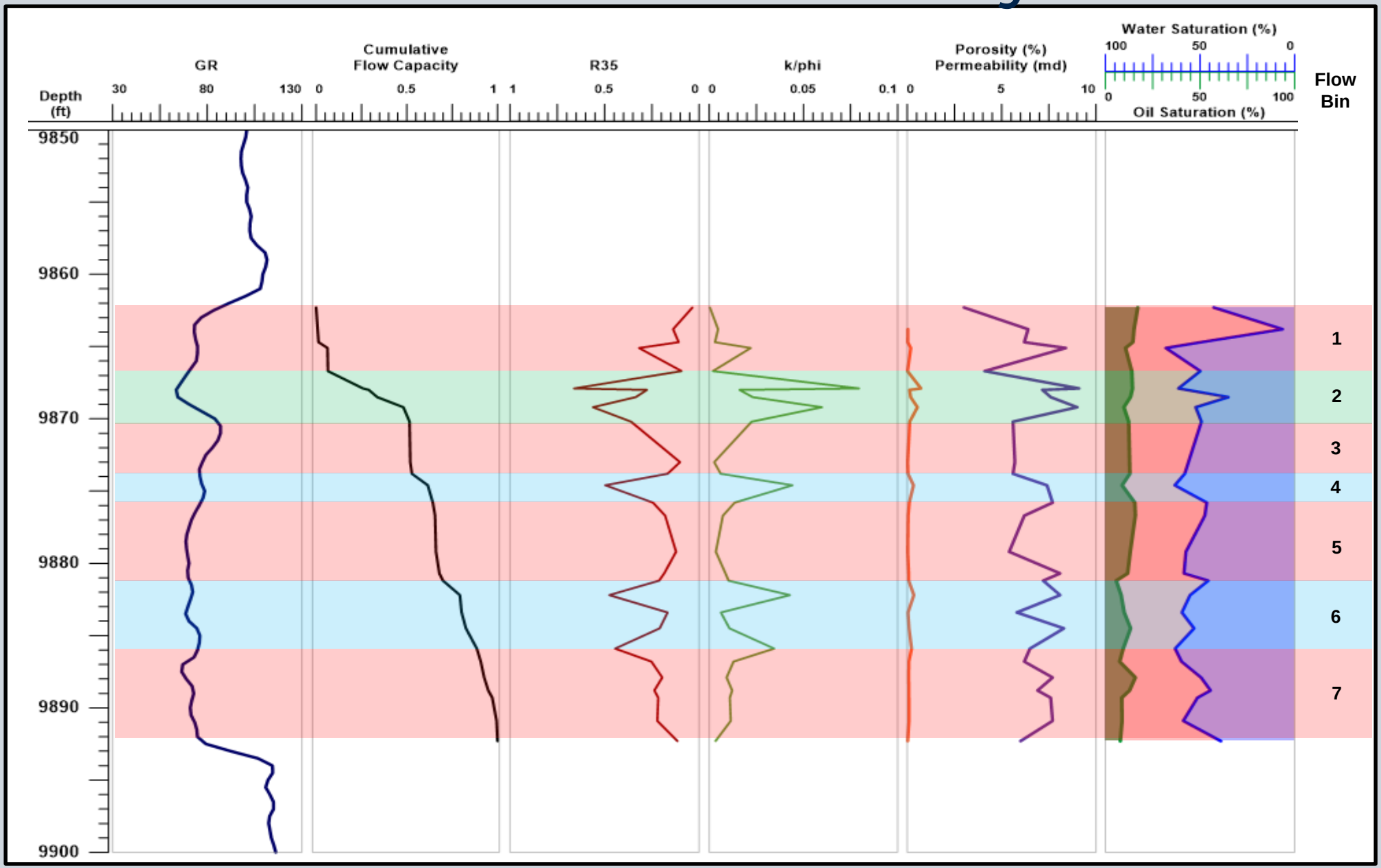
42-3 Cactus Ranch

- Eastern part of the study area
- T43N R75W, Campbell County, section 3
- Available data: XRD, 4 thin sections, and 40’ of core

Cactus Ranch – Modified Lorenz Plot



Cactus Ranch – Core Analysis Plots

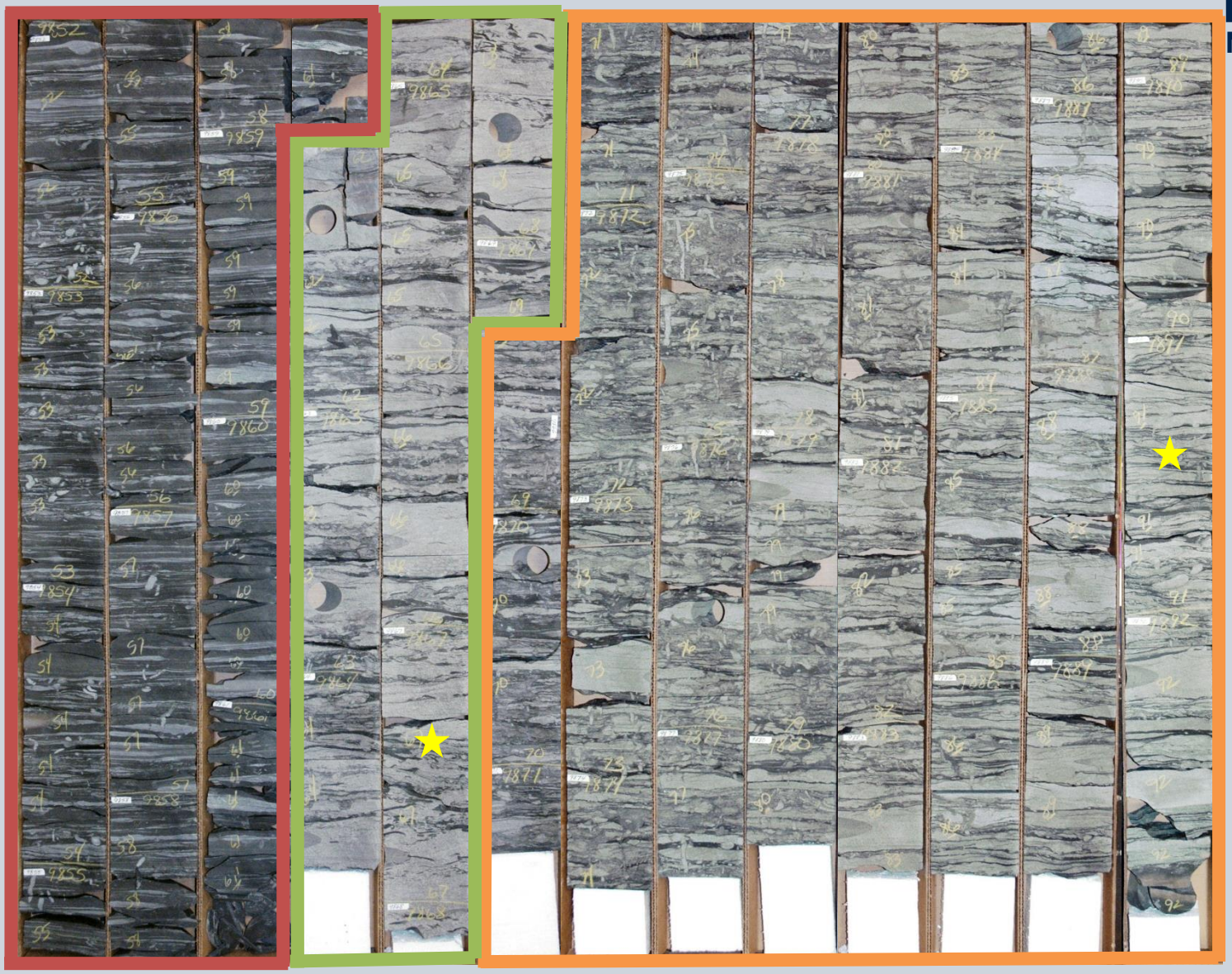


Cactus Ranch Facies

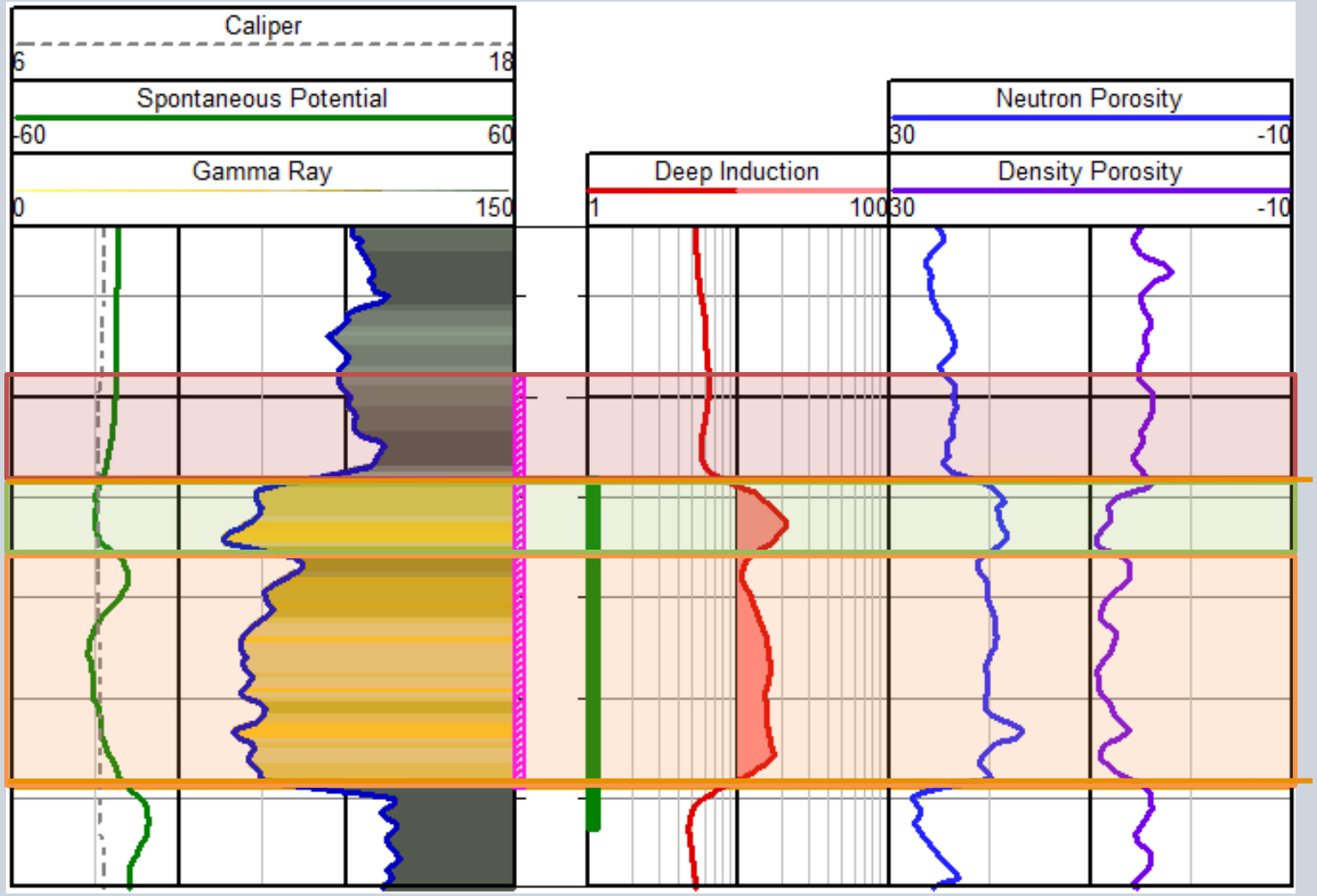
Facies 5: Laminated silty shale

Facies 3: Glauconitic planar to low angle cross-stratified heterolithic sand

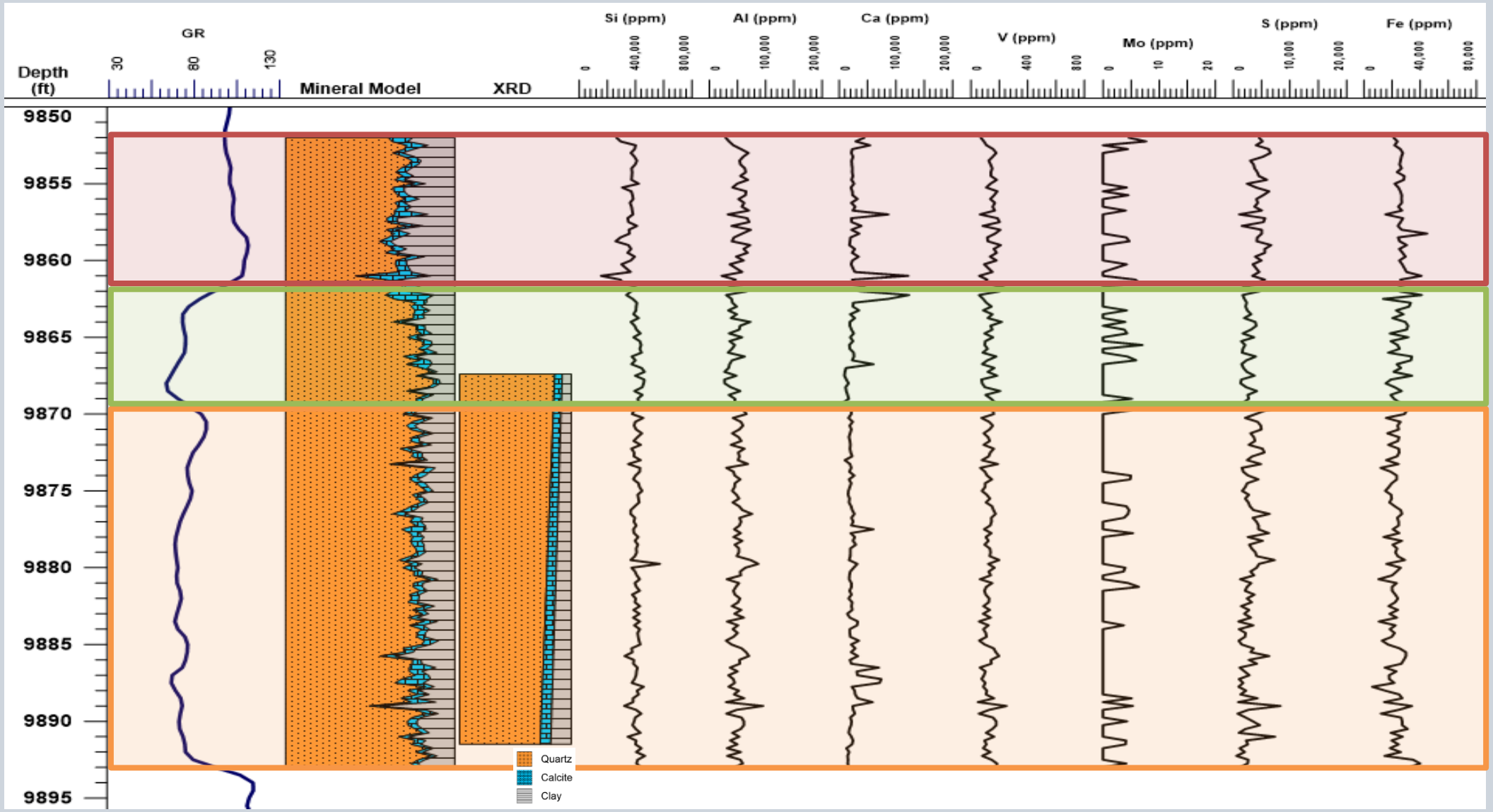
Facies 1: Moderately bioturbated silty sand



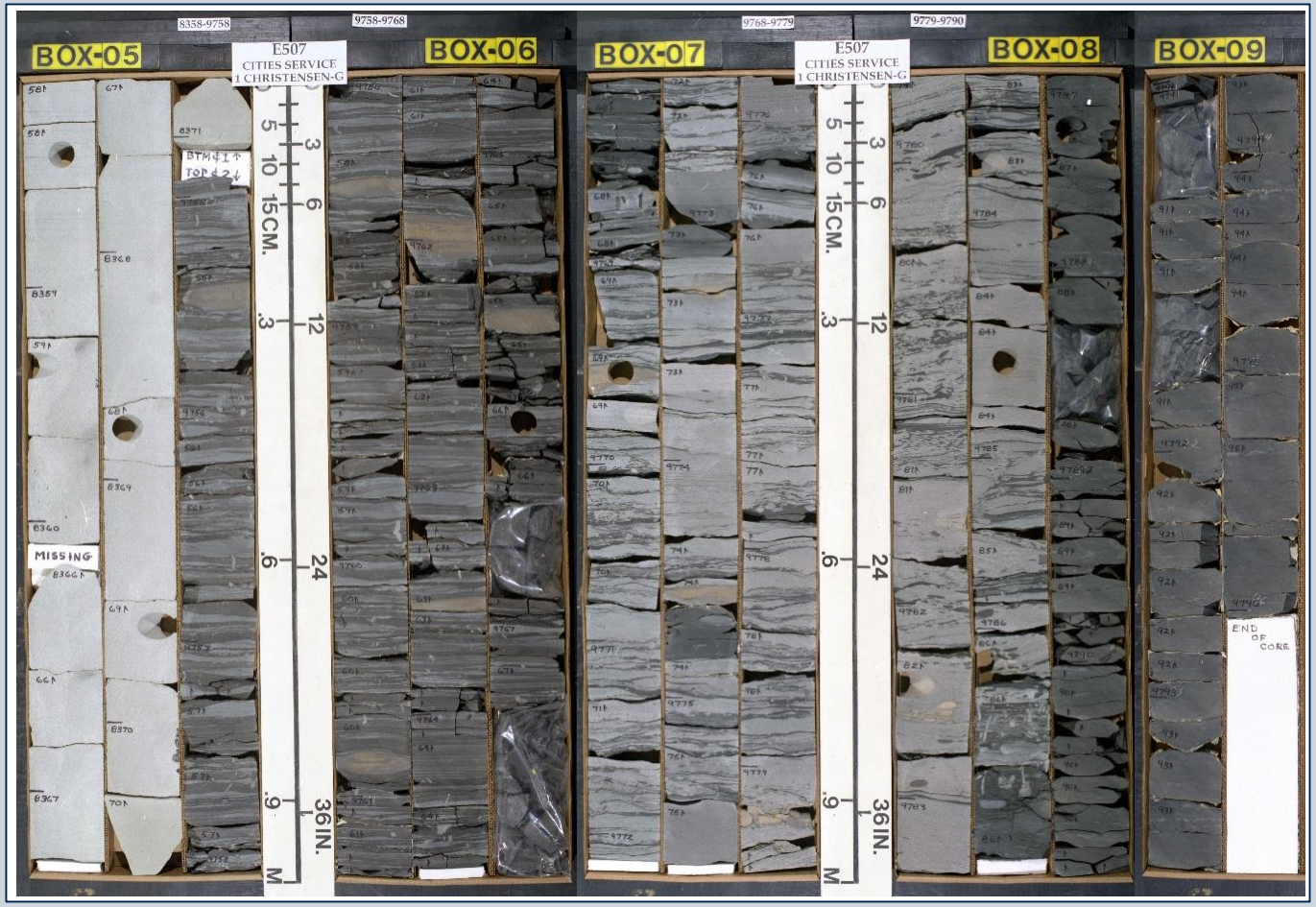
Cactus Ranch Logs

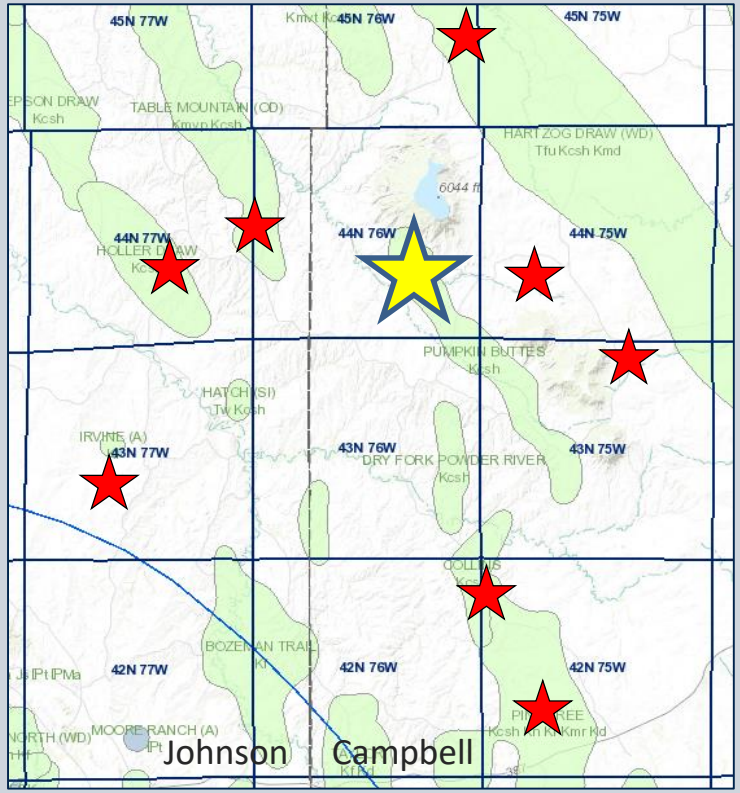


Cactus Ranch – Chemostratigraphy



1 Christensen G

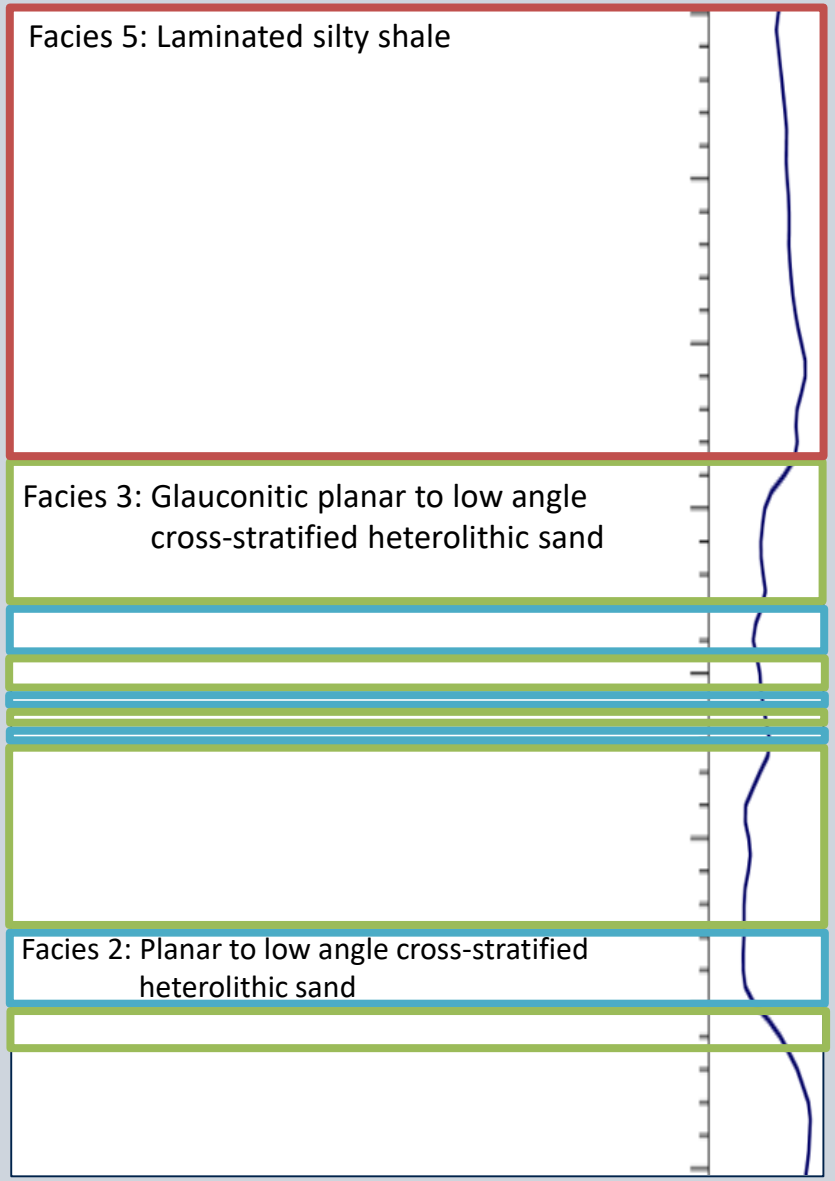


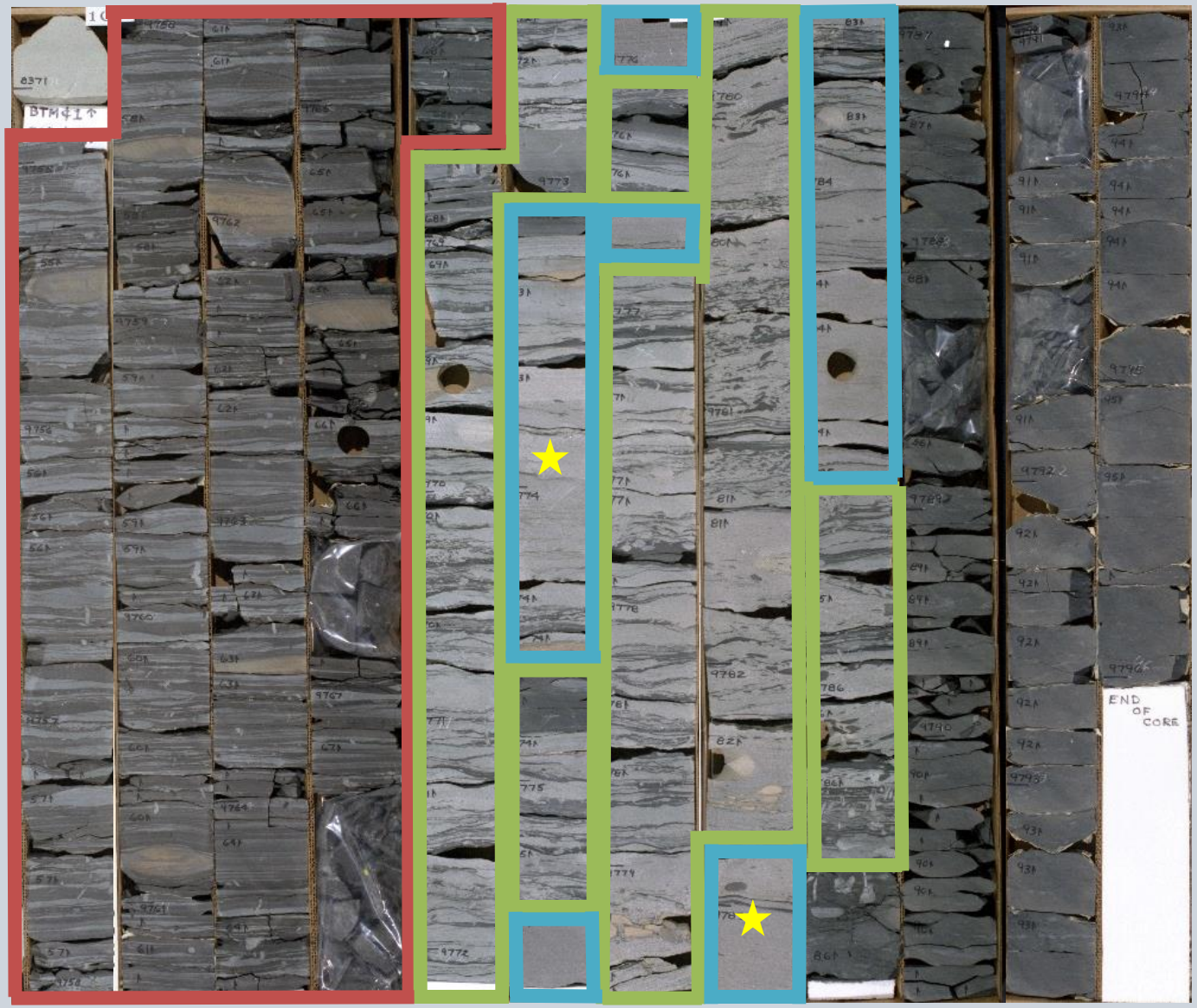


1 Christensen-G Well

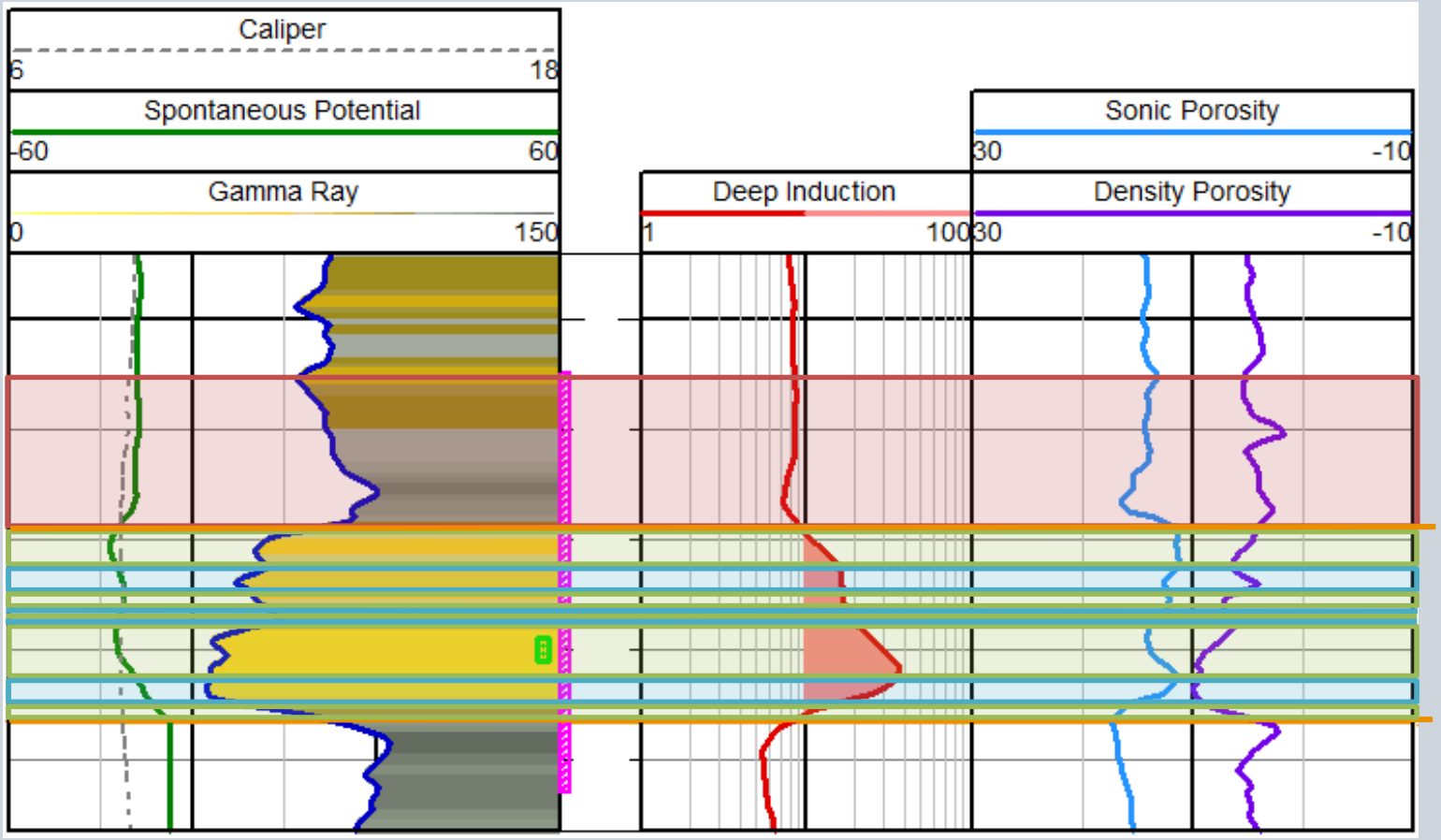
- Northern part of the study area
- T44N R76W, Campbell County, section 22
- Available data: XRD, 2 thin sections, and 40’ of core

1 Christensen G Facies

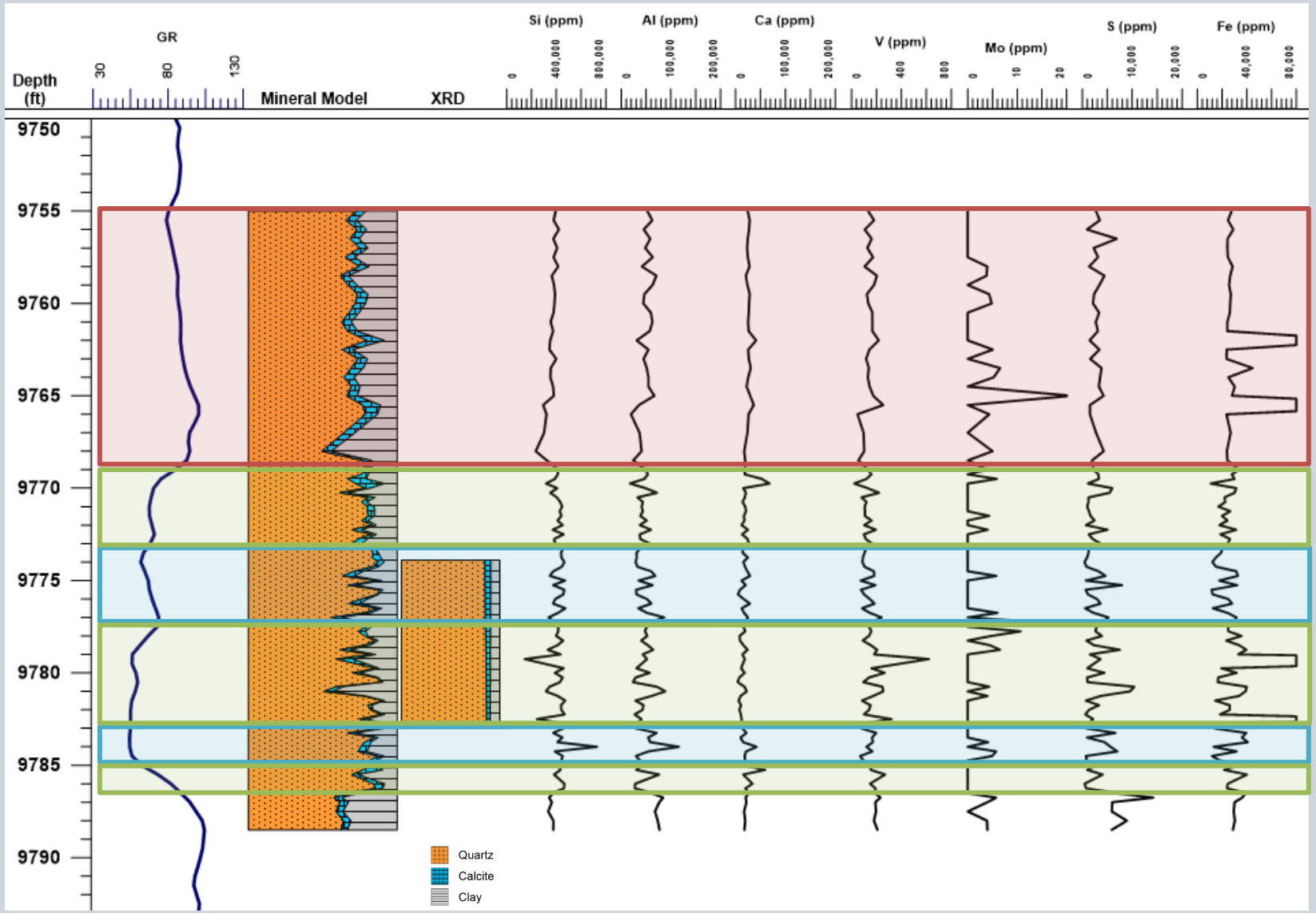




1 Christen G Logs

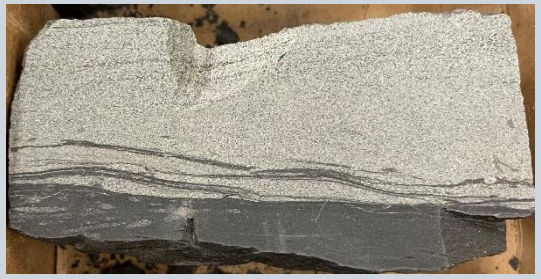


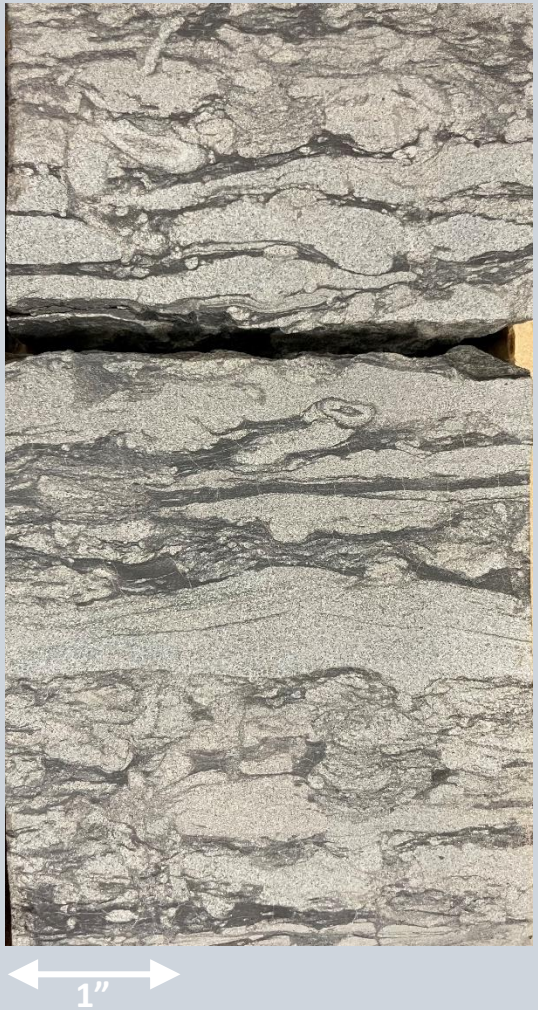
1 Christensen G – Chemostratigraphy

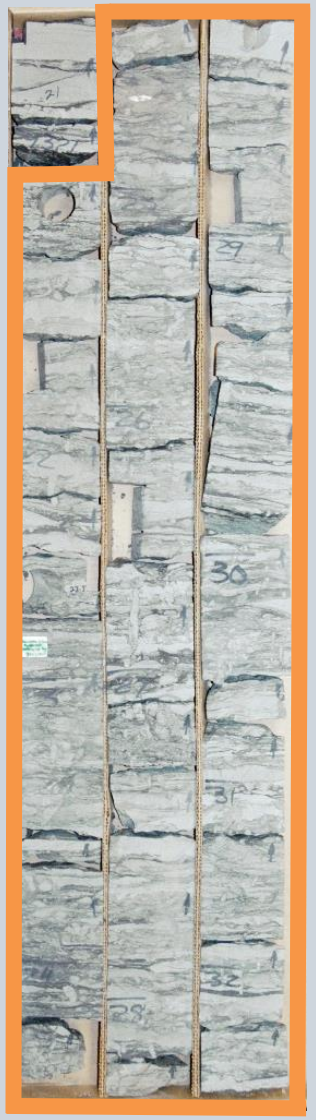


Shannon Facies

Facies 1: Moderately bioturbated silty sand

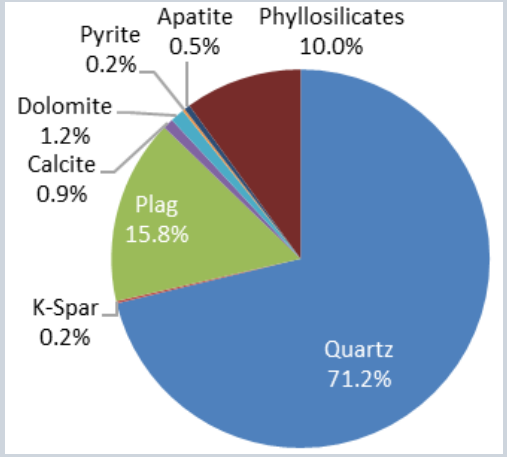






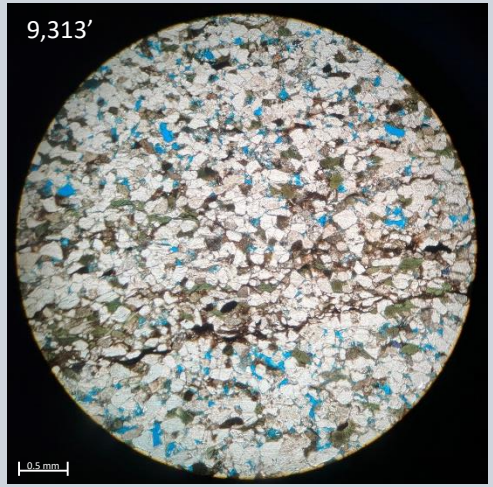
Shannon Facies

Facies 2: Planar to low angle cross-stratified heterolithic sand



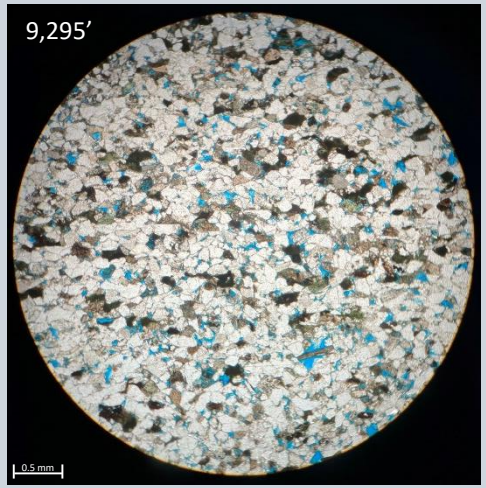
φ = 10.8%

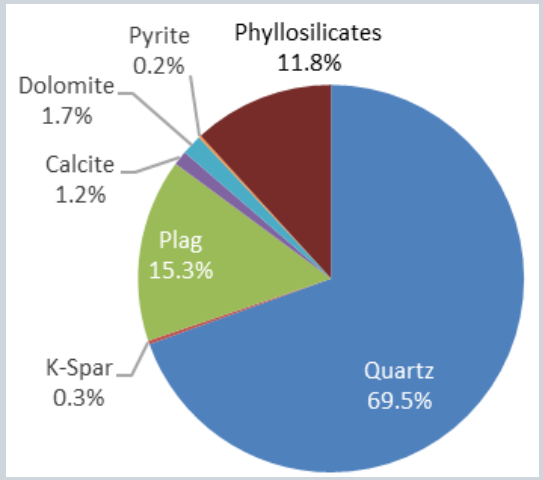
k = 3.7mD



Shannon Facies

Facies 3: Glauconitic planar to low angle cross-stratified heterolithic sand



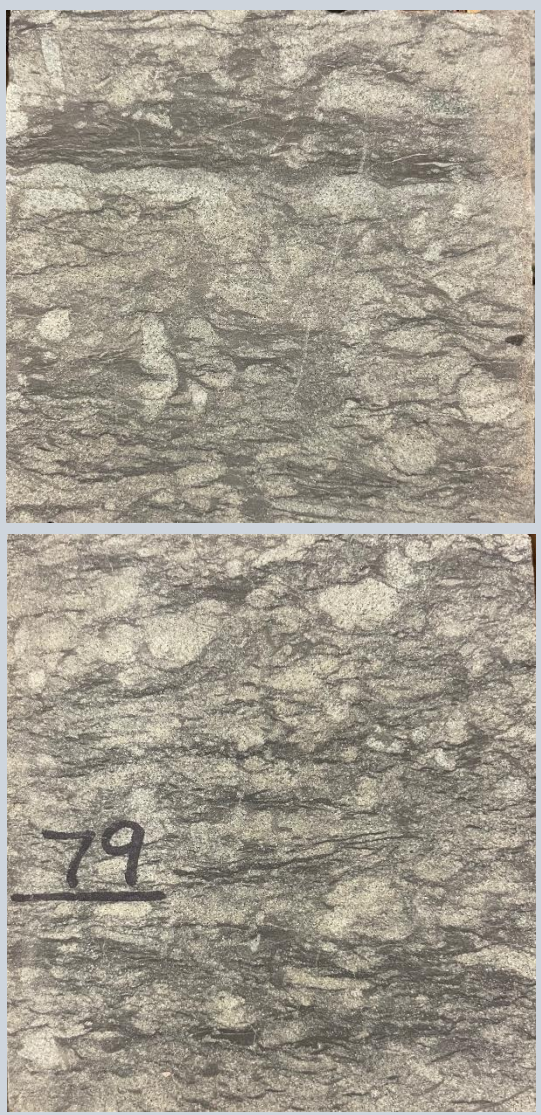


$\varphi = 11.9\%$

$k = 0.61mD$

Shannon Facies

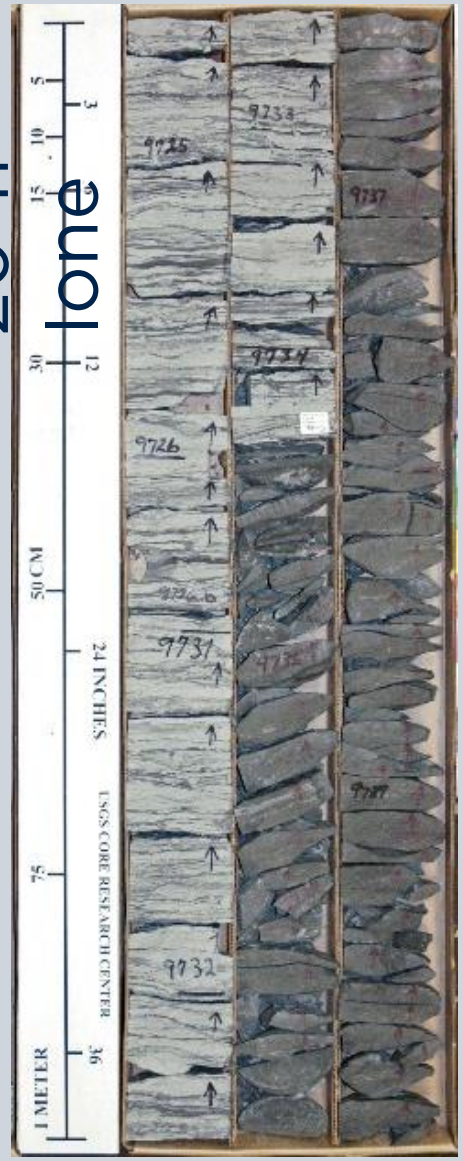
F4: Heavily bioturbated silty sand



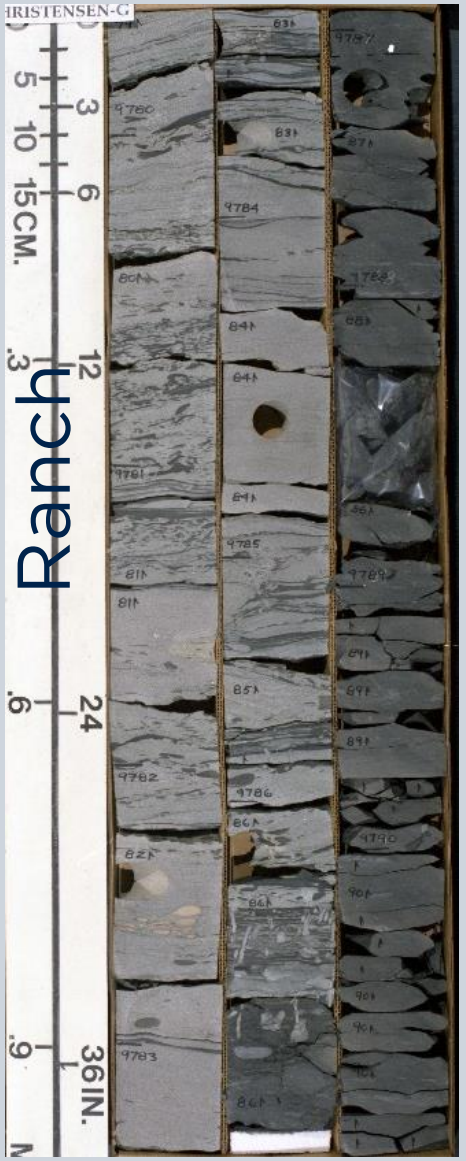
F5: Laminated silty shale

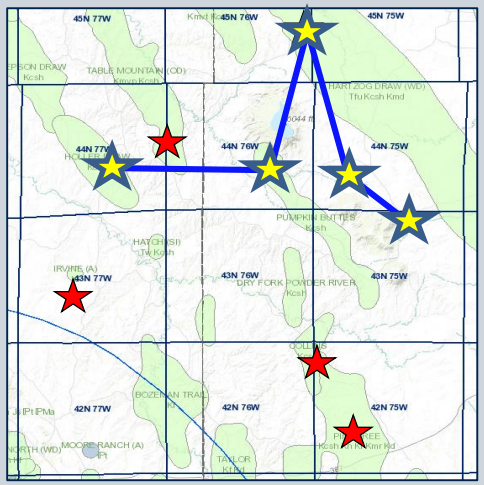
Basal Contact with Cody Shale

20-11 Ione



42-3 Cactus Ranch





Halo Play Potential

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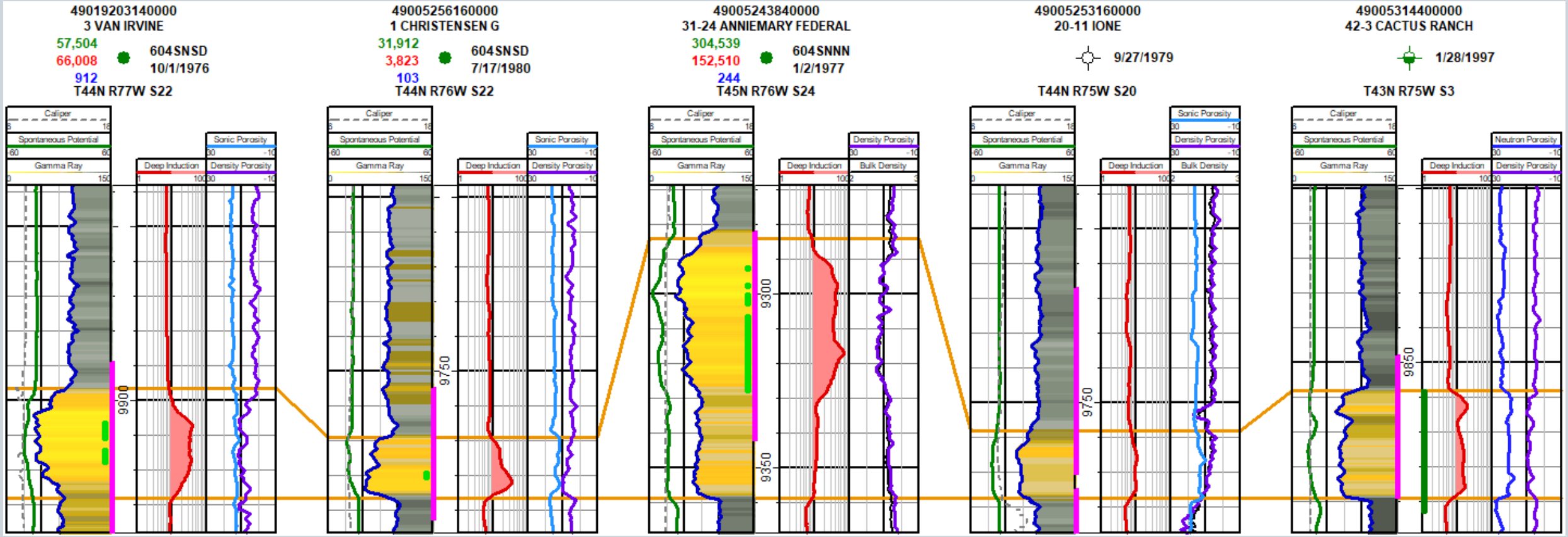

Continued Work

- Core and outcrop analysis
- Thin section analysis
- XRF and XRD
- Subsurface analysis
- Characterization of lateral and vertical variability
- Write thesis!!
- Graduate!!

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HALLIBURTON

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