Eagle Newsletter

Eagle Reservoir Services

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See our latest podcast with Top Gun Oilfield Training! https://youtu.be/Qk8m14vKKSg

3/31/2025

Eagle Newsletter

Eagle Reservoir Services

Kansas Independent Oil and Gas Association Wichita Kansas

An Excellent Show and Turnout in Kansas

Every faucet of the Oil and Gas Industry were present at this convention. Much focus was on issues that confront our businesses. New technology and new ways of tackling familiar challenges were addressed through quality speakers, presentations and booths.

The ongoing issues in Topeka, Washington and across Kansas were addressed to prepare for brighter days ahead.

Deacero Wireline Industry Mixer Houston Texas

Deacero Wireline Mixer at OTC in Houston

Seeing all the new technology in the Wireline Industry was very exciting.

The best part of this event was seeing many friends old and new.

Work and Meeting with EPA in Colorado

The EPA has guidelines in place to ensure that disposal wells do not communicate with protected aquifers, such as drinking water or other.

The advancements of tools in recent years, as well as procedures and technology; were discussed with a group of experts from Texas A&M (Dr Tom Blasingame), Eagle, PLS and ALPED International with experts from the EPA in a very productive seminar.

We have done many jobs for the EPA to ensure that environmental concerns are held to the highest standard while insuring the production of highly efficient energy and safe disposal of produced water.

Work and Meeting with EPA in Colorado

Falloff tests provide reservoir pressure data and characterize both the injection interval reservoir and the completion condition of the injection well. Both the reservoir parameters and pressure data are necessary for UIC permit demonstrations. Additionally, a valid falloff test is a monitoring requirement for all Class I injection wells.

The ultimate responsibility of conducting a valid falloff test is the task of the operator.

Operators should QA/QC the pressure data and test results to confirm that the results "make sense" prior to submission.

A falloff **test** is a pressure transient test that consists of shutting in an injection well and easuring the pressure falloff. The falloff **period** is a replay of the injection preceding it; consequently, it is impacted by the magnitude, length, and rate fluctuations of the injection period. Falloff testing **analysis** provides transmissibility, skin factor, and well flowing and-static pressures.

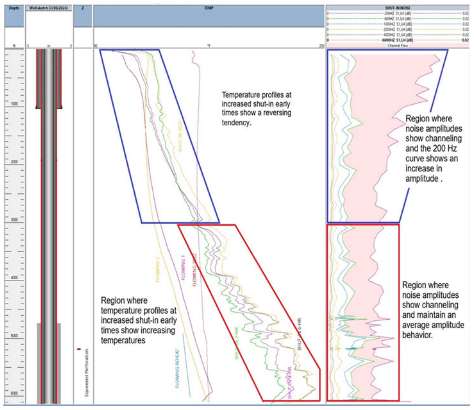
We acquire and analyze these data, submit and discuss with an EPA inspector to obtain final approval for the operator.

Work and Meeting with EPA in Colorado

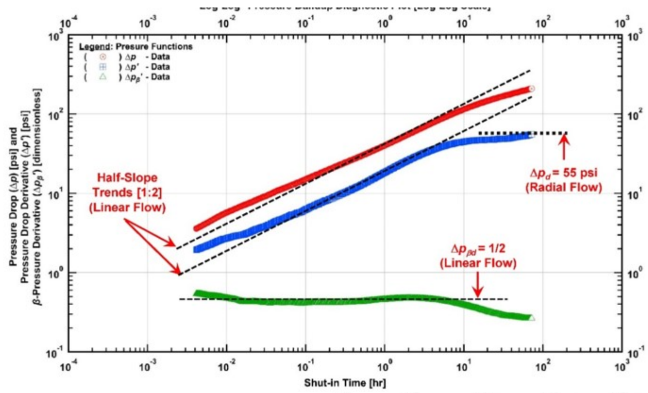
The acquisition of temperature surveys, (multi dynamic and time lapse shut in) that are used to determine the internal mechanical integrity of tubing and casing in an injection well, are very beneficial in verifying confinement of injected fluids within the injection formation.

We acquire and analyze these data, submit and discuss with an EPA inspector to obtain final approval for the operator.

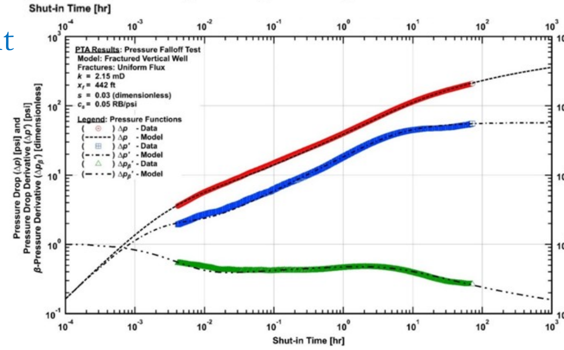
Fulfilling Environmental Requirements

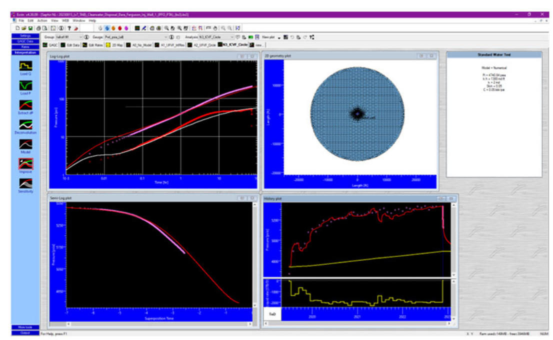


Noise-Temperature

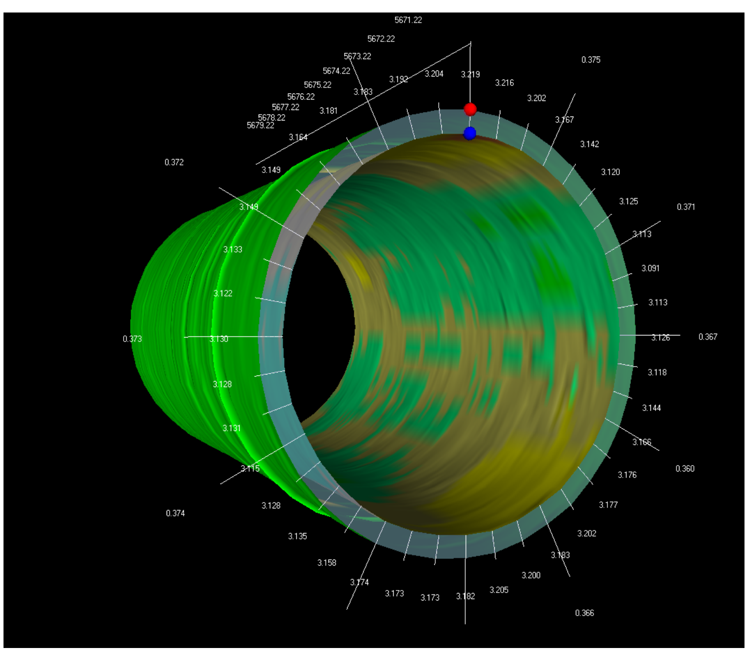


Pressure Transient and PFOT

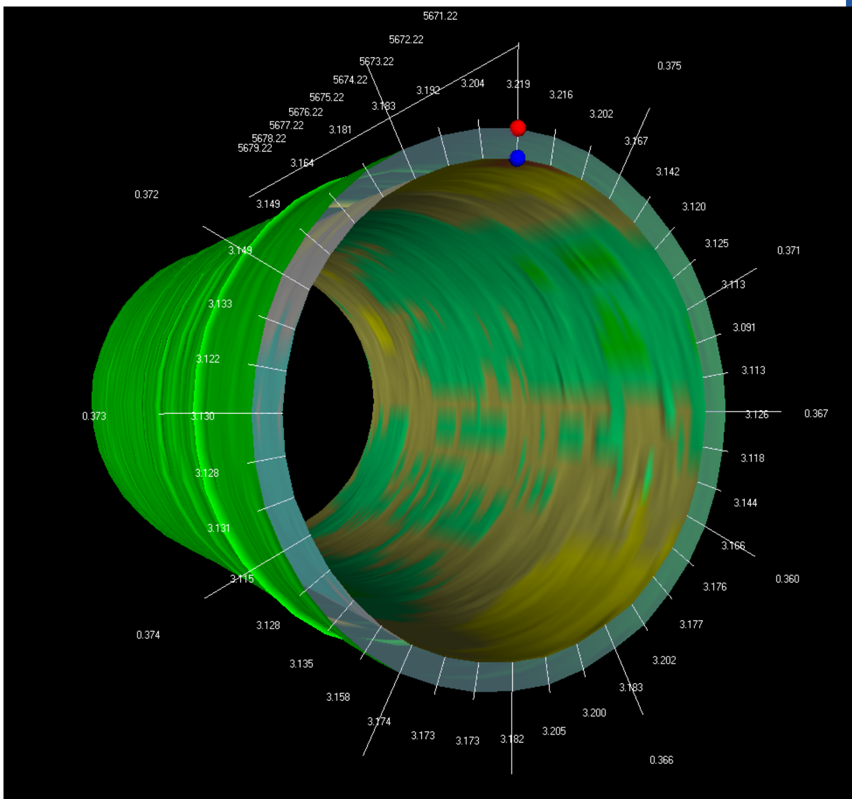


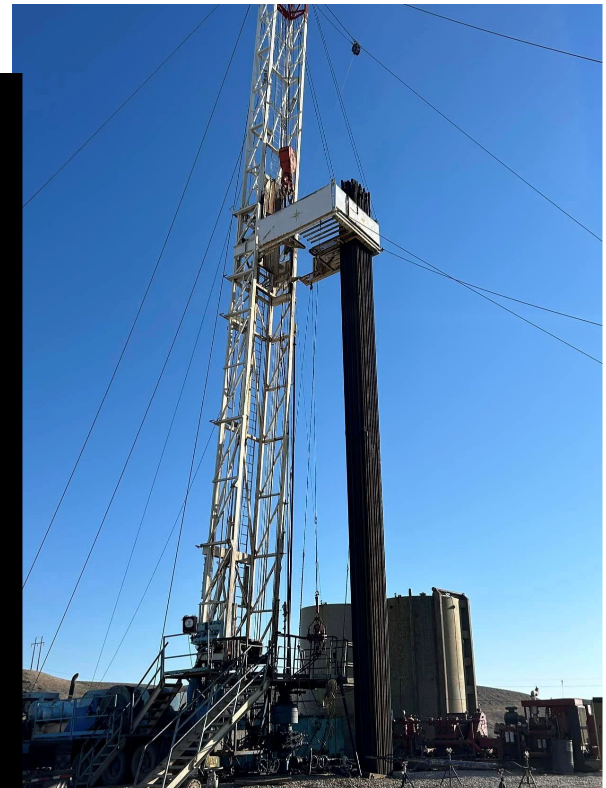


Casing Inspection-Thickness

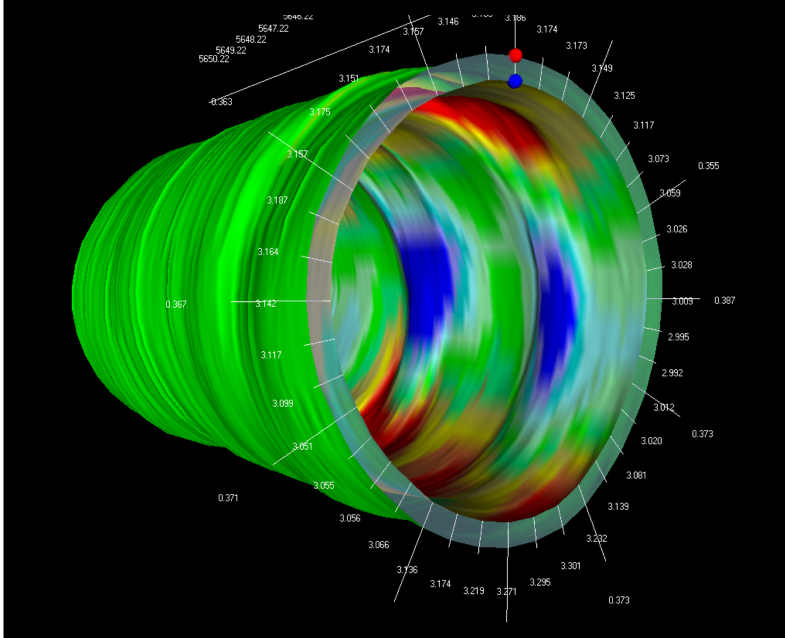


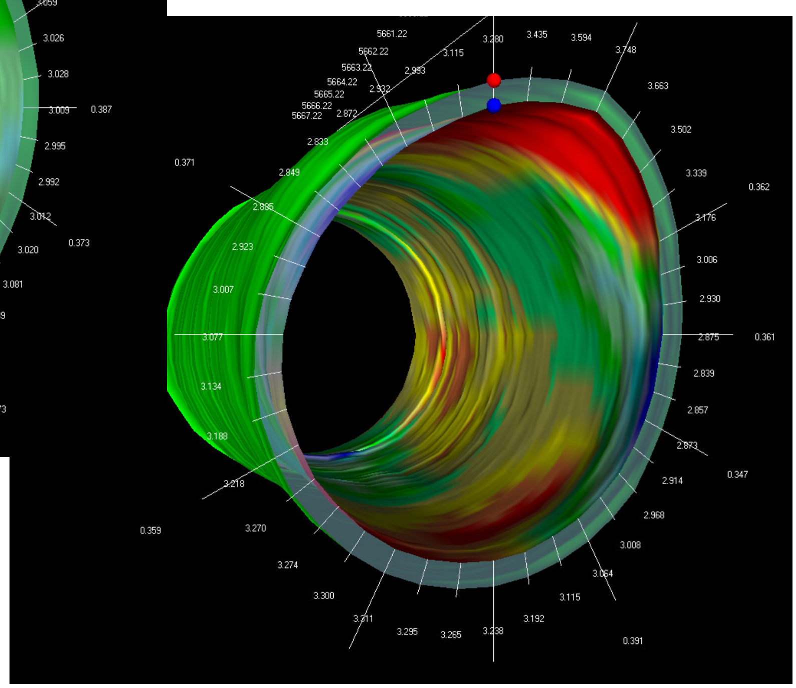
Casing Inspection—Thickness





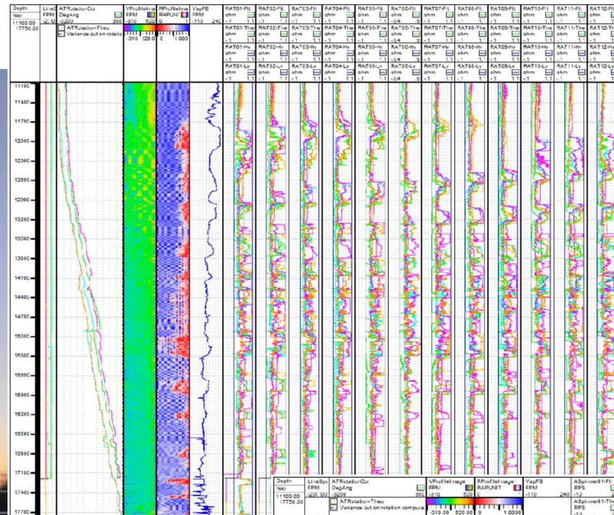
Scaling-Slight Ovalation

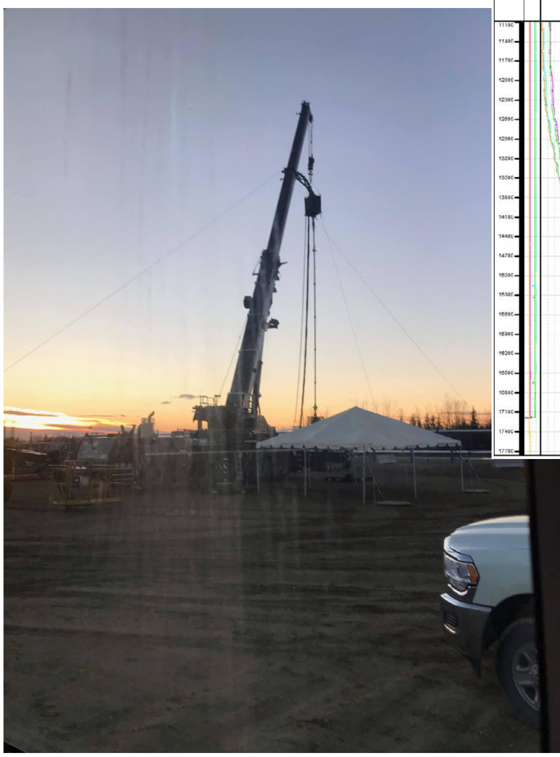


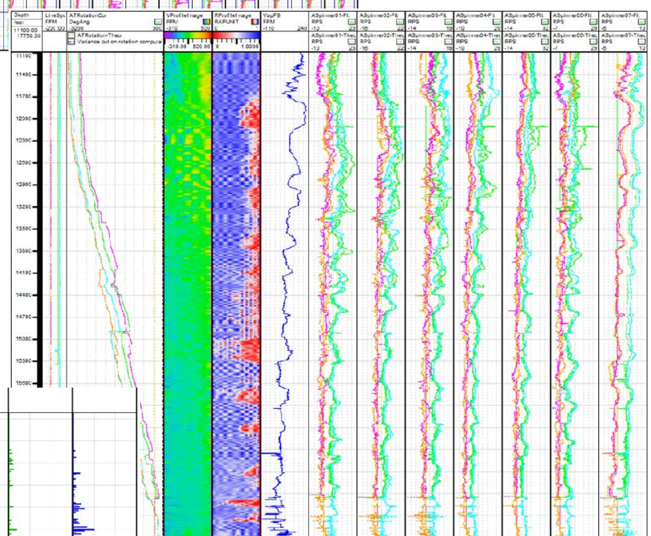


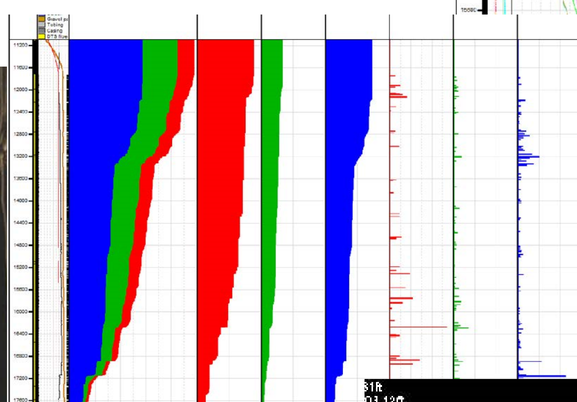
Crush-Ovalation

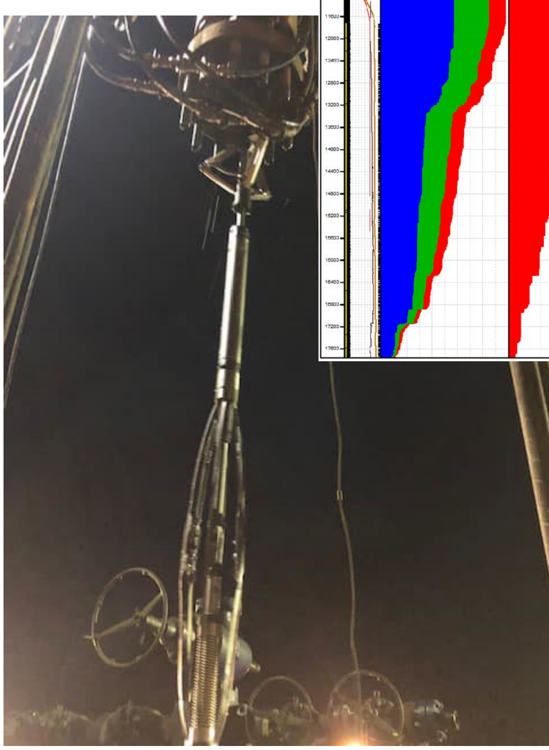
Horizontal Array Production Logging

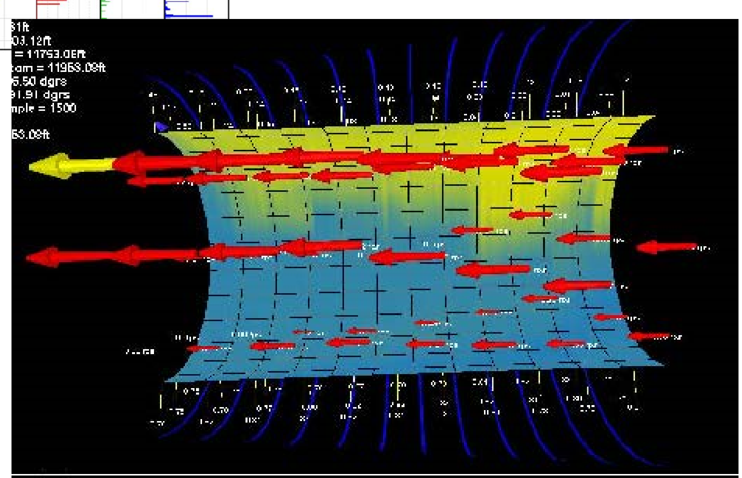




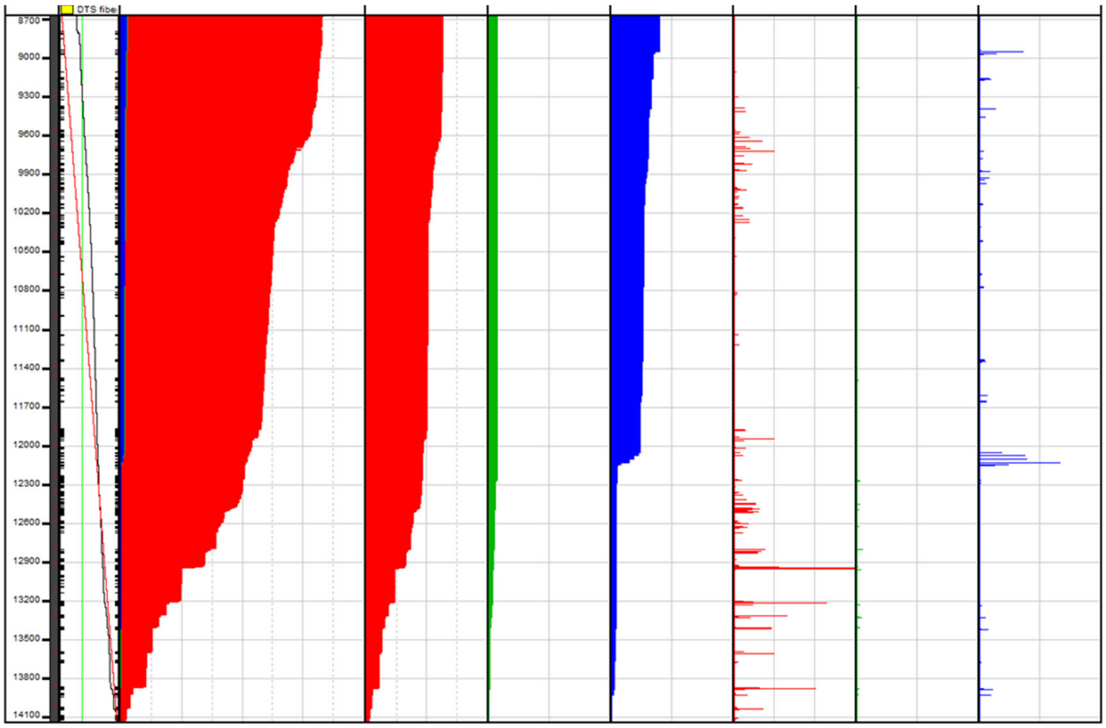






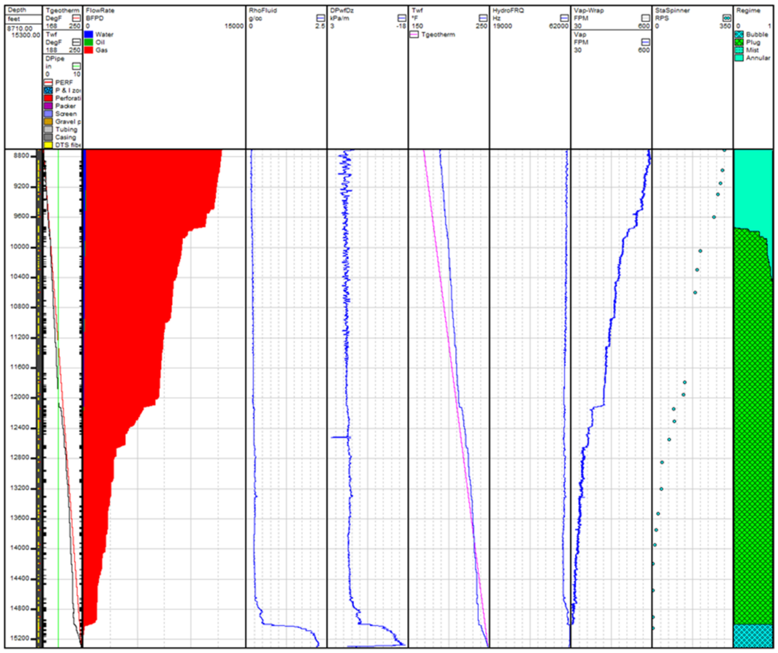


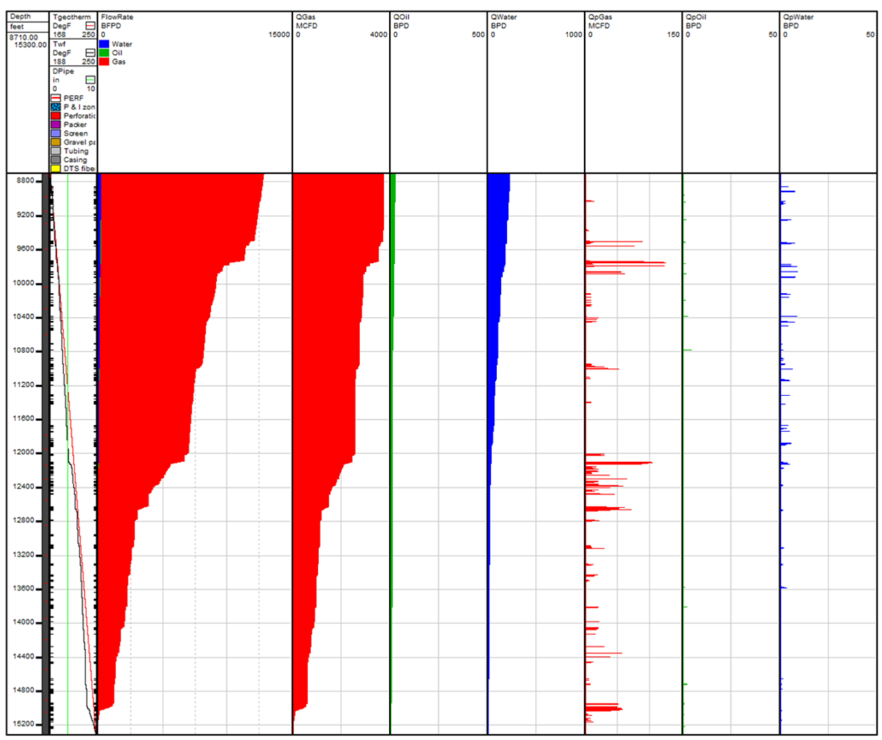
Natural Gas Production Logging



9/25/2024						3/8/2024			
Depth	**Qp-Water-STP**	**Qp-Gas-STP**	**Total Water and Percentage**	**Total Gas and Percentage**		**Qp-Water-STP**	**Qp-Gas-STP**	**Total Water and Percentage**	**Total Gas and Percentage**
feet	**BFPD**	**MCFD**				**BFPD**	**MCFD**		
Total Well Production			398.33	3809.94		Total Well Production		608.41	5679.22
Stage 28 8795-8974	54.27	0.00	14%	0%		93.00	0.00	15%	0%
Stage 27 9108-9243	17.28	3.80	4%	0%		22.23	0.00	4%	0%
Stage 26 9300-9481	17.97	62.20	5%	2%		36.40	84.60	6%	1%
Stage 25 9555-9643	0.00	133.00	0%	3%		0.00	147.70	0%	3%
Stage 24 9683-9831	5.62	254.90	1%	7%		17.40	294.10	3%	5%
Stage 23 9856-9977	26.64	41.70	7%	1%		40.17	52.80	7%	1%
Stage 22 9996-10159	4.14	109.62	1%	3%		7.54	127.60	1%	2%
Stage 21 10210-10311	1.08	96.60	0%	3%		1.44	112.20	0%	2%
Stage 20 10390-10568	4.50	7.60	1%	0%		9.33	13.20	2%	0%
Stage 19 10665-10853	4.47	15.80	1%	0%		3.79	24.90	1%	0%
Stage 18 10992-11349	8.58	21.10	2%	1%		13.70	32.70	2%	1%
Stage 17 11476-11656	11.62	0.86	3%	0%		17.48	2.42	3%	0%
Stage 16 11865-11957	0.00	188.00	0%	5%		0.00	205.40	0%	4%
Stage 15 12007-12172	198.60	66.60	50%	2%		286.24	78.50	47%	1%
Stage 14 12232-12324	1.63	29.40	0%	1%		1.38	51.70	0%	1%
Stage 13 12352-12464	0.34	115.10	0%	3%		0.63	178.70	0%	3%
Stage 12 12478-12534	0.12	289.20	0%	8%		0.79	392.80	0%	7%
Stage 11 12580-12672	0.20	157.20	0%	4%		0.45	714.90	0%	13%
Stage 10 12796-12892	0.00	245.76	0%	6%		0.00	100.70	0%	2%
Stage 9 12922-13089	0.10	534.30	0%	14%		0.13	585.20	0%	10%
Stage 8 13131-13237	1.88	344.30	0%	9%		3.60	523.10	1%	9%
Stage 7 13308-13421	12.22	317.50	3%	8%		17.58	750.80	3%	13%
Stage 6 13589-13673	1.18	134.30	0%	4%		1.95	32.70	0%	1%
Stage 5 13864-13941	25.89	380.40	6%	10%		33.17	556.10	5%	10%
Stage 4 14020-14117	0.00	107.70	0%	3%		0.00	389.40	0%	7%
Not Logged Below 14117	0.00	153.00	0%	4%		0.00	227.00	0%	4%

High Stage/Perf Count Gas well





Pulsed Neutron

Measurements:

Sigma: Pulsed Neutron Capture
C/O Oil Saturation from Inelastic Carbon and Oxygen
Water Flow: from Oxygen Activation
Gas Saturation: From long space detector

Applications:

1. Porosity and correlation (and Sw alternate) of open hole logs
2. Gas detection and Sw
3. Locating gas/oil and water oil contacts and determination of coning, which if left unchecked can lead to overall loss of Ultimate Recovery
4. Shale indicator
5. Completes a full cased hole reservoir analysis, which compliments Production logs, casing inspection and bond logs.

Pulsed Neutron Answers

Neutron Porosity

- Real Time/Calculated using ratio of near to far capture and ratio of near to long detector capture count rates

Sigma

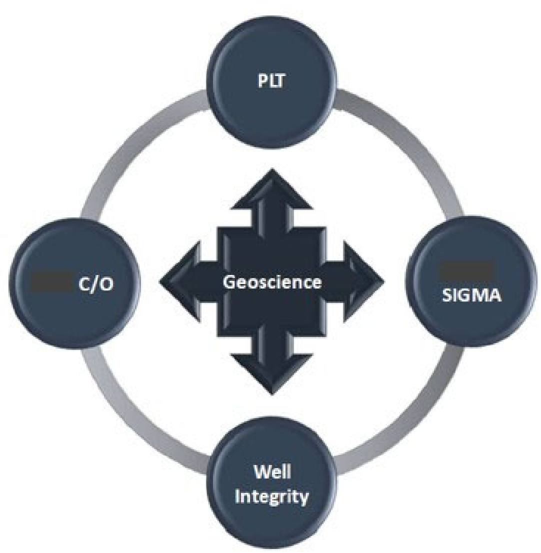
- Sw

Carbon Oxygen

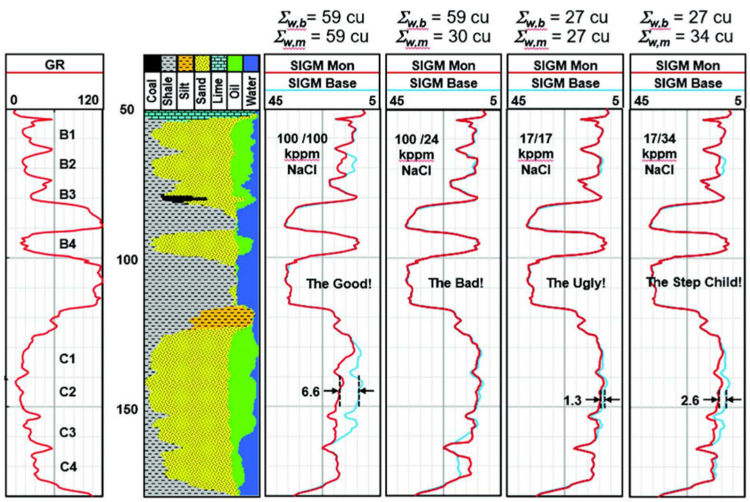
- Oil saturation and lithology correction

- 3 Phase Interpretation for oil/water/gas reservoirs – gas in place

Open Hole Emulation



Pulsed Neutron



Water Flood Monitoring

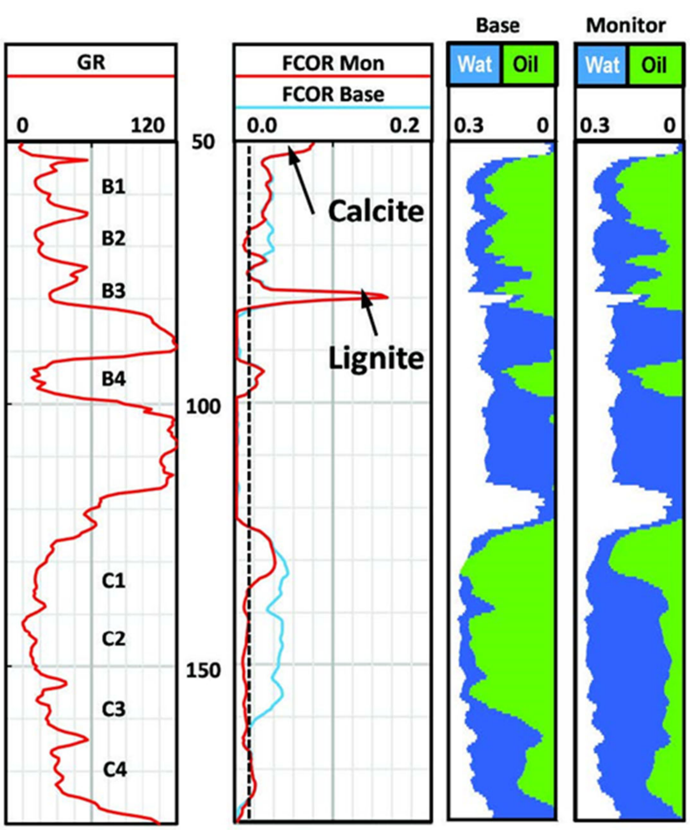
Sigma benefits and Limitations

The Good High Salinity connate (immoveable) water and high salinity injection brine with good high porosity are ideal. Water breakthrough shown in B2, C1, C2 and C3 reservoirs. C4 is already at high Sw so no conclusion made

The Bad Capture Cross Section (Sigma) of formation at residual oil saturation is equal to sigma of the formation at connate Sw with original formation brine. No conclusions except that C4 and bottom of C3 have been swept with brackish water

The Ugly Formation and injection water salinity are low so flood front movement is difficult but feasible. Water has swept B2 and C1 through C3, but only a slight change is seen

The Step Child Formation water is low, but seawater rather than formation water is reinjected. The increase in ∑ enhances the ability to see water breakthrough. Sulfates in seawater, however; eventually turn the fresher water field into an H_2S field, which bring many problems



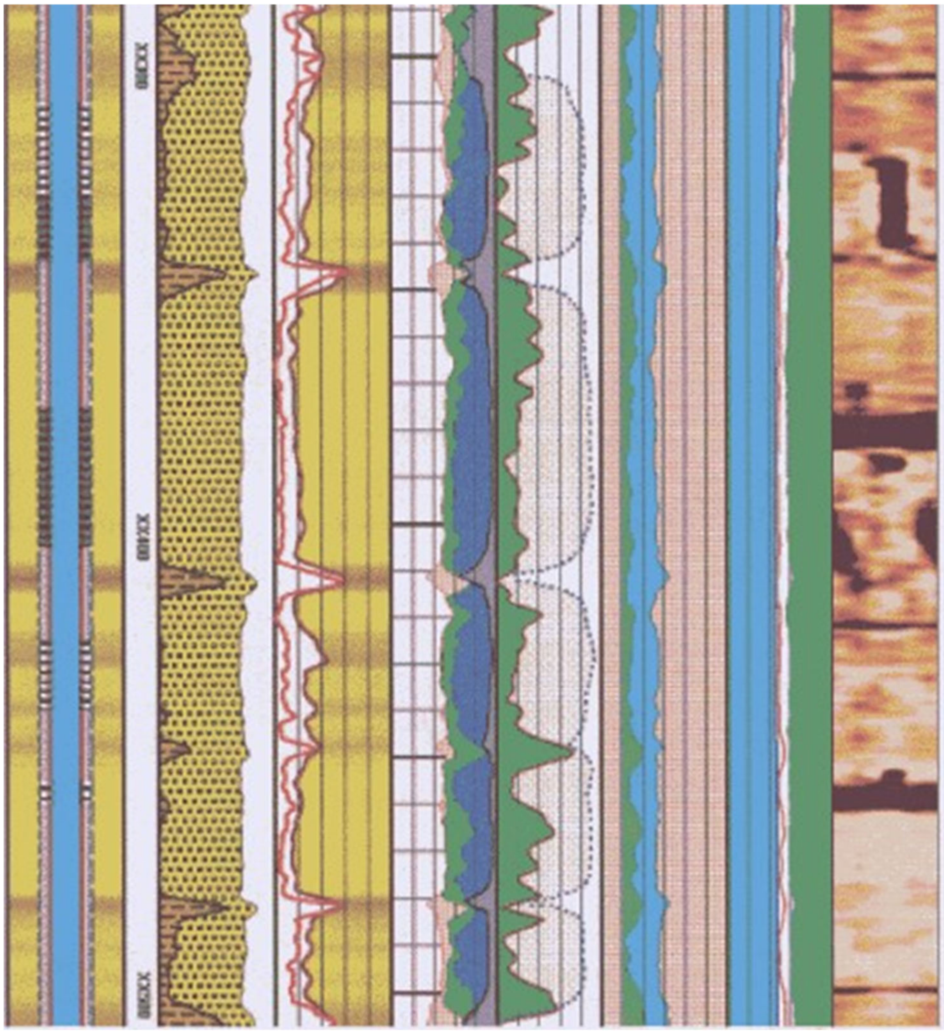
Fitz, Petrophysics, Vol 64, No 4 (August 2023)

Same well as above, using CO mode

Pulsed Neutron

Pulsed Neutron

CO Interpretation in Fresh Water Environment



“Initial Field Application of a new 1.7 inch Pulsed Neutron Instrument” W. Gilchrist, W. Wilson, D. Trcka, R. Pemper, E. Frost; SPWLA 41st Annual Logging Symposium (June 4-7, 2000)

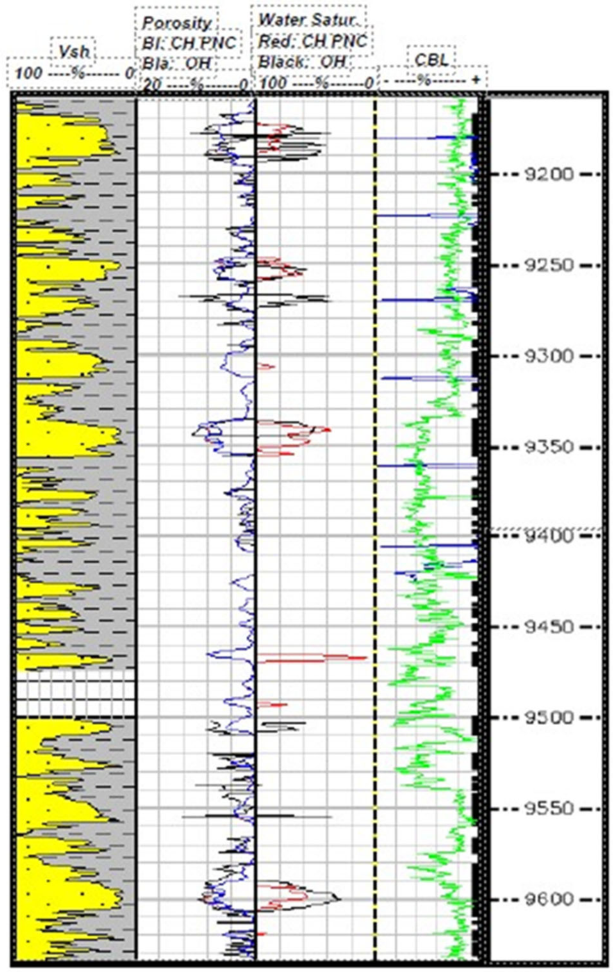
CO Interpretation in a Fresh Water environment.

This sand shale sequence has been producing under a steam flood for several years. Consequently, the formation water is fresh and there is virually no difference in the thermal neutron capture cross section of the water and oil. (hinders sigma capture, but ideal for CO).

Figure Description:
Left Track (Track 1) =Completion with 8.5” BH and 7” Casing. Closed perfs are shaded.
Track 3 =Shaded shale and sand with porosity
Track 4 =Sigma (red) and GR (brown) curves
Track 5 =Bulk Volume Fluid Properties. Left to right: Total Porosity, calculated effective porosity, volume of remaining oil, volume of moved oil, volume of water originally in place. Remaining oil in place is shaded dark green. The volume of depletion between original open hole data and pulsed neutron data is shaded in dark blue. Original water in place at time of OH resistivity log is shaded as lighter blue.
Track 6 =original open hole water saturation and current cased hole (CO) saturation values.
Tracks 7 and 8 =CO minimum and maximum displays. Standard scales in track 8 and amplified scales in track 7 where the water line is normalized to remove shifts due to changes in mineralogy or borehole holdup. The blue shading in track 8 highlights position of CO minimum water line and the green highlights CO maximum oil line. Area shadings in track 7 indicate relative volumes of oil in green and water in blue.
Track 9 =cement map from a sector bond log.

Pulsed Neutron

Tight Gas ShaleySands



Well A log from Piceance Basin comparing open-hole porosity and water saturation calculations to cased hole, newer generation pulsed neutron porosity and water saturation values.

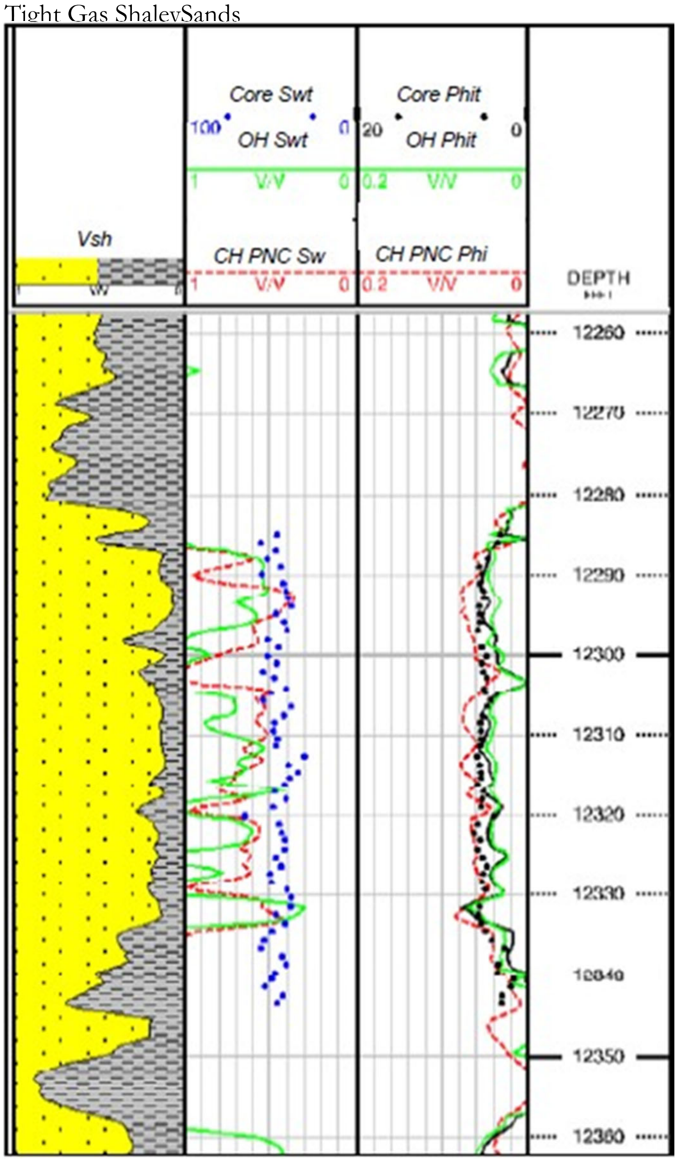
In this example from Piceance Basin, Colorado; open hole logs were acquired cross the entire Mesaverde section in a 6” wellbore and gas saturations were acquired over the same interval after 4 ½” casing was run. 9400’-9500’ was not logged with OH tools, and only logged with Pulsed Neutron (operational constraints). In the 4th track, bond log amplitude is shown in green.

Porosity from both open and pulsed neutron data show very good agreement. Water Saturation also agree well.

“Pulsed Neutron Logging in Tight Gas Sand Reservoirs: A Cost Effective Evaluation Approach” Pingjun Guo, Dale Fritz, Russell Spears; Exxon Mobil SPWLA 51st Annual Logging Symposium (June 19-23, 2010)

Pulsed Neutron

Tight Gas ShaleySands



In this example from Piceance Basin, Colorado; conventional core plug, open hole data, and cased hole new generation pulsed neutron data are acquired in one well. Core data were acquired, then logged with conventional open hole instruments. Total porosity and water saturation data were calibrated from the open hole logs to the core data in a 6" wellbore. Pulsed Neutron was run following the placement of 4 ½" casing, then compared against open hole porosity, core porosity and Dean-Stark water saturation data.

Good porosity correlation is seen, and somewhat good Sw calculations.

"Pulsed Neutron Logging in Tight Gas Sand Reservoirs: A Cost Effective Evaluation Approach" Pingjun Guo, Dale Fritz, Russell Spears; Exxon Mobil SPWLA 51st Annual Logging Symposium (June 19-23, 2010)

Lagniappe!

Houston Livestock Show and Rodeo commits more than 28 Million dollars in 2025 to Texas Youth for Scholarships and more!