

Rio Grande Gorge, Taos, NM, February 2023

PBS-SEPM NEWSLETTER

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KEY DATES For Spring 2023

MARCH 2023

- **2nd: Robert Read Distinguished Lecture & Dinner** feat. *Mark Mathis*, Petroleum Club, 6pm-9pm
- **21st: PBS-SEPM Luncheon, Bush Convention Center**
11:30am-1pm, *The Occurrence of Critical Minerals in Fine-Grained Strata: Insights from the Upper Devonian of Western New York State*—Randy Blood

APRIL 2023

- **18th: PBS-SEPM Luncheon, Bush Convention Center**
11:30am-1pm, *Wells Under (Hot) Water? Geothermal Options for the Oilpatch*, Joe Batir

MAY 2023

- **16th: PBS-SEPM Annual Meeting, Bush Convention Center**
11:30am-1pm, *TBD*, Lowell Waite

President's Column—Letter from the President Elect

On the evening of Thursday, March 2, 2023, the Permian Basin Section – Society for Sedimentary Geology (PBS-SEPM) will be hosting its second annual **Robert L. Read, Jr., Distinguished Lecture Series**, benefiting PBS-SEPM.

The Robert L. Read, Jr., Distinguished Lecture Series was created to honor and memorialize the life, spirit, and contributions of one of our dedicated members, the late Robert L. Read, Jr., a promising geologist whose life was cut tragically short. To honor his memory and passion for geosciences, PBS-SEPM has invited a distinguished lecturer to Midland for the purpose of educating the geologic community, and general public on current topics of interest. All the proceeds will go toward our commitment to promote the science of geology through technical luncheons, field trips, core workshops, and scholarships for high school and college students pursuing a degree in the geosciences.

A dinner at the Petroleum Club of Midland will feature guest speaker, Mr. Mark Mathis. For more than twenty years Mark has been an advocate for good energy policies for America and the world. Mark is creator of Clear Energy Alliance videos, short form animated explainers on important energy topics that are misunderstood and often misrepresented in the mainstream press. He is the Producer/Director of *spOILed*, a 2011 film that examines the vital role oil plays in our daily lives. In 2016 Mathis released *Fractured*, a documentary that makes the case that the words and phrases we use in describing energy are dangerously deceptive—sometimes intentionally so. Mark is author of *Feeding the Media Beast: An Easy Recipe for Great Publicity*. His book is published in the U.S., China, Russia, Korea, and India and has been used in several universities as a textbook in journalism and communications classes. To learn more about our Keynote Speaker, please visit our website.

I'm writing this column to ask for your help with making our **Robert L. Read, Jr., Distinguished Lecturer Series** fundraiser a success. By supporting this event as a sponsor, you will receive recognition before and during the event. However, most importantly, your support demonstrates your commitment to helping make a difference in the geologic community, especially as it relates to continuing education for professionals as well as supporting students in their studies of the earth sciences. Your sponsorship will be advertised via direct email to hundreds of Permian Basin Operators, Management, Geologists, Geoscientists, and Decision Makers. We are highly active with our promotion and marketing on social media. The sponsorship levels range from \$250-\$5,000 and are outlined on our website. If you are interested in supporting the event, a sponsorship form can be found on our website.

In lieu of a sponsorship, you may attend individually with a seat at an open table. Individual tickets are \$75 for members and one guest, and \$100 for nonmembers. All tickets include entry to the event, dinner, and drinks. If you cannot attend, you can help us by sharing this event with your colleagues and fellow community members.

If you have any questions, please contact me at (903) 431-2190 or afaulkner@berylol.com.

We look forward to seeing you on March 2nd.

Sincerely,

Ashton F. Bruyere

PBS-SEPM President Elect, 2022-2023

Visit the Robert Read webpage at www.pbs-sepm.org/robertread to purchase tickets and learn more.

Apply to become an Executive Committee Member next year!



JUNE 1-4, 2023

Young Professional and Intern Field Trip

Guadalupe Mountains

Designed for Engineers, Geologists, and Landmen

Four day multi-disciplined field trip in the Guadalupe Mountains for geology, engineering and land young professionals and interns will be led by **Dr. Robert Trentham** from The University of Texas of the Permian Basin and **Dr. Cory Hoffman** of Diamondback. Combined they have over 60 years of geological experience in research, development and production in the Permian Basin.

Robert Campbell and **John Hagar**, also with over 60 years of combined Permian experience, will provide engineering mentoring. **Chris Fling** with over 35 years of Permian experience will provide land mentoring.

"The Goal is to Educate Participants in Combining Outcrop Data with Industry Exploration and Production Techniques in a Multi-Disciplinary Environment."

- Participants will have opportunity to observe world-class outcrops of shelf to basin deposits that are direct analogues to producing fields in the Permian Basin.
- Lectures covering geology of West Texas, carbonates, sequence stratigraphy, quick and simple log and engineering calculations and land practices.
- Classroom exercises on general land practices, sequence stratigraphy, log correlation, water saturation determination, seismic interpretation and production analysis.

COST: \$1,395

Participants will leave Midland, TX on June 1, travel to Carlsbad, NM, where they will stay at the Stevens Inn, and return to Midland, TX, the evening of June 4.

Included in the costs: Round trip transportation from Midland, three nights lodging, welcome dinner, three breakfasts, three lunches, refreshments in the field, guidebook and handouts.

Limited Space Available

Reserve your Individual/Corporate Spots Today!





PBS-SEPM
Young Professional & Intern Field Trip
Designed for Engineers, Geologists, and Landmen
June 1 - 4, 2023



info@pbs-sepm.org

www.pbs-sepm.org/ypift

(432) 279-1360

Four day multi-disciplined field trip in the Guadalupe Mountains for geology, engineering and land young professionals and interns will be led by **Dr. Robert Trentham** from The University of Texas of the Permian Basin and **Dr. Cory Hoffman** of Diamondback. Combined they have over 60 years of geological experience in research, development and production in the Permian Basin.

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Goal is to educate participants in combining outcrop data with industry exploration and production techniques in a multi-disciplined environment.

- Participants will have opportunity to observe world-class outcrops of shelf to basin deposits that are direct analogues to producing fields in the Permian Basin.
- Lectures covering geology of West Texas, carbonates, sequence stratigraphy, quick and simple log and engineering calculations and land practices.
- Classroom exercises on general land practices, sequence stratigraphy, log correlation, water saturation determination, seismic interpretation and production analysis.

Participants will leave Midland, TX on June 8, travel to Carlsbad, NM, where they will stay at the Stevens Inn, and return to Midland, TX, the evening of June 11.

Included in the costs: Round trip transportation from Midland, three nights lodging, three breakfasts, three lunches, refreshments in the field, guidebook and handouts.

Limited space is available, so the first to register will be given priority!

REGISTRATION FORM

Cost: \$1395.00 (Double occupancy. Single rooms will be allocated based on availability and happenstance of an odd number of male or female participants)

• **Registration Fee is non-refundable AFTER May 26, 2023**

Discipline (mark one) Engineer () Geologist () Land Professional ()

Name: _____

Company/Affiliation: _____

Mailing Address: _____

Business Phone: _____ Contact Email: _____

Payment: check, cash or credit card

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Card Number: _____ Exp Date: _____ CVC: _____ Zip Code: _____

Signature: _____

Make checks payable to **PBS-SEPM**. Send registration and payment information: PBS-SEPM, 2900 W. Front St., Midland, TX 79701
 (or Register Online: www.pbs-sepm.org/ypift). Credit card forms may be mailed to the address above or emailed to info@pbs-sepm.org. You may also request an emailed invoice. For additional information contact: **Robert Campbell** (432) 557-2458

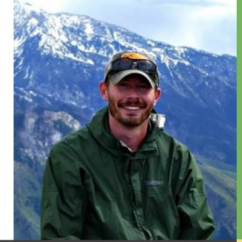
PBS-SEPM MARCH LUNCHEON

Tuesday, March 21, 2023 – 11:30AM

Bush Convention Center & Online via Zoom

Early Bird Rate \$25 | Walk-In/Late RSVP \$35 | Student \$10 | Virtual FREE

Register by 3PM on 3/17: www.pbs-sepm.org/events | info@pbs-sepm.org | (432) 279-1360



The Occurrence of Critical Minerals in Fine-Grained Strata: Insights from the Upper Devonian of Western New York State

Randy Blood – Geologist/Petrophysicist, DRB Geological Consulting, Wildlands Research

ABSTRACT

Over the coming decades, global demand for critical minerals is projected to increase rapidly. Several organizations (the IEA and the USGS) have underscored the importance of defining the abundance and geographic distribution of these minerals, many of which are required materials for Li-ion battery development and may be found in black shale deposits. To-date, little attention has been given to understanding the geologic controls on the occurrence of these elements in black shale. Here we investigate depositional and diagenetic processes which may concentrate critical minerals into discrete beds, potentially providing more favorable economics for extraction.



The Point Gratiot Bed, a prominent, laterally continuous black shale marking the Upper Devonian Mass Extinction occurs near the top of the Hanover Shale. An eastward thickening wedge of sediment, informally termed the Beaver Meadow Beds occurs between the Point Gratiot Bed, and the base of continuous black shale in the overlying Dunkirk Shale. The unit thickens eastward from about 15 cm at Dunkirk, NY to over 10 meters at Java Village, NY, roughly 75 km away. The section is dominated by grey shale with an eastward increase in the occurrence of abundant, thin, pyritic black shale beds. These beds merge westward via erosional overstep and/or non-deposition with the base of the continuous black shale of the Dunkirk. Thin black shale beds have sharp basal and upper contacts, with the upper contact often undulatory at outcrop scale, and bioturbated with planolites and chondrites-like burrows.

We have identified two modes of deposition for thin black shale beds: 1) the lowermost beds are organic-rich hyperpynites, likely the result of storms flushing lagoonal muds out to sea, and 2) beds associated with transgression which are often accompanied by a basal pyrite lag which may disappear upslope.

We conducted elemental analysis using energy dispersive X-Ray Fluorescence across this interval at one-centimeter intervals from numerous exposures. Preliminary data shows enrichment of critical minerals, specifically Co, Cu, Ni, and to a lesser extent Zn, associated with pyrite. Moreover, we have identified four phases of pyrite occurrence in the unit: 1) Gray shale-hosted diagenetic pyrite forming in micro-anoxic environments within worm burrows and decaying organisms. Later, such material is often concentrated into erosional placer-like deposits of pyrite that form at the base of some thin black shale beds; 2) occurrence in some black shale beds of syngenetic framboidal pyrite; 3) later stage formation of larger framboidal and euhedral diagenetic pyrite hosted by black shale; and 4) diagenetic enrichment of pyrite in basal lags and underlying gray shale resulting from sulfide diffusing out of Fe-depleted black muds into underlying organic-lean, Fe-rich muds.

We conclude that transitional deposits between black and gray shale may provide a source of critical minerals in fine-grained strata. Metals critical to the construction of lithium-ion batteries are closely associated with pyrite. While pyrite often occurs as microscopic grains within black shale, it often occurs as larger macroscopic nodules, concretions, and fossils within gray shale immediately subjacent to black shale.

BIOGRAPHY:

Randy Blood is a geologist and petrophysicist based in the greater Pittsburgh area working on various aspects of Paleozoic strata in the Appalachian Basin. He is the founder of DRB Geological Consulting and a co-founder of Wildlands Research. He has worked unconventional organic-rich mudstone and tight gas sand reservoirs for over 15 years. Much of his research focuses on building gas-in-place models, understanding hydrocarbon storage mechanisms, and building holistic geological models to explain the accumulation and distribution of reservoir facies. Most recently he has begun work creating resource assessments of critical minerals in various deposits in North America. Randy leverages his subsurface experience combined with extensive fieldwork to better understand depositional and diagenetic processes which may concentrate critical minerals in sedimentary strata. He has delivered over 60 talks and posters, published full-length journal articles in several special publications, lead multiple core workshops, and numerous field trips focusing on the geology of organic-rich mudstones.

PBS-SEPM Luncheon Location

PBS-SEPM Luncheons will be held at the Bush Convention Center in the downstairs meeting room!



**A parking map for the Bush Convention Center is shown above.
105 N. Main St., Midland, TX 79701**

If you have any questions, please email info@pbs-sepm.org or call (432) 279-1360.

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1954**

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- Networking opportunities
- Distinguished Lecturer Series
- Special member pricing on publications, field trips, and more!

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Please email us at info@pbs-sepm.org to get more details about the position or committee.

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MARK MATHIS

President, Clear Energy Alliance

Producer, Director, Author, and Energy Policy Advocate



THURSDAY, MARCH 2, 2023

6:00-9:00 PM

PETROLEUM CLUB OF MIDLAND

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WWW.PBS-SEPM.ORG/ROBERTREAD



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BERYL
OIL AND GAS





SAVE *The* DATE

14 MARCH 2023

Geoscience and Geoengineering
TechFest at GSA South-Central

Student Research Poster Session
and Networking Dinner



Oklahoma State University
Wes Watkins Center
Stillwater, Oklahoma

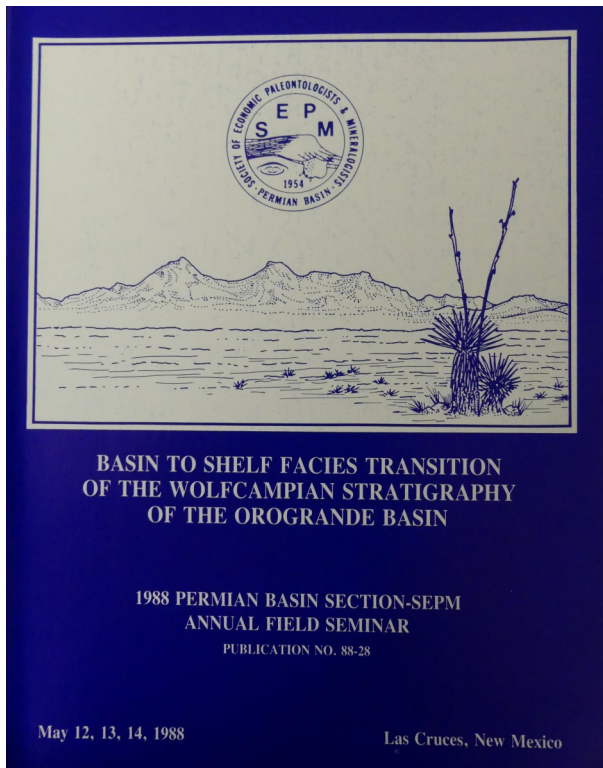


PBS-SEPM Publications

**PBS-SEPM PUBLICATION HIGHLIGHT**

“Basin to Shelf Facies Transition of the Wolfcampian
Stratigraphy of the Orogrande”

88-28

[Digital Copy: \\$25](#)

**Entire PBS-SEPM publication library
(1955 – 2007)**

There is a fully searchable Table of Contents—find a topic or author just by typing in the word (s). All publications are in Adobe PDF with all major articles being bookmarked, and all the figures are linked in the text for quick reference. Those areas that are off limits to geologists like the Glass Mountains or Sierra Diablos have been written up in these publications. Numerous out-of-print publications and figures and/or plates not published in the original guidebooks are now available in this library.

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PBS-SEPM Publications

PUBLICATIONS

- PERMIAN BASIN CORES: CORE WORKSHOP #1-3
- PERMIAN BASIN CORE WORKSHOP - DOE FUNDED RESERVOIR CHARACTERIZATION PROJECTS
- PENNSYLVANIAN CORRELATION CHART
- CARBONATE SEMINAR
- THE PRECAMBRIAN ROCKS OF THE SOUTHEASTERN FRANKLIN MOUNTAINS, EL PASO COUNTY, TX
- CAPITAN REEF, NEW MEXICO AND TEXAS: FACTS AND QUESTIONS TO AID INTERPRETATION AND GROUP DISCUSSION
- TECTONICS & PALEOZOIC FACIES OF THE MARATHON
- MARATHON MARFA REGION, WEST TEXAS
- MIDDLE & UPPER PENNSYLVANIAN SYSTEM OF NORTH CENTRAL AND WEST TEXAS (OUTCROP TO SUBSURFACE)
- THE GEOLOGIC EVOLUTION OF THE PERMIAN BASIN: A SYMPOSIUM
- LOWER PERMIAN TO UPPER PLIOCENE CARBONATE AND CLASTIC FACIES SOUTHERN EASTERN SHELF
- PERMIAN CARBONATE/CLASTIC SEDIMENTOLOGY, GUADALUPE MTS.
- HYDROCARBON RESERVOIR STUDIES SAN ANDRES / GRAYBURG FORMATIONS, PERMIAN BASIN
- THE LEONARDIAN FACIES IN W. TEXAS AND S.E. NEW MEXICO AND GUIDEBOOK TO THE GLASS MOUNTAINS, W. TEXAS
- BASIN TO SHELF FACIES TRANSITION OF THE WOLFCAMPAN STRATIGRAPHY OF THE OROGRANDE BASIN
- GEOLOGIC GUIDE TO THE WESTERN ESCARPMENT, GUADALUPE
- THE LOWER PALEOZOIC OF WEST TEXAS AND SOUTHERN NEW MEXICO MODERN EXPLORATION CONCEPT
- 1990 MARATHON THRUST BELT: STRUCTURE, STRATIGRAPHY AND HYDROCARBON POTENTIAL
- SEQUENCE STRATIGRAPHY, FACIES, AND RESERVOIR GEOMETRIES OF THE SAN ANDRES, GRAYBURG, AND QUEEN FORMATIONS GUADALUPE MTS.
- PALEOKARST, KARST RELATED DIAGENESIS & RESERVOIR DEVELOPMENT: EXAMPLES FROM ORDOVICIAN-DEVONIAN AGE STRATA OF WEST TEXAS AND THE MID-CONTINENT
- PALEOKARST, KARST RELATED DIAGENESIS & RESERVOIR DEVELOPMENT EXAMPLES FROM CAMBRIAN-PENNSYLVANIAN AGE STRATA FOR THE MIDCONTINENT ARBUCKLE MTS, OKLAHOMA
- FIELD GUIDE TO THE PALEOZOIC SECTION OF THE SAN ANDRES MTS.
- CARBONATE FACIES AND SEQUENCE STRATIGRAPHY: PRACTICAL APPLICATIONS OF CARBONATE
- SAN ANDRES IN OUTCROP AND SUB SURFACE
- THE BRUSHY CANYON PLAY IN OUTCROP AND SUBSURFACE: CONCEPTS AND EXAMPLES
- BIG BEND FIELD TRIP STRUCTURAL TYPES AND HYDROCARBONS:FOLDS,FAULTS, AND FRACTURES
- THE BRUSHY CANYON FORMATION (DELAWARE MOUNTAINS) W TX: DEEP-WATER SANDSTONE RESERVOIR ARCHITECTURE
- CYCLOSTRATIGRAPHIC PRINCIPLES FOR RESERVOIR CHARACTERIZATION IN CARBONATES: EXAMPLES FROM THE CRETACEOUS OF WEST-CENTER TX
- UPPER ORDOVICIAN MONTOYA GROUP OUTCROPS IN THE COOKS RANGE OF NEW MEXICO AND SOUTHERN FRANKLIN MOUNTAINS
- CYCLOSTRATIGRAPHIC PRINCIPLES FOR RESERVOIR CHARACTERIZATION IN CARBONATES: EXAMPLES FROM THE CRETACEOUS OF CENTRAL, TEXAS
- BASINAL FACIES OF THE UPPERMOST GUADALUPIAN: APPLICABILITY TO EXPLORATION AND DEVELOPMENT PROJECTS CD ONLY
- PBS-SEPM FIELD TRIP- APRIL 4-6, 2008 CARBONATE SLOPE STYLES: EXP. FROM THE PERMIAN OF THE GUADALUPE MOUNTAINS
- SEQUENCE STRATIGRAPHY AND DEPOSITIONAL SYSTEMS OF THE EASTERN SHELF LOWER PERMIAN, CENTRAL TEXAS
- PALEOZOIC MOUNDS STRATIGRAPHIC ARCHITECTURE IN THE SACRAMENTO MOUNTAINS: IMPLICATIONS FOR RESERVOIR CHARACTERIZATIONS
- GEOLOGY OF THE CAPITAN SHELF MARGIN: THE GULF PDB-04 CORE
- FOLDS-FAULTS-FRACTURES SURFACE STRUCTURES AS ANALOGS TO SUBSURFACE HYDROCARBON DEVELOPMENT
- SAN ANDRES RESIDUAL OIL ZONE (ROZ) CORE WORKSHOP GUIDEBOOK
- SAN ANDRES RESIDUAL OIL ZONE (ROZ) FIELD TRIP GUIDEBOOK

SPECIAL PUBLICATION

- CHART-PENNSYLVANIAN CORRELATION CHARTS, KANSAS, OKLAHOMA, TEXAS AND NEW MEXICO, 1960
- PERMIAN AND PENNSYLVANIAN STRATIGRAPHY, MIDLAND BASIN
- GEOLOGY OF THE DELAWARE BASIN
- 2009 CORE WORKSHOP: APPLICATIONS OF CORES TO PERMIAN BASIN RESERVOIR CHARACTERIZATION



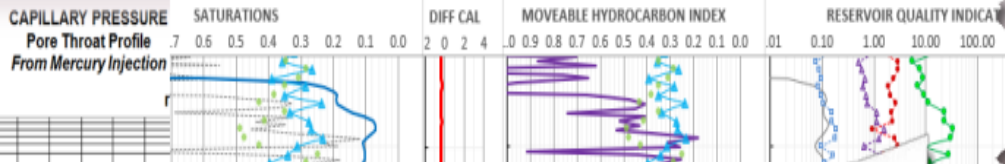
Carbonate Log & Core Analysis Spreadsheet v. 5.0

By Cory L. Hoffman, Ph.D.

Major Upgrade (January 2020)! [Designed for Microsoft Excel 2013]

Carbonate Log analysis draws heavily upon teachings of George Asquith

Core Data analysis draws heavily upon teachings of Dan Hartmann

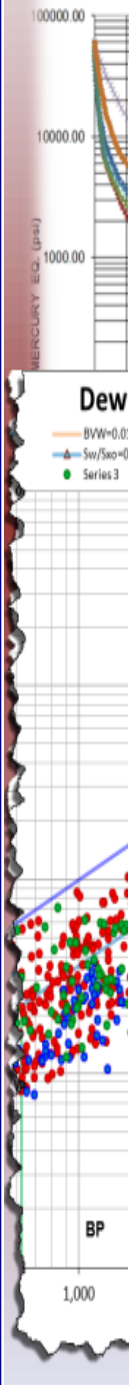


NEW AND IMPROVED! Carbonate Log Analysis Tool

- Analyze up to 7500 data rows (3750' at 0.5' depth step)
- Includes 'mini' version of spreadsheet for analyzing 2000 rows of data
- Color-code up to 5 different series of data points on plots
- GR, Sw, and PHIt filters hide unwanted points on plots and analyses
- Detailed workflows for log and core analysis with interpretation helps
- Added apparent Rw method for Rw determination
- Determines Quick Rt, Quick Rxo, PHIsenic, PHIt from raw input data
- Uses M-N and Neutron-Density plots for automated lithology selection
- Customizable inputs (lithology / travel time) for improved sonic porosity
- Added cell bar graphs to quickly visualize data trends within tables
- Performs 12 carbonate log analysis techniques simultaneously:
 - Secondary porosity using sonic or resistivity data
 - Archie Sw, PRI, Ratio Water Saturation, MHI, BVW
 - Variable 'm' Sw (Nugent, Borai, Focke & Munn, Shell, user-defined)
 - Uses Rz technique if no Rxo device present
- Interprets results & highlights potential pay zones meeting user cutoffs
- Improved interpretive crossplots: Dew, Buckles (BVW), Pickett

Core Data Analysis Tool

- Interpret capillary pressure (Pc) and core perm, porosity, So, Sw data
- Winland R35, RQI, Lucia ARFN, K/Φ methods for reservoir quality
- Shift core to logs using GR and/or PHIt to integrate log and core results
- Integrated Plots: Log / core analyses on interpretive well log plots
- Convert Pc from Lab fluids / conditions to Reservoir fluids / conditions
- Determines Height above FWL from each Pc curve; creates HAFWL plots
- Plots up to 20 capillary pressure curves
- Plot multiwell Sw vs subsea to further evaluate FWL



0.004	OIL	23%	8%	Interparticle - Swa reliable	0.138	--	HC present + moved	0.00%
0.023	OIL	73%	68%	Interparticle - Swa reliable	0.735	--	????	0.03%
0.005	OIL	22%	5%	Bimodal/Fracture - Swa reliable	0.087	--	HC present + moved	0.01%
0.002	OIL	19%	31%	Interparticle - Swa reliable	0.390	--	HC present + moved	0.00%

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Norman E. Wells, Jr.
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Sponsorship Information (2022-2023)

Our non-profit society relies entirely upon the efforts of dedicated volunteers to serve the geological community—primarily through educational events. The PBS-SEPM hosts luncheon lectures, core workshops and field trips that are led by experts in their chosen areas of the geosciences. If you would like to sponsor the PBS-SEPM in anyway, we have various levels of commitment you can choose from.

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- Full Page Advertisement on Luncheon Slides for that month
- Website
- Table tents

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- Website

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Email: info@pbs-sepm.org

If you are interested in a sponsorship opportunity, please call PBS-SEPM for more details at (432) 279-1360 or e-mail info@pbs-sepm.org.

Do you have an idea for an interesting luncheon talk? Have a core workshop you'd like to present? Have some suggestions on how PBS-SEPM can better serve the geologic community? Send us an e-mail to share your idea, your PBS-SEPM Executive Board wants to hear from you!

PBS-SEPM is the Permian Basin Section of SEPM—the Society for Sedimentary Geology. However, you do not need to be a SEPM member or a geologist to join PBS-SEPM.

PBS-SEPM prides itself on its success in providing high caliber speakers as well as exceptional core workshops and field trips. PBS-SEPM also provides scholarships to graduating high school students in western Texas and New Mexico. These scholarships are on occasion, offered to college students that have declared their desire to pursue a degree in the geosciences. Through continued support from the industry, PBS-SEPM can continue to provide excellent educational opportunities for the oil and gas industry.

If you would like to join PBS-SEPM, you may visit our website to learn more about us, download a membership form, and learn how to get involved.

Scholarship and Distinguished Speaker Events (2022-2023)

Wendell J. Stewart Fund: so named for the famous sequence stratigrapher, was initially funded by the family, and then later through PBS-SEPM members who have contributed over the years. In the past, the scholarship was established to award high school students intending to pursue a college education in the geoscience field (declared major), and had evolved to include college students actively pursuing a geology degree when there were no other qualified candidates. Funding for this scholarship has waxed and waned over the years with the changes of the petroleum industry and because this scholarship is set up in such a manner that only the interest can be used to distribute funds, most scholarships in the last 30 years have been awarded through the PBS-SEPM main budget and not the scholarship fund.

Robert Read Distinguished Lecturer Fund: was founded to honor a bright, young geologist who had been an active member of both PBS-SEPM and WTGS and was tragically killed by a drunk driver. Donations from various members of both societies contributed to a membership donation fund that both encourages our continuing education efforts by helping offset the cost of bringing in a distinguished lecturer, usually in geosciences, but not required.