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BULLETIN

September - October 2024 VOLUME 64, NUMBER 1

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From the 2024-20245 President-Elect ~ Steven Harbison

WTGS Members,
Summer is over, kiddos are heading back to school, vacations are over, and we are all prepping for an exciting 4th quarter. WTGS Symposium is around the corner and all the events that go with it. I wanted to take this opportunity to speak on something near and dear to my heart.

A vast majority of our members are Transplants from all over the country. Midland is a true melting pot. Yes we have our famous legendary local Celebrities who tell us the stories of Downtown Midland being two way streets. "Raising Hell in Odessa and raising your family in Midland". So many of us were born and raised far from this pump jack dotted landscape with flare stacks providing a unique ambiance to the night sky. I remember flying in for the first time seeing all the well locations as small square dirt patches dotting the landscape for miles in all directions like some type of giant art project laid out on a massive scale. It almost reminded me of the Nazca People who drew massive pictures in the Peruvian countryside looking up to the sky asking for rain and other blessings. We orchestrate our great project on a similar scale only looking deep underground for the lifeblood that fuels the world economy.

The Permian Oilfield has united people from all over the world that otherwise would never have crossed paths. Its like the scene from Field of Dreams talking about the baseball field. (Best sports movie ever made and I will not hear any slander on this matter).

They'll come to Iowa for reasons they can't even fathom. They'll turn up your driveway, not knowing for sure why they're doing it. They'll arrive at your door as innocent as children, longing for the past.

"Of course, we won't mind if you look around," you'll say. "It's only twenty dollars per person." They'll pass over the money without even thinking about it. For it is money they have and peace they lack.

And they'll walk out to the bleachers, and sit in short-sleeves on a perfect afternoon. They'll find they have reserved seats somewhere along one of the baselines, where they sat when they were children and cheered their heroes. And they'll watch the game, and it'll be as if they'd dipped themselves in magic waters. The memories will be so thick, they'll have to brush them away from their faces.

People will come, Ray.

The one constant through all the years, Ray, has been baseball.

America has rolled by like an army of steamrollers. It's been erased like a blackboard, rebuilt, and erased again. But baseball has marked the time.

This field, this game — it's a part of our past, Ray. It reminds us of all that once was good, and it could be again.

Ohhhhhhhh, people will come, Ray. People will most definitely come.

We showed up. Built our families and Careers. We toughed it out. We paid our dues. We heard a calling and headed West! Through the most euphoric highs and crippling lows. Through the mergers and buyouts. Through the bankruptcies and cashouts. Through the Promotions and layoffs. Once midland has gotten in your blood it becomes home. The people came and they were strangers but they did have something in common. So what did they do? They built our societies! For they knew that as a professional in a new city there needed to be a way to welcome and introduce new friends to our geological family. A way to meet and recruit help in their Wildcat exploration companies. A way to learn from each other and share knowledge. They built a community to congratulate you on your successes and support you during your failures. A network to cheer you on and be there in times of need.

When I was first asked to Serve as the 100th President of this Prestigious Organization my first reaction was I don't have the time. I don't have the bandwidth. How would this effort benefit me? etc. Then I realized it was all me me me excuses. The truth was I was happily taking all the benefits from the WTGS but not giving anything back. It's not that I didn't have time, it's that I wasn't making it a priority. I think it's important to give before you can take. Serve before you can receive. Just like a lot of us do every Sunday. It is my goal to add value that all members can tangibly receive from their membership. My hope is that our Leaders, our Managers, and our Supervisors lead by example in participating and continuing this 100 year legacy. I encourage you to show up to the meetings; incentivize your team members to show up and be active. It's our duty to continue this progress for another 100 years.

I have a year of learning under the very talented Judd Tudor to absorb and prepare for my coming term of service. I am open to any and all suggestions or changes you would like to see to help the WTGS progress and function in 2025.

Looking forward to our collective effort to ensure the WTGS remains a valued resource for years to come.

Steven Harbison

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WTGS Publications: San Andres "King of Kings"

By David J. Entzminger

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The San Andres Formation overview is the sixth article in this series promoting the WTGS library. WTGS publications are filled with a wealth of knowledge, and most of these articles are not currently found on the world-wide web. You can discover this information by searching the WTGS archives of guidebooks, symposiums, bulletins, field trips, maps, cross sections, well logs, discovery wells, field documentation, cores and production. It is my hope that you will start using the materials in the WTGS publications and encourage others to do the same.

The San Andres is the "King of Kings", when it comes to cumulative production from the Permian Basin. This production is concentrated on the Central Basin Platform or NW Shelf. It was the dominate producing horizon until the unconventional reservoirs arrived in the Permian Basin. The San Andres has gone through the evolution of primary production to enhance oil recovery (EOR) both waterfloods and CO2 floods. Recently, the horizontal wells targeting the ROZ and transition zones along with large frack stimulations have rejuvenated the San Andres. What is next? Maybe it is some advanced completion or targeted reservoir modeling. For some of these billion-barrel oil fields, a 5% increase in recovery is millions of barrels of oil.

The San Andres has been a favorite target for the independents and majors alike. Independents corner-shoot fields or geological features making profitable San Andres wells, or they may try some new innovation to squeeze more oil out of this formation. Majors have developed the large structural or stratigraphic features and have established EOR projects in the San Andres to feed their larger financial appetites. The San Andres Formation has produced the most conventional oil in the Permian Basin with over 14 bbo (2023).

While working with ARCO in the early 1990's I had the privilege of being the Director of Geology. I was responsible for overseeing our geological field models that were integrated into our engineering forecast models for ARCO's large waterfloods and EOR projects. Two memorable projects that I worked were the Willard San Andres Unit in Yoakum County, TX and the Seminole San Andres Unit operated by Amerada Hess. Integrating digital logs and core data was instrumental in providing the foundation for a good geological model. At that time digitizing logs was expensive and tedious work. For the Willard unit we only digitized about 100 feet of log to save money. Today we not only digitize the entire log, but we get a full array of log suites and integrate them with 3D seismic projects. We started considering the transition zones for EOR projects back in the 1990s, but at the time the ROZ was only a dream.

By the mid-2010's, the ROZ in the San Andres became a hot play from Andrews County to the north through Yoakum County. The Platang Field discovery and development in southwestern Yoakum County by Manzano and Walsh & Walsh kicked off a multi-year boom that invigorated activity on the Central Basin Platform, see WTGS Symposium 2015 paper by John Worrall. Experts like Dr. Robert Trentham and Steve Melzer have provided the insights to exploit this elusive target for over a decade, see WTGS Symposium 2016 paper & 2013 core workshop. Horizontal drilling and multi-stage frack stimulation increase producibility of the ROZ to make the economics profitable if adequate water disposal was provided.

The San Andres is thought to still have over 20 bbo recoverable from current technologies. For those that are diligent and innovative, there is a bright future. Good Luck and Happy Hunting.

Please help us locate the lost or missing WTGS Publications from our library. We would like to get them digitized so they can be archived for future geologists. A list of missing publications is on the WTGS home page, just click the link to download it. Send or bring all missing publications to the WTGS office.

For those that may not have seen the list of publications by WTGS, I bring your attention to the website:

https://www.wtgs.org/page-18185.

Some WTGS Publication San Andres References:

Proposed Correlation of San Andres High Frequency Sequences Across the Northwest Shelf of Texas and New Mexico, Holt Stephens, WTGS Fall Sym 2017.

Resurrecting the San Andres Play - Observations and Challenges in Horizontal Wells on the CBP, Farhan Alimahomed, WTGS Fall Sym 2017.

The I-20 San Andres Corridor: A core-based look at the San Andres, and San Andres Residual Oil Zones, across the Central Basin Platform, Bob Trentham, WTGS Fall Sym 2016.

Geology and Horizontal Development of a Conventional Stratigraphic Trap in the San Andres Dolomite, Platang Field, Yoakam, County, Texas, John Worrall, WTGS Fall Sym 2015.

Correlating the Glorieta and San Andres formations in the carbonate platform of the Guadalupe Mountains of West Texas: sequence stratigraphy and geochemistry, Eric Bergman, WTGS Fall Sym 2015.

Laguna #11, U. San Andres / Grayburg, Ector County, Tx, University of Texas - Permian Basin, Ettebong Emmanual, WTGS Fall Sym 2015 Core Workshop.

San Andres Core, Goldsmith Landreth San Andres Unit, Ector Co., TX, WTGS Fall Sym 2013 Core Workshop.

An Exceptionally Well Preserved Calcisponge-Dominated Reef Facies in the Upper San Andres Formation (Permian), East Vacuum Grayburg-San Andres Unit, Lea County, NM, David M. Orchard, Gregory P. Wahlman, Govert J. Buijs, WTGS Fall Sym 11-24.

Calcisponge-microbial shelf-margin reef facies, Upper San Andres Formation (Guadalupian, Middle Permian), Vacuum Field, Lea County, New Mexico, Gregory P. Wahlman, David M. Orchard, and Gulvert J. Buijs, WTGS Fall Sym 11-24.

Outcrop-Constrained Characterization of Along-Strike Variability in San Andres Formation Clinoforms: Last Chance Canyon, New Mexico, p106. WTGS 06-117.

Outcrop and Subsurface Comparison of Lithology Distributions in the Permian San Andres Formation - Implications for a Dolomitization Model, Beatriz Garcia-Fresca and F Jerry Lucia, p38. WTGS 06-117.

Reservoir Characterization at North Monument Grayburg/San Andres Unit: Stratigraphic and Facies Constrained Kx/Kh Variation for Reservoir Simulation, Mark D. Sonnenfeld, K. Lyn Canter, James R. Gilman, Hai-Zui Meng, David C. Newman, Scott B. Pluim, and Michael J. Uland, p257, WTGS 04-112.

Anhydrite Diagenesis and Reservoir Quality, San Andres Formation, Willard Unit, Yoakum County, TX, Alton Brown., p125, WTGS 02-111.

Opportunities for Recovery of Remaining Oil in San Andres Reservoirs: Example from Fuhrman-Mascho Field, University Lands Block 10, Andrews County, Texas, Steve Ruppel, p105, WTGS 01-110.

Construction of a Permeability Model Applying the Lucia Characterization Methodology with Non-optimal Data Conditions: West Jordan Unit, San Andres Formation, Victoria L. French and Greg D. Hinterlong, p 77, WTGS 00-109.

Strata! Geometry, Cycle Hierarchy and Dynamic Facies Associations within Shelf-Margin and Slope Strata of Upper San Andres High Frequency Sequences G 12 and G 13, Last Chance Canyon, New Mexico, Mark D. Sonnenfeld, p 179, WTGS 00-108.

Stratigraphic Framework of the San Andres Formation, Algerita Escarpment, Guadalupe Mountains, New Mexico, Charles Kerans, p 153, WTGS 00-108.

Karst Features in the San Andres Formation on the Northwest Shelf of the Permian Basin- They're Not Just at Yates Field Any More!, Emily L. Stoudt, and Michael L. Raines, p181, WTGS 00-107.

Geologic Model Construction Using Log Data in a San Andres Carbonate of Lea County, New Mexico, Michael A. Raines, and Emily L. Stoudt, p160, WTGS 00-107.

Stratigraphic Framework and Reservoir Delineation of the McCamey Field (Grayburg-San Andres), Upton County, Texas, Alfred C. Guiseppe and Robert C. Trentham, p43, WTGS 99-106.

Detection of Bypassed Pay Using Time-Lapse Log Analysis, San Andres Formation, Central Vacuum Unit, New Mexico, Max Scuta and Neil Hurley, p185, WTGS 98-105.

How an independent Operator Can Integrate Engineering, Geophysics, and Geology in a Reservoir Study: Grayburg/San Andres of Foster and South Cowden Fields, Ector County, Texas, Robert C. Trentham, William C. Robinson and Richard E. Weinbrandt, p109 WTGS 97-102.

Imaging a San Andres Reservoir with Interwell Seismic, James H. Justice and J. Craig Woerpel, p121, WTGS 96-101.

Use of Core and Core Analysis in an Intergrated Study of the Grayburg/San Andres Reservoir, Foster Field, Ector County, Texas, Robert C. Trentham and Richard Weinbrandt, p39, WTGS 96-101.

An Integrated Study of the Grayburg/San Andres Reservoir, Foster and South Cowden Fields, Ector County, Texas, W. Hoxie Smith, James J. Reeves, Robert C. Trentham, and David A. Rowland, p97, WTGS 95-98.

Back to the Rocks: Tips on identifying Rock Type and Environment from Binocular Examination of San Andres Dolomite Cuttings Using, Transmitted, Polar Light, Stewart Chuber and Jerry S Kier, p93, WTGS 95-98.

Post-Permian Folding and Fracturing of the Spraberry and Sand Andres Formations Within the midland Basin Region of West Texas, Keith E. Winfree, p189, WTGS 94-95

An Integrated Study of the Grayburg/San Andres Reservoir, Foster and South Cowden Fields, Ector County, Texas, W. Hoxie Smith, James J. Reeves, Robert C. Trentham, and David A. Rowland, p15, WTGS 94-94.

The Role of Diagenetic Studies in Flow Unit Modeling: San Andres Formation, Yoakum County, Texas, Steven K. Henderson, (Abstract) p43, WTGS 93-93.

High-Resolution Stratigraphy Forward Modeling: A Case Study of the Lower-Middle San Andres Sequence, Permian Basin, Mark W. Shuster and David W. Childers, (Abstract) p44, WTGS 93-93.

Integrating Geology and Engineering in a Three-Dimensional Model to Assess Additional Recovery Potential: Keystone (San Andres) Reservoir, West Texas, Rick P. Major, Mark H. Holtz, and Joseph S. Yeh**,** p1, WTGS 93-93.

Calibration of Porosity Logs and Delineation of Flow Units in a San Andres Reservoir: Keystone Field, West Texas. R. P. Major. M. H. Holtz, and R. D. Dommisse***, p*** 100, WTGS 92-91.

Microfacies Analysis of the Pio Bonito Member (Leonardian-Guadalupian) of the San Andres Formation in the Southern Sacramento Mountains, Otero County, New Mexico, Chris F. Whitman and R.E. Clemons, p195, WTGS 92-90.

Evaporite Geometries and Diagenetic Traps, Lower Sand Andres, Northwest Self, New Mexico, David R. Keller, p. 183, WTGS 92-90.

Geologic Model of San Andres Reservoir, Roberts Unit CO2 Phase ill Area, Wasson Field, Yoakum County, Texas, James V. Bent, Jr.., p113, WTGS 92-90.

Sequence Stratigraphy of the Upper San Andres Formation and Cherry Canyon Tongue, Brokeoff and Guadalupe Mountains, New Mexico and Texas, M.E. New and W.M. Fitchen, p186, WTGS 90-87.

DOLOMITIZATION, SULFATE SOLUTION, AND POROSITY DEVELOPMENT: THE SAN ANDRES FORMATION, HOWARD-GLASSCOCK FIELD, HOWARD COUNTY, TEXAS p. 91, WTGS 84-78

Hondo Sandstone Member of the San Andres Formation, p161, WTGS 76-66.

Lovington Sand Member of the San Andres Formation, p190, WTGS 76-66.

San Andres Limestone, p262, WTGS 76-66.

Cyclic SanAndres Facies and Their Relationship to Diagenesis, Porosity and Permeability in the Reeves - Stewart Chuber & Walter C. Pusey, p135, WTGS 72-60

Oil Field, Yoakum County, Texas - Stewart Chuber & Walter C. Pusey, p135, WTGS 72-60.

The Queen - Grayburg - San Andres Problem Solved by Frenzel, p87, WTGS 62-48.

San Andres contour map - Rocker "A" Field, 65, WTGS 56-38.

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Permian Basin Section-SEPM San Andres Mountains Field Trip April 22-24, 1994, Frank E Kottlowski et. al., Apr 1994, WTGS Bull Vol 33, #8.

Geologic Description of the San Andres Reservoir Facies in the Mabee Field, Andrews and Martin Counties, Texas, Edward A. Horvath and Krista D. Miller, Mar 1994, WTGS Bull Vol 33, #7.

The Relationship of Permian San Andres Facies to the Distribution of Porosity and Permeability in the Garza Field, Garza County, Texas, Gregory P Hild, Jan 1986, WTGS Bull Vol 25, #5.

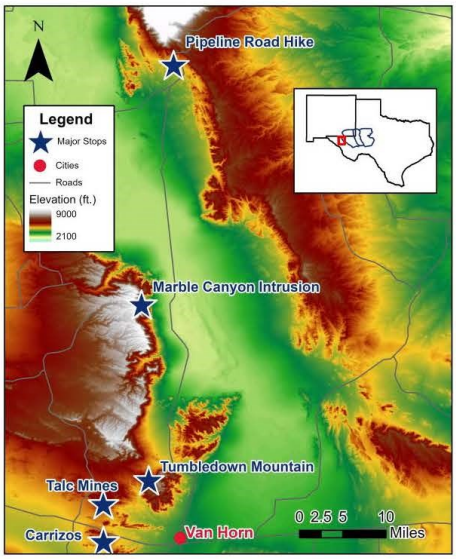
Announcing the Field Trip for WTGS's 2024 Fall Symposium:

Precambrian to Permian: A Geologic Transect from Van Horn to the Southern Guadalupe Mountains

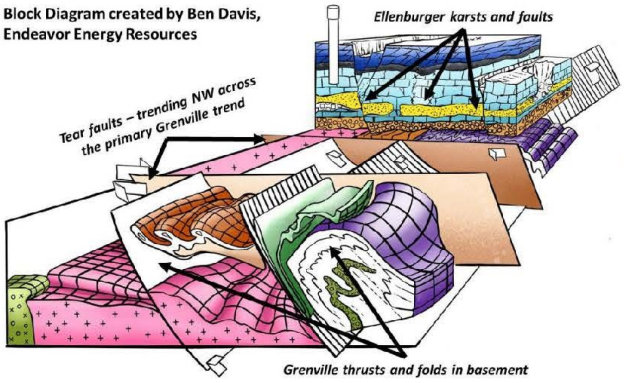
Ben Davis (Endeavor Resources) and **Andy Roark** (Chevron), **Co-Leaders**

NOTE DATE CHANGE!

Depart: Friday afternoon, September 13 (weekend PRIOR TO Symposium)
Return: Monday afternoon, September 16
Cost to participants: $900 (includes 3 nights in the Hotel El Capitan, transportation, and lunches)



- View the Precambrian stratigraphy of southwest Texas (analogs for seismicity zones in the southern Permian Basin on rarely accessible private land)!
- See the Grenville thrust front in outcrop!
- Visit active talc quarries that record the tectonic history southern North America!
- Explore an igneous intrusion hosted in the Wolfcampian Hueco Formation (analog for western Delaware Basin thermal maturity anomalies)!
- Hike through the basinal Lower Guadalupian stratigraphy of the southern Guadalupe Mountains (equivalent to the Lower Brushy Canyon, Bone Spring Lime, and Upper Avalon Shale)!



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Trip Information

Rocks exhumed between Van Horn and the southern end of the Guadalupe Mountains are exquisite analogs for obscure subsurface features in the Midland and Delaware Basins. These outcrops expose the Grenville Thrust Front as it cuts through thousands of feet of Precambrian sedimentary rocks – this same structural feature longitudinally bisects the Permian Basin and hosts clusters of deep seismicity events, including many of the earthquakes felt at the surface in the Midland area. Younger strata north of Van Horn are age- and facies- equivalent to deep disposal zones and Permian unconventional reservoirs. For this year's trip, we will ascend from the basement to the reservoir level building a composite stratigraphic section and discussing applications to development geology.

On the first day, we have secured access to Tumbledown Mountain, a peak within the Beach Mountains. A short hike up the hill will take us through more of the Precambrian stratigraphy and across the Great Unconformity to the Ordovician El Paso Group. This contact is equivalent to the subsurface Delaware Basin where the Ellenburger sits directly on the basement. In the afternoon, we will head up the highway to visit a quarry that is excavating Oligocene igneous rocks. At the Marble Canyon Quarry, in the Sierra Diablo Mountains, these rocks intruded into the Wolfcampian-aged Hueco Formation. The Hueco represents the carbonate platform adjacent to the Delaware Basin during deposition of the Wolfcamp Shale. Due east, within the basin, coeval sills and dikes cut into source rocks including the Woodford, Barnett, and Pennsylvanian Shales. These intrusions created metamorphic aureoles and locally altered thermal maturity, potentially impacting production in overlying Wolfcamp and Bone Spring Zones.

On day two, we will hike down the basinal stratigraphy in the southern foothills of the Guadalupe Mountains, passing through the lower Brushy Canyon, Pipeline Shale, and into the Cutoff Formation (equivalent to parts of the Bone Spring Lime and Upper Avalon). These rocks contain many similar lithologies to major horizontal well landing zones in the Permian Basin, and provide 3-dimensional exposures of lower slope and basin floor mass transport deposits. Combined, the stops on each of the three days allow us to build a robust framework for understanding the interaction of basement rock, faults, deep reservoirs, and Permian unconventional targets. In the afternoon, we will return to the Van Horn area for a full plate of road cuts in the Precambrian Carrizo Mountain Group (additional basement stratigraphy).

Finally, on day three, we will explore active talc mines along the Steeruwitz Thrust, a major fault that represents the northern end of Grenville Front. The talc mines produce from the Precambrian Allamore Formation, which also includes marine limestones and cherts. Folds and fracture sets in the talc record the history of deformation along this major thrust zone.

ITINERARY

Friday, September 13	Depart Midland ~5 pm, drive to Hotel El Capitan in Van Horn for group dinner
Saturday, September 14	Morning: Short (~1 mile) hike up Tumbledown Mountain to view Precambrian stratigraphy and the Great Unconformity Afternoon: Marble Canyon igneous intrusion quarry and surrounding Hueco Formation [Potential to alternate with other Wolfcamp exposure in Carrizo Mountain area pending land access]
Sunday, September 15	Morning: Drive to southern Guadalupe Mountains to start the hike at Pipeline Road, hike down to Cutoff Formation in Rest Area Gully (~3 miles round trip) Afternoon: Roadcuts in the Carrizo Mountain Group south of Van Horn. Additional area roadcuts if time allows.
Monday, September 16	Morning: Drive to visit multiple active talc quarries in the Precambrian Allamore Formation Afternoon: Return to Midland. Arrive back by ~5 pm.

SEPTEMBER 17, 2024 - SEPTEMBER 19, 2024
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Attendee Registration: https://site.pheedloop.com/event/wtgs2024/register#category

- **Tuesday, Sept 17 PM - Vendor setup and evening icebreaker**
- **Wednesday, Sept 18 - Full day of presentations and poster sessions**
- **Thursday, Sept 19 - ½ day presentations & poster sessions & ½ day core workshop**

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SEPTEMBER CALENDAR

Sun	Mon	Tue	Wed	Thu	Fri	Sat
1	2	3	4	5	6	7
8	9	10 WTGS LUNCHEON	11	12 WTGS	13 FALL	14 FIELD
15 TRIP	16	17 WTGS	18 FALL	19 SYMPOSIUM	20 ROCKHOUND CLASSIC GOLF	21
22	23	24	25	26	27	28
29	30					

WTGS Luncheon
Bush Convention Center
11:30 am, $25.00/50.00

PBS-SEPM
Bush Convention Center
11:30 am

SIPES
Midland Country Club
11:15 am

SPWLA Permian Basin
Bush Convention Center
11:30 am

- **WTGS Luncheon - Tuesday, September 10, 2024**
  John Savage - Halliburton - *PULSED NEUTRON AND FORMATION EVALUATION IN THE CASED HOLE ENVIRONMENT*

- **SIPES Midland Chapter - September 18, 2024**
  Arnie Ostrander - "A New Way to Look at Fractures and Fracture Contribu tion to Production"

- **PBS-SEPM Luncheon - September 17, 2024**
  TBA

- **SPWLA Permian Basin Chapter - September 24, 2024**
  TBA

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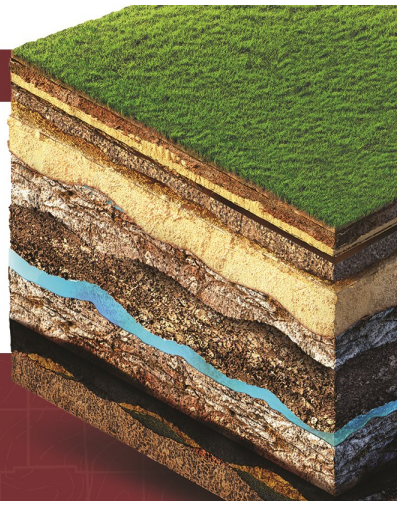

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Sun	Mon	Tue	Wed	Thu	Fri	Sat
		1	2	3	4	5
6	7 WTGS LUNCHEON	8	9	10	11	12
13	14	15	16	17	18	19
20	21	22	23	24	25	26
27	28	29	30	31 HAPPY HALLOWEEN!		

- **WTGS Luncheon - Monday - October 7, 2024**
  Prof. Sean Gulick - "Life and Death by Impact: Drilling for Clues"

- **SIPES Midland Chapter -October 16, 2024**
  TBA

- **PBS-SEPM Luncheon - October 15, 2024**
  TBA

- **SPWLA Permian Basin Chapter - October 22, 2024**
  TBA

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September 10, 2024 WTGS Luncheon

Bush Convention Center

Lunch: 11:30 AM **Cost**: $25 in person (pre-register)

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(432-683-1573) or Online @ wtgs.org

PULSED NEUTRON AND FORMATION EVALUATION IN THE CASED HOLE ENVIRONMENT

As the oil and gas industry continues to mature, wells are drilled in increasingly challenging environments, often putting at risk the formation evaluation program in an open hole environment. Even if the well is accessible, cost and risk of a complete multi-run open hole formation evaluation program can be prohibitive, however sufficient data is still required to identify hydrocarbons in these complex reservoirs. These and other considerations push operators more than ever to find accurate and complete formation evaluation in a rigless environment, after the completion has been run. Logging runs through the completion reduce both cost and risk, where downhole tools are better protected and efficient conveyance options such as slickline is feasible with memory-capable tools. Cased hole logging data have historically been limited as compared to the vast data that can be acquired in an open hole environment. Additionally, the range of conditions encountered in cased hole environment, and the complexity of the completions will challenge even robust environmental corrections models, putting accuracy at risk. Completions with smaller tubing force the evaluation tools further away from the formation being evaluated and limit the OD of the tools being conveyed through the completion. The statistical nature of spectral nuclear technologies are particularly heavily affected by these constraints.

Pulsed neutron formation evaluation has historically been successfully employed for water, oil, and gas saturations, whether for initial input into a petrophysical model or as part of a time-lapse well monitoring program. Advancements in electronics and scintillator materials that take advantage of high-yield neutron generators work together to improve the accuracy of the raw output. Continued improvements in MCNP nuclear modeling software coupled with a large variety of characterization lab conditions have improved validation, stretching the limits for the specified operating environment. Individual elemental yields have been fully characterized, both with the neutron generator active and from passive mode with the generator off. Processing software has been developed concurrently that incorporates the traditional parameters with several additional parameters such as cement density.

New multi-detector pulsed neutron tools can be conveyed in a wide range of borehole sizes, completion configurations, and borehole fluid types with a more accurate response across this array of challenging conditions. A comprehensive range of characterized elemental yields combined with spectral natural gamma measurements from the same tool enable valuable minerology data to be acquired thru-tubing. New tools are fully memory capable, where the full data including all energy spectra can be acquired via slickline conveyance. The inclusion of a direct measurement of total carbon yield from the inelastic spectrum lend to accurate physics-based TOC output that can aid in evaluating unconventional reservoir.

John Savage Bio

In 2022 after 17 years abroad, John returned back to his home country, USA, joining the Halliburton Global Team as a Product Champion for Well Intervention Technologies, Wireline and Perforating based in Houston. He began his career with Halliburton in 1994 as a Field Engineer in New Mexico and has remained with the company throughout his career. John has held primarily business development and operational management positions through the 7 countries he has been lucky enough to call home, spanning 4 continents. John holds a degree in Electrical Engineering from the University of Colorado at Boulder. He is a 21 year member of SPWLA & SPE

HALLIBURTON

October 7, 2024 WTGS Luncheon

Bush Convention Center

Lunch: 11:30 AM **Cost**: $25 in person (pre-register)

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Life and Death by Impact: Drilling for Clues

Prof. Sean Gulick, Jackson School of Geosciences, University of Texas at Austin

The most recent of Earth's five largest mass extinction events occurred 66 Ma, coeval with the impact of a ~12 km asteroid, striking at ~60 degrees into what is today the Yucatán Peninsula, México, producing the ~200 km-wide Chicxulub crater. This impact, by some estimations, drove the extinction of 75% of life on Earth at the genus level including all non-avian dinosaurs. Proposed kill mechanisms include thermal effects, dust, soot, and sulfate aerosols reducing Earth's solar insolation. In 2016, 835 m of core was recovered from the Chicxulub impact structure through International Ocean Discovery Program -International scientific Continental Drilling Program Expedition 364. Analyses done on these cores, downhole logs, and geophysical site survey data have led to a series of advancements to our understanding of impact cratering processes, how the Chicxulub impact affected the Earth's environment leading to the Cretaceous-Paleogene mass extinction, and what ecosystems existed within the newly formed crater. Key areas of discovery include: 1) clear evidence for origin of peak rings and crater dynamics in large impacts, 2) highest resolution record to date of impact processes within the crater include deposition of impactites and role of ocean resurge, 3) rapid recovery of life at ground zero with a key niche being filled by cyanobacteria, and 4) development of a long lived hydrothermal system with astrobiological implications.

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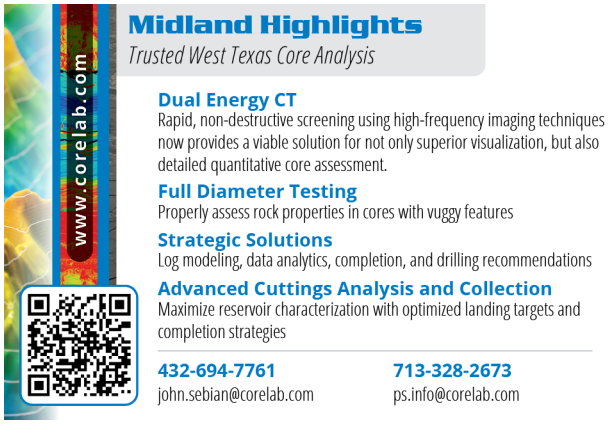
West Texas Geological Society 100 Year Anniversary:
A Core Workshop of Early Permian Basin Field Discoveries

Robert F. Lindsay & Robert C. Trentham

In January 2026 the West Texas Geological Society will celebrate its 100th Anniversary. It has been over a century since the earliest field discoveries were made in the Permian Basin. With the support of the West Texas Geological Society, a Core Workshop is planned to revisit early field discoveries.

In identifying early cored wells, several cores were found to require additional work. As an example, core from Westbrook Field (1st discovery of commercial oil in the Permian Basin) and Artesia Field (3rd discovery) have not been slabbed. These cores require funding for core slabbing, boxing, photography, etc. for inclusion in the core workshop. We anticipate a few additional cores may need similar preparation. All cores will require a minimum of core photography and thin section preparation to adequately describe the core for inclusion in the core workshop. Donations of core analysis, drilling history, etc. would also be of great value to the core workshop.
We estimate the cost of core preparation to be a minimum of $25,000. Funding will be managed by the West Texas Geological Society.
Below are 23 key fields that have been identified. These field discoveries opened the Permian Basin to additional exploration and development, and established it as a Super Basin:

Westbrook (1920) UCLFK
Big Lake (1923) GRBG
Big Lake (1929) ELLN
Artesia (1924) GRBG-SADR
McElroy (1925) GRBG *
McCamey (1925) GRBG-SADR *
Wheat (1925) BCYN *
Penwell (1925) SADR
Empire (1926) YTES
Maljamar (1926) GRBG
Hendricks (1926) YTES
Yates (1926) SADR
Waddell (1927) GRBG-SADR
Shipley (1928) ?
Kermit (1928) ?
Pecos Valley (1928) YTES *
Vacuum (1929) GRBG-SADR
Keystone (1929) YTES
Eunice Monument (1929) GRBG *
North Ward-Estes (1929) YTES/QUEN *
Sand Hills (1931) TUBS
Sand Hills (1935) MCKT, SIMP
Goldsmith (1935) SADR *
*Fields with cores identified and available



The Core Workshop will be published as a pdf volume. If you have information on any of these fields, please consider contributing a write-up to the publication.

If you would like to contribute a core to the WTGS Core Workshop, the core will be temporarily housed at the University of Texas at the Permian Basin (UTPB) for description by the core workshop organizers, UTPB graduate students, or core contributors themselves. Upon completion of the WTGS Core Workshop donated cores will be returned to the core contributors. If the core contributor would like, cores can be housed permanently at UTPB at no expense. We envision creating a core inventory where these cores, thin sections, etc. would be available for study by any company, university, or individual.

Please contact us with any questions you may have about financial support. Please earmark your contribution for the WTGS 100-Year Core Workshop, and send to it to the attention of Shellie Crossland at the **West Texas Geology Foundation**, PO Box 1595, Midland, TX 79702.

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PaleoScenes No. 17

THE CATSKILLS

Beautiful Topographic Bumps

Submitted by Jeff Smith

Most people have always defined the Catskills as mountains, but we geoscientists, we know the difference and we know that mountains have tectonic underpinnings and they'll have a real mixed lithology with a few different sediments. You'll have metasediments, igneous rocks, metamorphic rocks...the Catskills don't have any of those things; they just have sedimentary rocks that are highly oxidized red beds. They were eroded away from some real mountains that used to exist and some people believe the Catskills to be the Catskill delta, but it's not a delta. The Catskills are a detrital wedge with most of the rocks being clastics.

When I was young I lived on the other side of the Hudson. I know everyone calls it the Hudson River, but we're scientists and know it's really an estuary up to Albany. If you want to see the Hudson River you'll have to go north of Albany because there is a strong tide south of there. In spite of that really strong tide, we would go down to watch the ice breakers work in the 1950's and there would be ice three or four feet thick that they were breaking up so the transport ships could get through. Back then all of the world's climate scientists-all three of them-said we were going into a new ice age. Where I grew up about halfway between New York City and Albany, on the east side we could look over there and we could see the Catskills and they were just beautiful-beautiful spots on the horizon. Our family would go over there and take rides once in a while for sightseeing and when I got a little bit older, like in high school, I was over there doing ski trips and it was just a beautiful area. I really loved it!

When I went off to college sometimes we'd go down to that area, but not really for the Catskills, we'd go for the Helderberg escarpment which were the Silurian and Devonian limestones and the Manilus and Coueymans, etc. On one of those field trips I met a great guy, Peter J.R. Buttner. He was a postdoctoral fellow studying with a famous professor, Gerald M. Friedman at RPI. I met him down there and became friends with him and he took a liking to me and asked if I wanted to come down and maybe spend a weekend or two helping them out in the Catskills. I learned a lot...I really learned a lot! The way he did things was that he'd go up one side of a huge valley and have someone else on the other side and they'd have telescopes and mirrors so they could shine to each other with a mirror where they were. They had walkie talkies and you'd look with the telescope to see where the other person was and you could direct that person to the best outcrops over on their side. You did have to be very careful because there were timber rattlers and copperheads who like to lie on sunny spots.

Peter taught me a lot about the geology in the area and then when I was getting ready to graduate from Union College, he asked what I was going to do and I said that I didn't know...thought maybe I might end up in Viet Nam. So I got a call one day from his professor, Dr. Friedman, who said, "Hey! I've heard about you. You need to come be one of my students!"
I said, "What do I have to do?" He said,

"Show up."

I told him that I didn't have any money and he said, "You don't need it." And then I

said, "Well, I'm going to try and find a summer job."

He said, "I'll get you one."

He was friends with the man who was the head man for Shell Oil in the Permian Basin and that guy called me and said, "We have a job for you in Midland, Texas." So I flew down to Midland in the summer of 1968 and right away I was taught by coworkers that if your dog escaped you could watch him run for three days. I got to see some really interesting places like Guadalupes, Big Bend and the Franklin Mountains, the Sacramento Mountains...I got to see a lot of really interesting places. Then I went back up to New York to study with Dr. Friedman and decided that I could do my Masters thesis in the Catskills. Dr. Buttner recommended either on the very north side or the very south side and I thought maybe I'd spend time in both of those.

I went looking around for a good place to live and there was a really neat town on the north side called Hensonville. Now most little towns in New York, especially in rural areas normally have a mercantile and a bar and grill. I went into the one there in Hensonville and told them I thought I might need to find a place that I could rent to do geological field work. The guy pointed out the window and said, "You see that three story house over there? Lenny and his wife live over there and they had two sons who were up on the second and third floors, but those sons are professional ski mobile racers and they rent those floors out to skiers, but when it's not ski season, nobody is there."

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So I went over and talked to Lenny and he said that I could have the second and third floors for $100 a month. Wow! So he saw me unloading out there one day and he saw my golf clubs. He asked if I was a golfer to which I replied that yes, I was. He said, "Are you any good?"
"Yeah, I was on my college team."

He said, "Well, I belong to the Windham Country Club up the road here and the pro and his buddies are always picking me for all kinds of money. Can you help me win my money back?"

I said, "Probably can."
Lenny said, "All right, from now on rent doesn't cost you a thing, it's free. I want you to play golf with me at least once-maybe twice-a week at the country club."

I thought, "How much better can life get?"

So for two years I had the top two floors, not during ski season, but who wants to climb around on rocks during ski season anyway.

I'd go down to the southern part of the Catskills in an area known as Woodstock. I met quite a few people down there. It seemed like an area where a lot of liberal professors would retire and I'd get permission to go climbing around in the stream beds down there. They said some kind of music thing was going to go on and so I invited some friends to come down, but it was cloudy and raining a lot and there was a lot of traffic so we didn't go. We didn't know it was going to be the defining moment of our generation! We saw the movie, though.

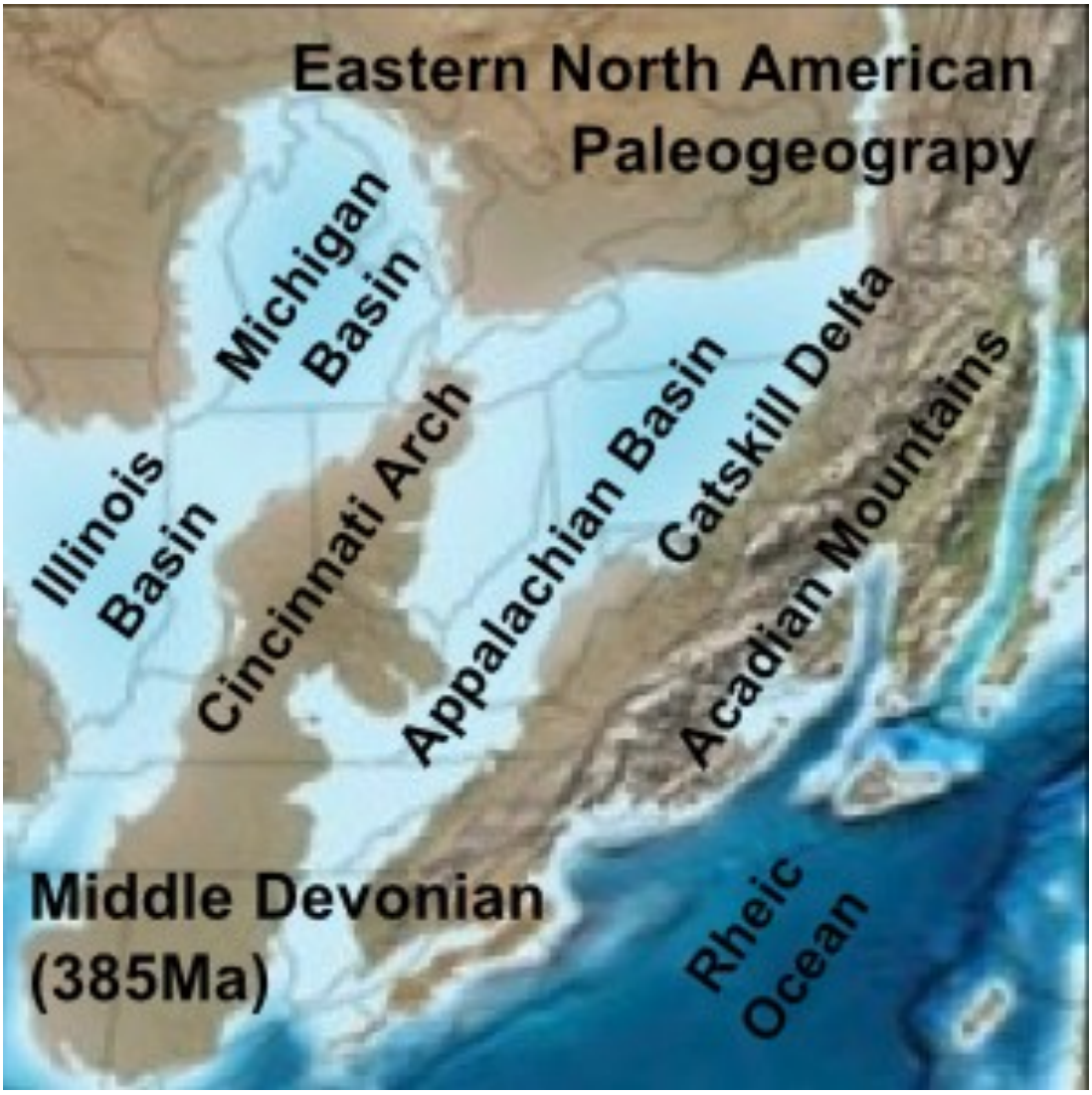
All those beautiful spots I went into up there in the Catskills and you have to be really careful about finding outcrops because a lot of trees get in the way. So you go to places where you have streams and these are trout streams flowing through so I would carry a little four piece bamboo fly rod with me. You had to look out for black bears, but I'd go up the stream, studying the rocks and stop once in a while to catch a brook trout. I'd get a little fire going and have a little brook trout lunch. Life was good!

That's how I spent most of my college days down there doing that and occasionally I'd be out with Dr. Buttner. He ended up becoming the chief geologist for the State of New York. He was a great man, he really was. The reason I was there studying with Dr.
Friedman who had an international reputation was because of Dr. Buttner.

I thought about where did all these rocks come from? Well, there used to be these mountains way over east called the Acadian Mountains which were produced by the Acadian orogeny. Orogeny is kind of like an organ transplant in the lithosphere. Those mountains were over 20,000 feet high. So here was this huge detrital wedge, the Catskills, which were now being called the mountains because they're higher than anything, but they were just being deposited as detritus on the slopes of those mountains, but what happened to the actual mountains? I guess it had something to do with some kind of glaciers and I think probably since Long Island is the terminal moraine maybe a lot of those mountains ended up there.

There's still a few mountains over there...the Fishkill Mountains, Taconic Mountains, the Berkshire Mountains. None of them are near as high as the Catskills are, but they were the real mountains and the Catskills weren't. The Catskills were just the rubble that was on the slopes of the mountains. I've learned that the exact same rocks were present over in Great Britain and called the Old Red Sandstone. Hmm, wait a minute...the Old Red Sandstone is Devonian Age...Catskills are Devonian Age. Same rocks, how did they get over there with an ocean between them? I'm confused. Oh, well.

The Catskills were a beautiful place to live and a beautiful place to study. I also did quite a bit of skiing there and that wasn't bad either! I have a lot of good memories.



AUGUST LUNCHEON PHOTOS

How to submit Articles, Forms, Photos, News Items, Calendar Notices, Advertisements, and Letters to the WTGS Bulletin:

The WTGS Bulletin is a bi-monthly publication: January-February; March-April; May-June; July-August; September-October; November-December

All submissions need to be received by the 10th day of the month before the upcoming publication. I.e. A submission for September-October would need to be received by August 10th.

Technical Articles:

- Text submissions should be submitted in either PDF or DOCX format
- Approved Fonts: Arial, Times
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- Title at Top, Centered, Bolded
- Authors and Contact information underneath, centered
- Illustrations, Pictures, Graphics should be integrated into the article at appropriate sections. Utilize PNG, TIFF, PDF, or BITMAP files for pictures, as these are lossless formats
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Permian/OilField Perspective Articles and Letters:

- Text submissions should be submitted in either PDF or DOCX format
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Forms:

- Text submissions should be both digital and hard copy. Digital in either in PDF or DOCX format. Formatting can remain per how the form was originally designed
- Illustrations, Pictures, Graphics integrated into form should ideally utilize PNG, TIFF, PDF, or BITMAP files.

Photos:

- Submit any relevant photos to the WTGS Bulliten! It could be utilized on one of our covers, or write out short captions for us to display as in our Permian/OilField Perspective Section!
- Acceptable Files: TIFF, PNG, PDF
- If using JPG/JPEG: Maximize quality, and save as Baseline ("Standard") for maximum quality and the least amount of compression
- If files are large, create and share a link to files through GoogleDrive or DropBox

Calendar Notices/Short Items:

- Relevant community calendar notices and other short items may be informally sent through email
- For Calendar Notice, please note: Society, Date, Event Type, Event Speaker (if relevant), Event Title

Submissions to WTGS Editor-in-Chief: Haleigh Fitzgerald (HFitzgerald@diamondbackenergy.com)

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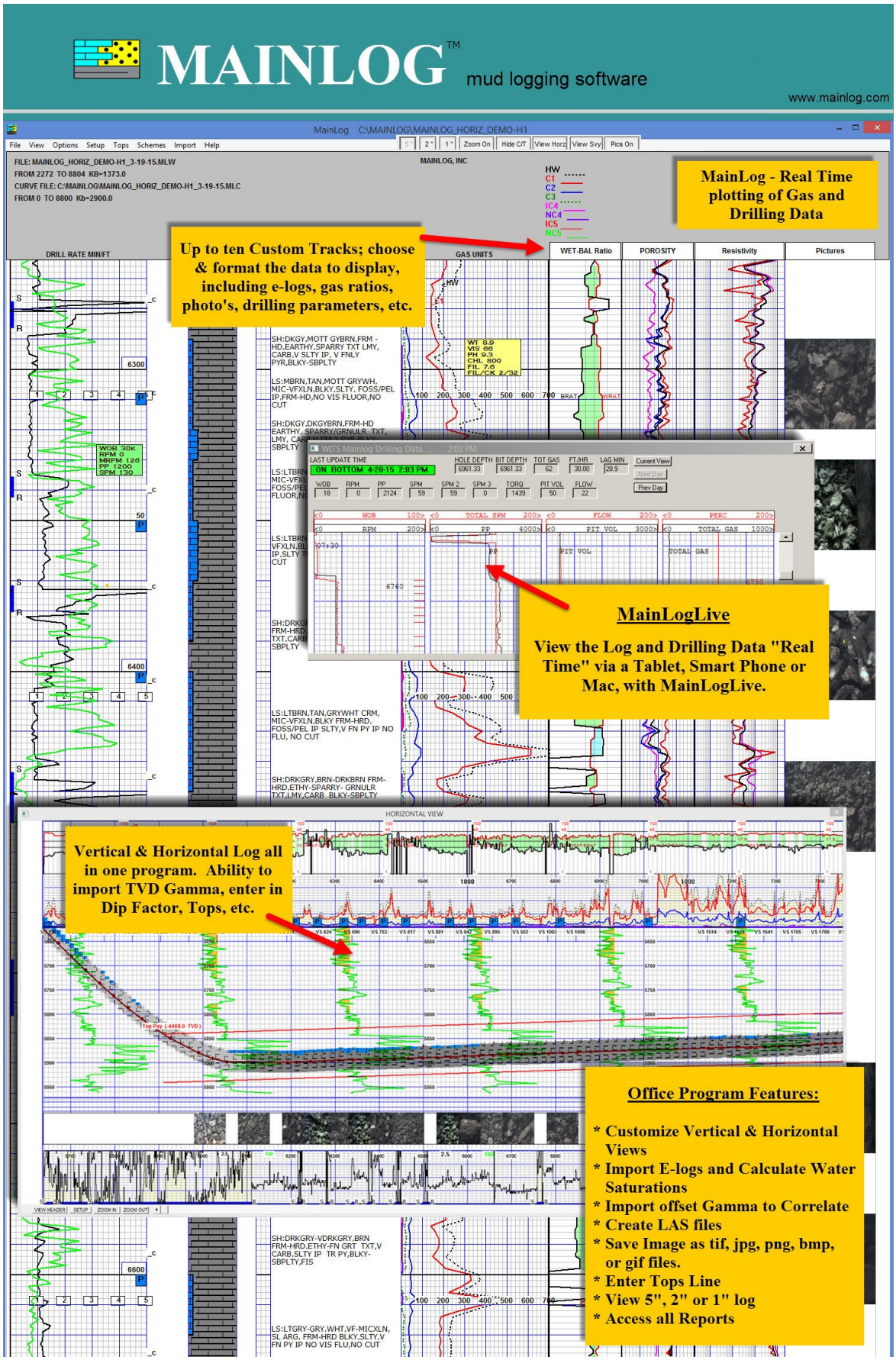
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