The Record

Denver Geophysical Society

Volume 47 Number 2 June/July 2022

Upcoming Events

DGS Golf Tournament—July 21
The Ridge at Castle Pines

August Luncheon—August 11 @ 12:00pm

IMAGE '22—August 28—September 2
Houston, TX

September Luncheon—September 8 @ 12:00pm

October Luncheon—October 13 @ 12:00pm

DGS Elections—October

November Luncheon—November 10 @ 12:00 pm

Holiday Party—December 8

In This Issue

Technical Talk

Trends in Seismic Acquistion

- C. Jason Criss, Inova Geophysical
Sugarland, TX

Trends in Seismic Acquisition

Seismic acquisition in open terrain areas is driving innovations in seismic recording equipment and operational strategy. Vast regions of open desert in areas like the Middle East have few driving restrictions and limited permit issues and do not have the complexities realized in North American operations. Operations in these regions will involve dramatically larger projects with unprecedented volumes of recording equipment. In comparison, North American projects are much smaller in scale and more focused on specific prospects for enhanced drilling operations. Projects with more challenging and restrictive terrain and complicated permit issues tend to dictate project size and timing. Operators may benefit from utilizing the trends developed in open terrain regions with vibroseis sweep design and operational strategies. While many of the concepts are known and understood, a review of the trends and benefits can prove beneficial to the smaller more complex projects faced by companies in our region.

Seismic Nodes

The acceptance and utilization of nodes in seismic acquisition was adopted originally in North America. The local seismic operators closely recognize the advantages of reduced equipment volumes and weights. Nodes have progressed dramatically from the original designs, which utilized separate batteries and had connectors for traditional geophone strings that had limited run times. INOVA Geophysical current node technology, Quantum, is an all-in-one single channel recording system that can operate continuously for up to 50 days or more resulting in operations restricted only by shot rate. One original objection to seismic nodes was the lack of real-time quality control. Time and experience have shown that equipment reliability and new methods for quality control have eliminated those concerns. INOVA's long-range wireless QC communication technology, HyperQ, is showing great promise in eliminating the issues with quality control of Quantum nodes.

Figure 1 Quantum seismic

HyperQ utilizes LoRaWAN technology, which is an acronym that stands for low power and wide area and is a technology developed as part of the Internet of Things philosophy. Similar to chirp spread spectrum modulation, LoRaWAN allows for radio connectivity on exceptionally low-power devices but with operational ranges of several kilometers. This technology has been implemented and utilized extensively in node projects in the Middle East. Operators have been able to monitor thousands of nodes at ranges exceeding five kilometers with vehicle mounted antennas and drones. Although LoRaWAN is still a radio technology and subject to traditional restrictions, the extended range has been shown to have a dramatic impact on the process of managing the health of large deployments of nodes. Drones have seen a great deal of use in these areas and may have found a critical operational purpose in seismic. In some regions, autonomous drone flights are allowed with certain restrictions making node spread quality control very practical, timely and efficient from an operational perspective. Even if autonomous drone operations are not allowed, the increase in communication range is a game-changing technology. The implementation of low power LoRaWAN technology in current single channel, all-in-one nodes has had only a marginal impact on run times due to the low power consumption reducing run times by 5% or less.

Technical Talk *continued on page 3*

Large projects in the open terrain of the Middle East are the last regions to embrace the advantages of nodes but projects that are seeing the greatest absolute benefit. Nodes have proven to have a dramatic impact on operational issues. Nodes have resulted in reduced crew sizes, the use of smaller less costly vehicles and more agile and environmentally friendly seismic operations. Design of acquisition geometry is unconstrained by cables, and we are beginning to see high density grid-based geometries. The benefits of seismic nodes are being realized in every region and are capturing greater proportion of the global seismic activity.

Sweep Design

Sweep design technology for enhanced low frequency vibroseis operations has found broad acceptance in Middle East operations and was originally utilized on extensive projects in Oman. Characterized as sweeps that are designed for a specific vibroseis type, the custom sweep drives the low frequency portion of the sweep spectrum at near theoretical limits to maximize force output. Referred to as low dwell, sweeps are designed to dwell for a longer portion of the sweep at lower frequencies and power settings before transitioning to a traditional linear sweep for higher frequencies. Sweeps starting as low as 1.5Hz have been utilized on millions of source points on projects in the Middle East to date. Analysis and results have shown consistent reflection data in the 2-3Hz range with all types of vibroseis.

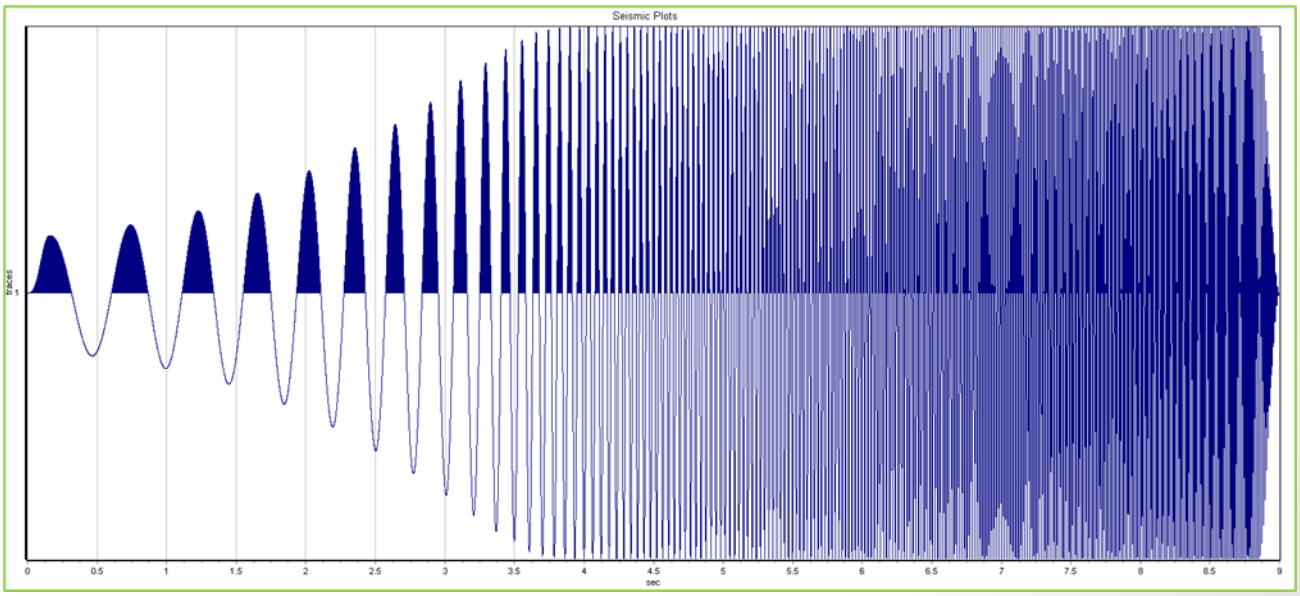

Figure 2 Figure shows a 9 second 1.5-86 Hz low dwell sweep typical of sweeps utilized on projects in the Middle East.

Harmonic Distortion

Harmonic distortion algorithms that effect control on the servo valves results in reduced distortion and increased fundamental force output. Originally experimental, the current versions of the technology are now used routinely on projects because of the improved performance. There is substantial evidence showing that an unrelated benefit of reduced harmonic distortion is that there is a reduction in the air wave generated in vibroseis sweeps. Both benefits of harmonic distortion are viewed as small but incremental improvements in results.

Newest Vibroseis

Other aspects of vibroseis technology continues to evolve. Electronic monitoring of vibroseis mechanics and fluids is resulting in better maintained more consistent operations. More fundamentally, new vibroseis designs are much quieter. Analysis of vibroseis mechanics have shown that the most overwhelming source of acoustic noise generated by vibroseis is caused by the hydraulic cooling fans. Alterations to cooling fans design have reduced the acoustic signature of the newest vibroseis by 17dB. Middle East experiments show that the acoustic noise is picked up in sensors out to a

Technical Talk *continued on page 4*

kilometer or more and results in chimney noise in seismic records. By reducing the recorded acoustic noise, the overall signal-to-noise of unprocessed recorded data is improved, especially at the nearest offsets.

INOVA's newest large vibroseis, the AHV-V TITAN, is an 80000lb vehicle designed to produce more low frequency force due to the doubling of the mass stroke. While 80000lb vibroseis are seldom utilized in North America due to regulations, a 60000lb variant of the vehicle is envisioned. The doubling of the mass stroke increases the low frequency force output of the vibroseis in the frequencies below 5Hz.

Figure 3 shows the AHV-V Titan during trials in Oman.

When combined with the low dwell sweep design the combination of technologies is altering the perception of what is possible. The first large scale project with this combined technology is nearing completion in Oman and the results are characterized as excellent by the end client. Other experiments with the same technology combination suggest that sweep durations can be reduced with no degradation in data quality. On projects with hundreds of thousands of source points, the reduced sweep time will result in substantial time savings. If applied to smaller more challenging North American projects, the same benefits can result in higher density shooting with less cost. Applying the technology advances for the greatest advantage in each situation will yield better more effective project results.

Conclusion

The large projects in the Middle East and subsequent demand for seismic equipment tends to drive trends in hardware development. These advancements can be utilized on smaller more challenging projects in other regions of the world. Adapting and utilizing these technology advancements to the greatest advantage for each project is task of operators who have historically shown a great ingenuity to optimize and improve the ultimate results.

Jason currently serves as Chief Geophysicist for Inova Geophysical LLC. Jason holds a BSc in Geophysical Engineering from the Colorado School of Mines. He has 39 years of broad based experience in the global geophysical community that includes seismic data processing, refraction statics, and seismic survey design and seismic acquisition project management, seismic hardware and software development. Jason has published articles which include topics on turning ray tomography, refraction statics, acquisition design, and several publications on the utilization of seismic acquisition recording equipment and sources.

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Information for Contributors

Your editorial contributions are encouraged, particularly about classes, seminars, personnel news, company news, or other items of interest to the geophysical community. All suggestions and manuscripts should be emailed to DGS at office@denvergeo.org. Targeted deadline for submissions is the first of the publication month (February, May, August, November) but exceptions can be made with the editor's approval. We reserve the right to edit all material according to standard practices.

Opinions expressed within are solely those of the authors. They are not to be interpreted as those of the DGS.

Executive Corner

By Jeff Zawila
SM Energy
2023 DGS President-Elect

Wow! Thanks for the chance to pull out my soapbox and pontificate to the masses for the short time I have your attention. It'll be challenging following Morgan's insightful thoughts from the February Executive Corner. My first shoutout from the soapbox is to Xan Davidson for resurrecting The Record to its former glory like a phoenix rising from the ashes. Keep it up Xan! I look forward to your work this year.

I want to highlight and discuss three items with you (assuming you haven't ripped out this digital page and thrown it in the recycle bin): 1) the 3D Seismic Symposium, 2) the value of a geophysicist nowadays, and 3) the impact of the Ukraine-Russian war on the oil industry.

The 27th Annual 3D Seismic Symposium was held on March 23rd at the Ellie Caulkins Opera House **LIVE and IN PERSON**!!! It was awesome to see everyone there and the smiling faces without masks! The Executive Committee gives a big thank you to all of the speakers that shared their technical knowledge during the symposium, the sponsors that contributed to a successful 3DSS, the exhibitors that showcased their wares, and especially to the behind-the-scenes hard work of the 3DSS Committee driven by the leadership of co-chairs Brad Birkelo and Sarah Gach. A big thank you to each of you. As I mentioned earlier, it was awesome to see everyone, the unobstructed big smiles on faces, and catching up on the last two years of each other's life. I certainly hope each and every future 3DSS is held in person.

Now for my second point…how does a geophysicist demonstrate their value in this world of the evolving energy transition, research, government, or environmental work? I've been in the energy industry for 25 years (oh my…the time flies by) with biased energy industry experiences that I want to share with you and hopefully include some wisdom, which my children may disagree…but I digress. I find geophysics exciting because it's the only remote sensing tool that fills in between data points whether it's 2D profiles or 3D grids. The value of geophysics is when it's combined with other data types to explain the big picture. Once the geophysical tool of interest is calibrated to the other data, then you have a tool that can predict everything in the subsurface between the data points. If you are in a for-profit organization, then focusing on the bottom-line dollar impact of the geophysical tool of interest is what creates a "valuable geophysicist". If you are in the government or research, then focusing on how your geophysical tool makes the biggest impact for the public will help garner more support for your "valuable geophysical efforts". If you are in the environmental field, calibrating your geophysical tool to predict where toxic plumes extend will protect the public and you become a "valuable geophysicist". Each of us can create value by integrating our geophysical data with other data sets to predict what is in the subsurface. I challenge you to do so!

Finally, when Russia invaded Ukraine on February 24th, it sent reverberations around the world. Oil prices shifted significantly higher, countries around the world denounced the actions, and most surprising to me was the speedy nature of numerous companies denouncing/reducing/exiting Russia (Towey et al, 2002); including large financial impacts to businesses including BP's write-down of $25.5 billion dollars in a single quarter. Since technology allows information/images/videos to be shared around the world instantaneously, the reactions of governments and especially businesses have been nearly as swift. In my 25 years in the oil and gas industry, I do not recall businesses reacting so quickly to denounce and exit an individual country. Through my numerous years working, I do not recall so many countries pivoting their energy security away from a single country. On February 24th, seismic reverberations were sent around the world like the ringing of a magnitude 9.0 earthquake that is still being felt: the rise of oil prices, countries

Continued on next page

Executive Corner ***continued from last page***

denouncing Russia, companies exiting Russia swiftly, higher prices for all goods, millions of Ukrainians being displaced, countries and people opening their borders and homes for the displaced, and numerous other items too long to list here. There's been a seismic shift in the world and how it ends, I do not know, but I hope it happens soon to the benefit of humankind.

Towey, H., Al-Arshani, S., Biron, B., and Hanbury, M. (2022, March 10). *Here are the major US and European companies pulling out of Russia following the invasion of Ukraine.* Business Insider. https://www.businessinsider.com/list-all-the-companies-pulling-out-of-russia-ukraine-war-2022-3

WE MOVED!

Denver Geophyscial Society has moved their mailing address.

Our new address is:

730 17th Ste B-1
Denver, CO 80202

Keep it Professional

Jess Vahling, Occidental Petroleum and DGS Treasurer, was promoted from Staff Senior Geophysicist to Geophysical Advisor. Jess has worked for Oxy for three years and was previously with Anadarko Petroleum, Hess Corporation, and Murfin Drilling.

Do you have news you would like to share with the community? A job change or a new promotion? Anything that's industry/job related, we would love to share your news. We aren't necessarily looking to share that Bob is now a grandfather but we would love to celebrate your accomplishments. Send 2-3 sentences with your name and what your news is and we'll add it to the next newsletter. For consistency, DGS reserves the right to edit and limit what gets published. So, if you really want your news shared, remember to "Keep it Professional."

Registration closes July 13! Don't forget to sign up.

Enjoy a day of special events, networking and 18 holes of golf including cart, breakfast, lunch, beverages, door prizes and an exciting awards banquet... All for just $600 per 4-Some or $150 per individual. Non-Members add $50.00 per player (includes DGS membership).

Thursday, July 21, 2022 7:30 am Tee Off
The Ridge at Castle Pines North playtheridge.com

CONTESTS

- Longest drive contests
- Closest to the pin challenge
- Hole-in-One Shootout
- And much more...

Early Registration
$600 per team or $150 per player
Non-Members add $50 (includes DGS membership)
Sponsorships Available
Contact Mathew Romero – golf@denvergeo.org (303) 725-4598 for sponsorship opportunities and information
Registration Limited
Please pre-register by going to: denvergeo.org

ROCKIES BASEBALL - June 16, 2022

The DGS hosted members at the Rockies baseball game on the afternoon of June 16, 2022. Despite falling to the Guardians 4-2, 12 members of the DGS had a fantastic time meeting each other, discussing shop, networking, and enjoying a beer or two under the hot summer sun. Attendees represented folks from all scopes of geophysics - from SM Energy and Occidental to Halliburton and IKON Science, and more. Looking forward to the next networking event - keep your eyes peeled!

Machine Learning/ Artificial Intelligence Workshop

DGS is looking to offer an ML/AI workshop this fall. We are interested to know if members would be interested in participating or helping to plan the workshop. If you are interested, please contact Jeff Zawila at jzawila@sm-energy.com.

Editor's Comments

- Xan Davidson

Hi Members, I hope this finds you all well. Here's my second issue of The Record. I would like to acknowledge Jason Criss for being the first person this year to offer up a technical article for The Record. The goal was to have the second issue out at the end of May but I still didn't have any content to put in the journal other than the golf tournament and the meeting minutes. I would like to remind everyone that this is an all-voluntary journal. If people aren't willing to submit content, then there's really no reason to publish. It begs the question, are people still interested in having The Record published? It's a constant conversation amongst the executive committee and something to ponder in the future. If you enjoy the publication, please consider submitting content. It's easier to have too much than too little.

Enjoy the summer weather.

HELP!

Technical Article

We are looking for technical articles and content for The Record. If you have a work in progress, a technical article, or a talk that you've written into an article, we'd love to consider it for publication. Please contact us at office@denvergeo.org to discuss your submittal. We look forward to reestablishing a tradition of quality technical work in The Record.

We do not restrict additional publications of your article, either in part or whole. Please note that if you have published it elsewhere, you will need to verify to us that DGS will be able to be publish the article. We will need information on where it has been published, when, and by whom.

STUDENT CORNER

We have received feedback from our members that updates on Colorado university geophysical programs is of great interest. We are, therefore, starting the Student Corner to highlight the university programs, and in particular the students of these departments. If you are or have a student or a department, research group, or project that you would like highlight in The Record, please reach out to office@denvergeo.org, and we can discuss inclusion in the Student Corner.

The general idea behind the Student Corner is to highlight work and achievements, but not as a technical article. We hope to leverage the column to make programs and projects more visible to our community, and highlight students and their accomplishments. It's also a great opportunity for students to make themselves known to our membership in preparation for entering the work force and build critical networking opportunities.

Prospects

As another addition to The Record, we are starting a prospects listing section. If you or your company have a prospect you would like featured in The Record, please send a copy of it and information to office@denvergeo.org.

3D SEISMIC SYMPOSIUM

PRESENTED BY THE DENVER GEOPHYSICAL SOCIETY

After a three-year in-person hiatus, the 3D Seismic Symposium returned on March 23, 2022 at the Ellie Caulkins Opera House. Headlining the "Reflecting On Our Future" Technical Program was past SEG President Klaas Koster, Chief Geophysicist for Occidental Petroleum with a talk entitled "The Bright Future of Geophysics." Our lunchtime keynote address was given by Alex Cranberg, Chairman of Aspect Holdings, LLC with "3D and Me: Surveying the Past 30 Years."

The diverse technical program included talks from the Permian Basin, the Marcellus, the DJ Basin, the Western Canadian Sedimentary Basin, the Rockies, and Colombia. The program highlighted technologies including dense 3D seismic acquisition, seismic inversion, neural networks, VSPs, and reserve estimation. Andrew Keene, of SM Energy, won the R. Randy Ray Best Speaker Award for his talk "Improving drilling efficiencies by utilizing 3D seismic inversion data and advanced wellbore planning, Permian Basin, Texas."

Brad Birkelo kicking off the 26th annual 3DSS Seismic Symposium.

The 3D Seismic Symposium was strongly supported by our 64 sponsors and 12 exhibitors and the organizing committee would like to thank them for their support. The Co-chairs of the organizing committee would also like to recognize the hard work of the volunteer committee members, Morgan Brown, Douglas Carlson, Mark Davidson, Jim Folcik, Todd Gibbs, Jason Harms, Heather Johnson, Sy Luke, Scott MacKay, Dave Scolman, Sissy Theisen, and Sally Zinke, who followed the tradition of the previous 26 committees and put on an outstanding symposium.

The 28th 3D Seismic Symposium is tentatively scheduled for March, 2023. Please mark your calendars, prepare your talks, and consider joining the 2023 organizing committee.

Regards,

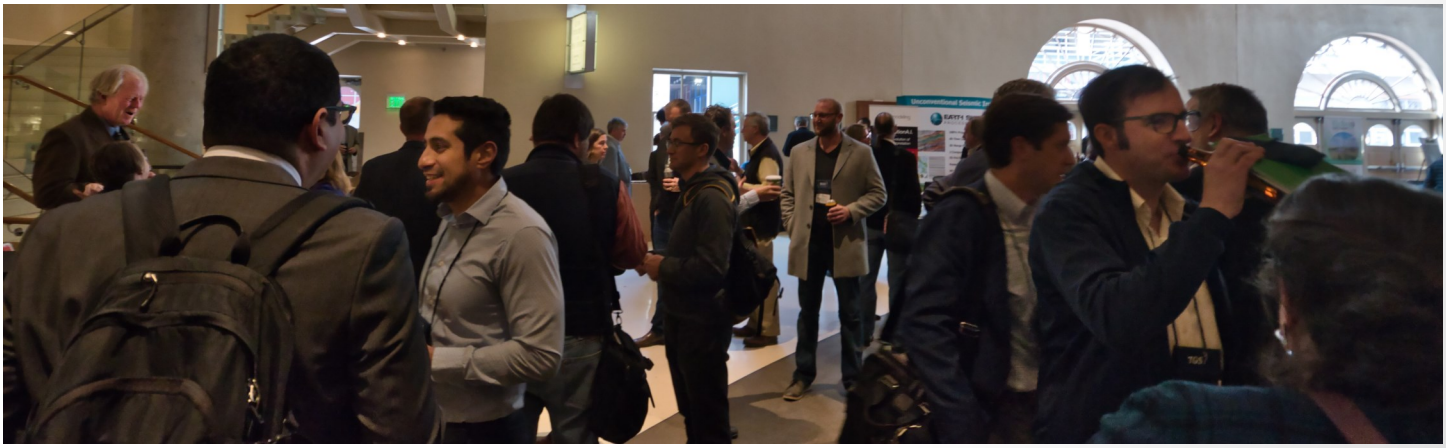
Brad Birkelo and Sarah Gach

27th 3D Seismic Symposium Co-chairs

If you'd like to join the 2023 Committee, please reach out to: 3dsschair@denvergeo.org or office@denvergeo.org.

Klaas Koster giving the opening talk at the symposium.

Andrew Keene being presented with the Best Paper Award by Brad Birkelo and Sarah Gach.



Happy Hour on the exhibition floor.

Election Information

The 2023 election process is about to begin and we are looking for individuals who would be interested in serving on the executive committee. Available positions for the 2023 year are: Vice-President/President-Elect, Secretary, Treasurer, and Editor. See below for requirements and responsibilities. If you are interested or know someone who is, please send an email to office@denvergeo.org.

Officer Requirements per the DGS by-laws:

Article VI - Officers Section 1. The officers of the Society shall be President, Vice President-President Elect, Secretary, Treasurer, and Editor. The Vice President-President Elect shall assume the office of President the following year. All other officers shall be elected for a term of one year or until their successors are elected. Secretary and Treasurer shall serve no more than 2 consecutive terms.

Section 2. The President and Vice President-President Elect shall be Active Members in good standing of the Society of Exploration Geophysicists (SEG).

Section 3. A vacancy in the office of President shall be filled by the VicePresident-President Elect. The vacancy thus created in the office of VicePresident-President Elect shall be filled by special election. Any other vacancy shall be filled by ballot of the Executive Committee.

Section 4. The newly elected officers shall assume the duties of their respective offices at the close of the Annual Meeting following their election.

Officer Responsibilities per the DGS by-laws:

Article VII - Duties of Officers Section 1. The President shall preside at the meetings of the Society and Executive Committee and may call Special Meetings of the Society and/or Executive Committee when deemed necessary. The President may appoint members to represent the Society and/or appoint such committees as are required for the purposes of the Society. The President shall sign all contracts for the Society, such signature to be witnessed by an additional member of the Executive Committee to witness said signature. A copy is to be filed with the Society office with notification to Secretary. The President shall be ex-officio member of all Society committees except the Committee on Nominations. The President shall be responsible for the preparation and mailing of election ballots.

Section 2. The Vice President-President Elect shall assume the duties of the President in case of vacancy in that office, or during the absence or disability of the President. The Vice PresidentPresident Elect shall be responsible for arranging the monthly meeting programs and shall have authority to appoint such assistants as required. The Vice President-President Elect shall assume such additional duties as may be assigned by the President or the Executive Committee.

Section 3. The Secretary shall record the proceedings of all meetings of the Society and Executive Committee. The Secretary shall serve as Chairman of the Membership Committee and maintain a complete list of the membership of the Society. The Secretary shall provide a description of the technical program of the Society's monthly meetings to the SEG. The Secretary shall perform other duties as may be assigned by the President or the Executive Committee.

Section 4. The Treasurer shall be custodian of all funds of the Society. The Treasurer shall make annual financial reports to the membership on the state of the Society's finances, and such report shall be published on the Society's website. The Treasurer shall make periodic financial reports to the Executive Committee, or when requested. The Treasurer will perform other such duties as may be assigned by the President or Executive Committee.

Continued on next page

Section 5. The Editor shall be in charge of editorial business under the direction of the Executive Committee. The Editor shall have authority to solicit papers and material for the Society's regular and special publications on paper or any other electronic means, and may accept or reject such material. The Editor shall be responsible for printing and distribution of all Society publications. The Editor may appoint associate and other editors and such assistants as may be required. The Editor will perform other such duties as may be assigned by the President or Executive Committee.

Please visit denvergeo.org/advertising-in-the-record/ to purchase advertising.

The Record plans to publish February, May, August, November with a special elections issue. Please note that purchasing the yearly rate after May will carry your advertising into 2023.

Monthly Luncheon Talks

Thank you to everyone who has given a talk or is signed up to give one.

August's Talk:

We are looking for a speaker for August. If you are interested, please contact Jeff Zawila at SM Energy. His contact information is 406-633-3108 or jzawila@sm-energy.com.

September's Talk:

RESERVOIR QUALITY AND WELL PERFORMANCE ANALYSIS IN THE MIDDLE MEMBER OF THE LEWIS SHALE, GREATER GREEN RIVER BASIN, WYOMING.

Carolina Mayorga-Gonzalez

Abstract:

The Lewis Shale is a turbidite system encompassing sandstones, siltstones, and organic-rich shales deposited during the last Cretaceous seaway transgression. Its lithological characteristics vary depending upon its location within the Lewis Shale depositional basin (eastern Greater Green River Basin). This basin is a large oil and gas producer in the United States, and it is expected to increase in the upcoming years. As a result, drilling operations in the area can significantly affect the wildlife by impacting their habitat and reproduction areas.

The main concerns of log analyses in tight sandstone reservoirs are porosity estimation, accurate water saturation calculation, permeability determination, and understanding how clay affects log responses. In addition, petrographic thin section, routine, and special core analyses are necessary to develop a reliable petrophysical model. Several authors have mentioned some of the petrophysical properties of the Lewis Shale. However, there are no petrophysical models in the sandstone intervals tying together log and core data to the author's knowledge. Completion techniques are often one of the most expensive parts of drilling and producing a well. Therefore, the costs of proppant and completion fluid are significant in determining individual well or even field economic viability. To identify which one was affecting the production the most, the production analysis was made using the volume of proppant, the volume of fluid injected, the number of fracture stimulation stages, and production to infer their effect on production. But it seems there is no correlation between them.

The objective of this work is to develop a high-resolution reservoir characterization. This analysis is crucial for understanding this play and decreasing uncertainty when planning new well placements. This formation is considered an unconventional reservoir due to its low porosity and permeability and the need to use hydraulic fracturing to obtain hydrocarbons at commercial rates. In addition, this area around the cores is relatively undeveloped for horizontal wells. The petrophysical characteristics of these four core displayed the same level of heterogeneity as the facies described. Samples have high variation in water saturation values and, in general, very low porosity and permeability, characteristics of these reservoirs.

Ligia Carolina Mayorga-Gonzalez is a PhD from Colorado school of Mines. She obtained her degree in May 2022.She obtained her undergraduate degree in geology at the Universidad Nacional de Colombia in Bogota. She then pursued a master's degree at the University of Oklahoma. She worked for two years as a reservoir geologist at MorningStar Partners focusing on the Lewis Shale formation in Wyoming.

DGS Meeting Notes – March 16, 2022

Attendees: *Mark Davidson, Joel Scott, Jess Vahling, Andrew Keene, Xan Davidson*

Minutes from February approved.

Treasury report: $85,426.71 in the bank by end of February. PayPal empty – Jess moving money to bank ($7,505.33 transferred). Cash on hand - $160.00. Lots of 3Dss checks and sponsorships**. Overhead: $3,494.42… revenue at $4,958.58.**

3Dss: Registration closes night of 3/16 (110 people total, before adding presenters and exhibitors). Total head-count roughly 140 folks. Ellie Caulkins did not receive insurance documents needed – Jeff said he sent, but Mark to follow up with Jeff this evening.

Icebreaker Tuesday evening (3/22 at 4:30) and registration starts Wednesday (3/23) at 7AM, talks start at 8AM. Vendors can show up as early as 6AM on Wednesday to set up. Mark/Joel to send an email to all registered to remind them of icebreaker events.

The Record: Still need technical paper suggestions for *The Record* and Jeff still needs to write executive corner note. Renjin reached out to write a technical piece, and we need a couple others as well. Joel said Jim at CSM might be able to write one as well. Anyone with contacts at other Universities in CO or any ideas – reach out and send Xan information.

Student Challenge Bowl approved for Thursday, April 21. Andrew to let Scott know and wheels moving.

Luncheon: Meal cost is $21 per person (member), $35 for non-members – thoughts to move to $25/person to help offset cost of booking. Wynkoop is reserved for April and will continue going forward.

Baseball in July: Andrew and Jeff to determine good date – afternoon game in June. Round up and make a few suggestions, then get ball rolling for RSVPs and ticket packages.

Funds Usage: Joel suggesting implementing geophysical scholarships in local schools, host local trainings or technical courses for those members looking to switch careers, underwrite students to attend DGS luncheons, underwrite students for RMAG luncheons – grab more folks from RMAG, etc.

At next meeting, let's assemble a list of suggestions and determine what to fund and how to fund. Jess to figure out what operation costs will be over the next few years to see reserves, and go from there in terms of use.

Other Business: Storage unit paid through April and set to be on auto-pay afterwards. **Purchase a shelving unit for our storage unit upcoming project! Set up a weekend to clean and inventory.**

Joel has a checkbook and a DGS Apple CPU for the group and he will bring to 3D symposium. Andrew will see if PO Box has these sponsorships.

Meeting adjourned at 12:38PM.

DGS Meeting Minutes – April 13, 2022

In attendance: Morgan Brown, Mark Davidson, Xan Davidson, Joel Scott, Jess Vahling, Jeff Zawila

12:03 Call to Order

Minutes approved – Jeff motioned, Joel seconded, all approved

Treasurer's Report – First Bank account balance as of March 31 was $78,088.73. Balance as of April 8 was $92,172.73. Current Paypal balance is $2,130.62. Cash in hand is $185.00. March revenue was $22,715.33 and expenses were $17,081.51 for a net revenue of $5,633.82.

Checks found from 2020 contained sponsorship for 3DSS and memberships. They will be destroyed by Jess.
Approval of financial report – Joel motioned, Jeff seconded, all approved.

Joel's credit card has been taken off the Sysco system. The new payment is through Jeff.

The Record – Aiming for end of May for next issue. To date there has been interest in the Student Corner, technical articles, prospects information or advertising. Mark will send out an email to members soliciting content. Jeff to write the Executive Corner article.

Joel suggested adding a list of courses offered. If companies want to advertise their course offerings, then they should pay advertising prices? Additional content – information about nominations for Executive Committee for next year is open (include rules from by-laws with it), nominations for honors and awards (again, include by-laws for requirements).

Student Challenge Bowl – is at Aspect and they are sponsoring it with?? RMAG made a $1000 donation. There is to be a happy hour… Andrew can fill in additional information including how many students are participating?

Luncheons – Lily Horne is tomorrow. Jess Barhaug is to talk in May pending outcome of merger, may not be able to present. Might be able to have ?? step in if she can't make it. Still need speakers for Aug, Sept, and Nov. June will be the Rockies game and July is the golf tournament.
Lunches are still at Wynkoop on a month by month basis. Have a few people signed up for virtual tomorrow. Trying to resolve having a mic for the lunch crowd and a mic for the virtual group. Joel bought a headset but Jess has it. Mark will bring his computer and a mic as backup.

Workshop – Deborah Sacrey approached Sarah Gach at the 3DSS about being willing to help put together a machine learning workshop. She said she would help gather speakers for it. Mark suggested adding Compressive Sensing by Peter Eik.

Funds – Looking for ways to use funds to better the community. Perhaps a scholarship. Jeff mentioned that in Tulsa the equivalent organization hosts a student poster session where students present their research to industry during a happy hour type event and they award prizes and money to students. This might be interesting if we could find someone to put it together.
Jess is trying to figure out how much extra funds we have to support events or opportunities before we commit to anything. She is hoping to present more at the next meeting.

DERL Membership – Tap level membership is $500/year. This gets us unlimited access to smaller conference rooms, a mailing address (current P.O. box is $166/yr but is not conveniently located), and luncheon venue (we would need a new day and cost is an extra $50/hr) but would be a good place for workshops.

Jess would like to move away from Paypal and use Quicken for invoicing. Some companies have issue with Paypal invoices. However, Quicken requires a physical address, which DERL would provide.

Vote to approve to buy DERL membership – Joel motioned, Jess seconded, all approved. Jess will reach out to Amanda at DERL.

Meeting adjourned - 1:02

DGS Meeting Minutes – May 11, 2022

In attendance: Mark Davidson, Xan Davidson, Joel Scott, Jess Vahling, Jeff Zawila

12:54 Call to Order

Minutes approved – Mark motioned, Jeff seconded, all approved

Treasurer's Report – First Bank account balance as of March 31 was $78,088.73. Balance as of April 8 was $96,485.59. Current Paypal balance is $187.67. Cash in hand is $0. April revenue was $18,828.89 and expenses were $1,142.00 for a net revenue of $17,686.89.

Approval of financial report – Mark motioned, Jeff seconded, all approved.

The Record – No inputs for ads or technical content for May edition yet. ION technical paper not likely to be approved for May issue. Ask Jess Barhaug to do an URTEC reprint of DJ Basin fiber talk? Need to promote Rockies baseball and Golf Tournament. Jeff Zawila has the executive corner, plans to address the 3DSS, value of Geophysics, war in Ukraine and will send a draft to the excom following the meeting.

Committee Updates – Nominations for excom open. Board to reach out to individuals about their interest in serving. Honorary Membership Committee brought forward several nominations for the 2022 year.

Luncheons – Jess Barhaug talking tomorrow at Wynkoop. 25 registered for in person, 5 online. Jess Vahling to bring microphone pointer, laptop, name tags, sharpies and onsite Paypal card readers. All speakers filled other than the November Luncheon.

Workshop – Deborah Sacrey would like to put on a machine learning workshop with multiple speakers. Excom prefers a single speaker and that we follow a training format rather than presentations. Jeff to follow up with Deborah. Peter Ike recently did a webinar for the EAGE on compressive sensing. Mark to follow up on webinar possibility.

Funds – Looking for ways to use funds to better the community. No new ideas this month, will revisit.

Golf Tournament - No updates. A few registrations and light sponsorships coming through.

DERL Membership – DERL membership paid. Jess to complete formal change of address through USPS and keep PO Box for remainder of term. Blast update in newsletter with new address once completed.

Meeting adjourned - 1:31

DGS Meeting Minutes - June 21, 2022

Attendees: Mark Davidson, Xan Davidson, Joel Scott, Jeff Zawila, Andrew Keene

Minutes approved from last meeting. Treasurer's Report also reviewed and approved. Jeff took care of storage payments.

Address: Andrew checked post office box and confirmed all mail forwarded, Jess confirmed all mail arrived at DERL. Jeff and Mark to notify proper parties of address change.

Website: Joel has a proposal to switch website maintenance company – it would cost an additional ~$350/year and they charge $125/hour for specific support 1 on 1. Motion to accept approved by committee and Joel to follow up with switch.

The Record: Hoping to get edition out this coming week.

Committee: We have a few nominations for folks in the editor, treasurer, and secretary roles. Excom discussed advantages in keeping current positions as folks know the ropes.

Luncheons: Still room for speaker in August, no lunch talk in July – locked in for September and November. Jeff hoping to have August finalized by next meeting in July.

Workshop: Deborah has hosted/seen Machine Learning and/or Artificial Intelligence workshops meet success in Houston, and is willing to help DGS put something together for Denver. She brought up the idea of RMAG/SPE collaboration – Andrew mentioned that he has seen RMAG run these courses with contacts at universities around the metro region.

Jeff thinks 1-3 speakers for a workshop learning session, not a symposium scale. DERL would be a good location for a 40-person work-session, perhaps a half-day or full-day. Looking October or November time frame for this event – Jeff to follow up with Deborah, etc.

Baseball Game: Very successful event – 12 people in total. Shaded seats in section 209, people greatly enjoyed the game and experience. Wide variety of folks from all walks of industry.

Golf Tournament: Roughly 30 members have signed up, to be hosted on July 21. Jeff to send internal email blast to SM folks who participated in RMAG golf tournament.

Next meeting to be held remotely in beginning of July, no lunch talk. Meeting adjourned.

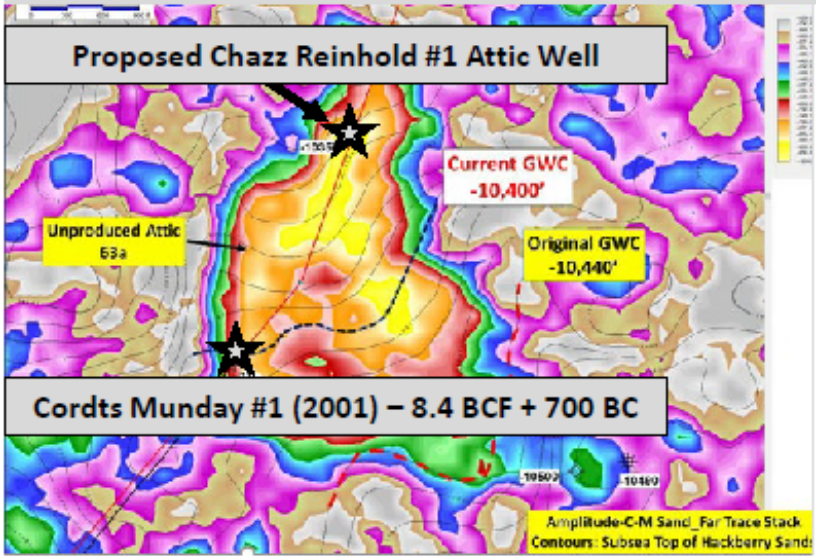
Aspect Energy
Chazz Reinhold #1
Hackberry Sands, Jefferson County, Texas
6.6 BCF & 550 MBC Reserves

Terms	20% back-in after 1X payout w/ 1.5% ORRI. Deliver 73.5% Net.
Leased	100%
Location	Jefferson County, Texas
Target depth	-10,400 ft
Net Thickness	40 ft
Area	63 acres
Reserves	6.6 BCF & 550 MBO
NPV10	$13MM

About Aspect Energy

Aspect Energy is a privately held company with over 25 years of E & P experience in the US Gulf Coast and worldwide. Aspect's innovative approach to 3D seismic interpretation and processing has led to a drilling success rate of near 60% and generation of $1.9 billion PV10 value. Focus on international exploration in recent years has led Aspect to divest remaining US assets and prospects.

Cordts Munday Anomaly



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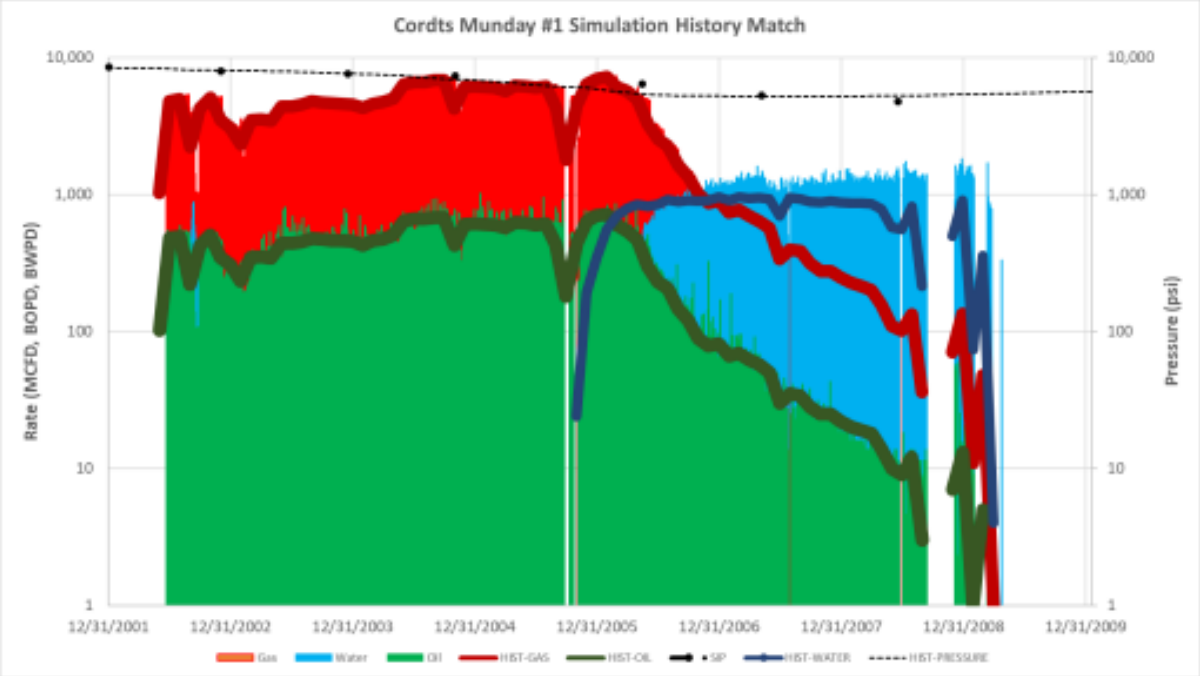
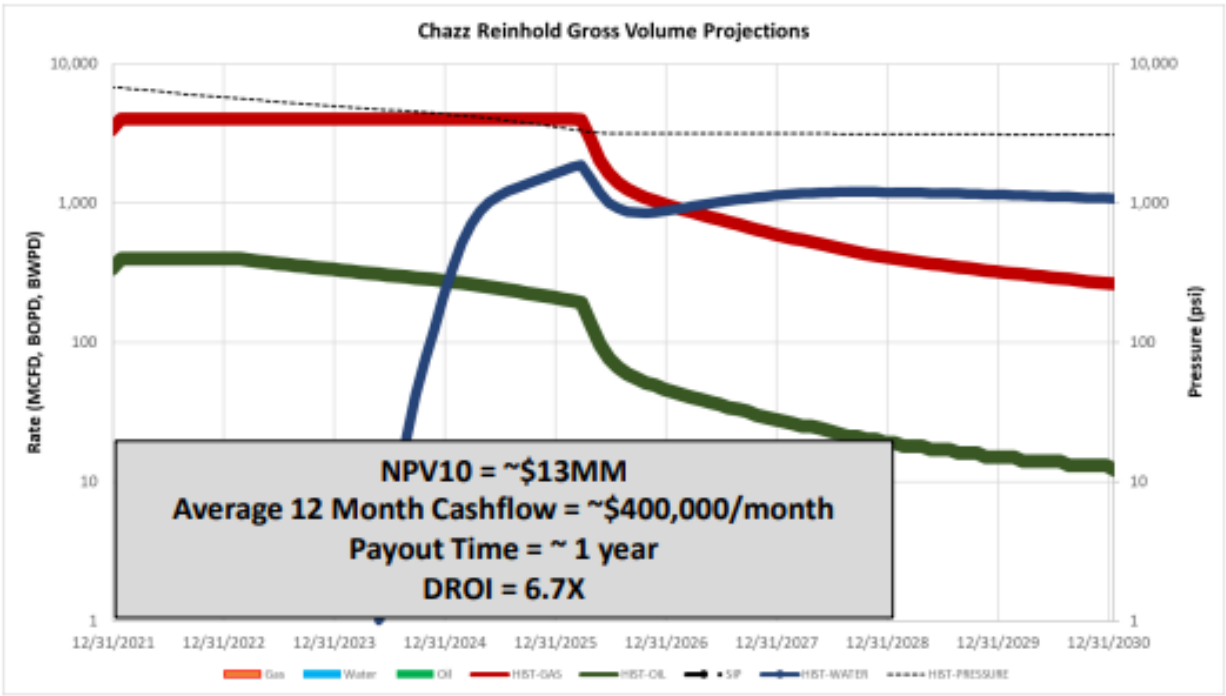
Chazz Reinhold #1
History Match and Economic Summary
$13MM NPV10 w/ 6.7X DROI





Economic model, volume projections, simulation assumptions are available upon request