

MARCH 2019 NEWSLETTER

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MARCH DINNER MEETING

SPEAKER:

Richard J. Goldfarb, Colorado School of Mines

TITLE:

Gold Deposits in Metamorphic Rocks: What we know and Why Are We Getting More Confused?

DATE:

Thursday, March 14th

TIME:

5:30pm Social, 6:00pm Dinner, 6:30pm Talk

LOCATION:

Fort Lewis College, Student Union, Vallecito Room

COST:

\$20/person with RSVP by deadline. 25/person post deadline and/or at the door while food lasts. \$2/person talk only. Eleven students can attend for free IF they contact Dr. Gary Gianniny (gianniny_g@fortlewis.edu) by the deadline.

RSVP:

By Tuesday, March 12th at 5pm. Students, members who are pre-paying and members who just want to reserve a spot and pay at the door can all register at this link (use your preferred buttons): <https://fourcornersgeologicalsociety.org/event/comparing-natural-fracture-systems-in-reservoirs-of-the-san-juan-piñon-raton-and-green-river-basins-by-john-lorenz-scott-cooper/> Or you can RSVP directly to Kim Gerhardt using our officer contact link: <https://fourcornersgeologicalsociety.org/about/>

Thank you student sponsors!!

Chuck Baltzer & E.S.S. - 9 students!

Tim Rynott - 1 student

Jim Corken - 1 student



Environmental
Support
Services



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Four Corners Geological Society, P.O. Box 1501, Durango, CO 81302

www.fourcornersgeologicalsociety.org

Save the Date!

April 25th @ FLC: Graduating Geoscience Seniors: *Senior Theses presentations.*

May 10th @ FLC: Kurt Blair, *Himalayan Mountaineering.* Guests welcome. Plus results of FCGS Officer Elections.

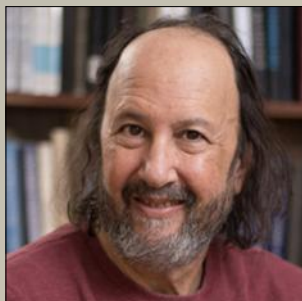
May 11th: Field Trip:
Hydrology and Methane Seeps in the Durango Area.

June 1-2nd: Field Trip:
Geology of the Ouray Area.

August 25th: @ Junction Creek Campground: *FCGS Summer Picnic.*

BIOGRAPHY: Richard J. Goldfarb

Department of Geology and Geological Engineering, Colorado School of Mines, 1516 Illinois Street, Golden, CO, 80401.

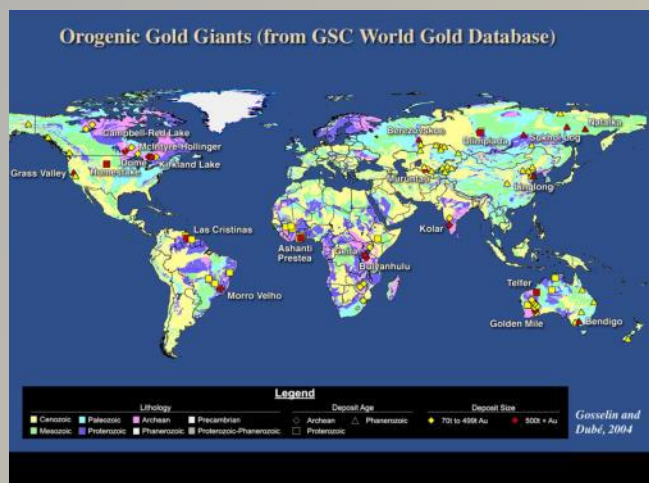


Richard J. Goldfarb was a research geologist with the Minerals Program of the U.S. Geological Survey for 36 years. He has conducted studies on the distribution of gold deposits throughout the world, compiling comprehensive global descriptions of their spatial-temporal setting and evaluating their ore controlling factors. His research has been focused on global metallogeny, geology of ore

deposits in the North American Cordillera with emphasis on orogenic gold, distribution and geology of lode gold deposits in China and elsewhere in Asia, and fluid inclusion and stable isotope applications to the understanding of ore genesis. Rich has senior authored and co-authored more than 225 papers on mineral resources, with many recognized as the authoritative research on gold in metamorphic terranes and on aspects of regional metallogeny. He is a past-president of the Society of Economic Geologists and past chief editor of *Mineralium Deposita*. Presently, Rich is a research professor at

Colorado School of Mines and China University of Geosciences Beijing, as well as an independent consultant to the exploration and mining industry.



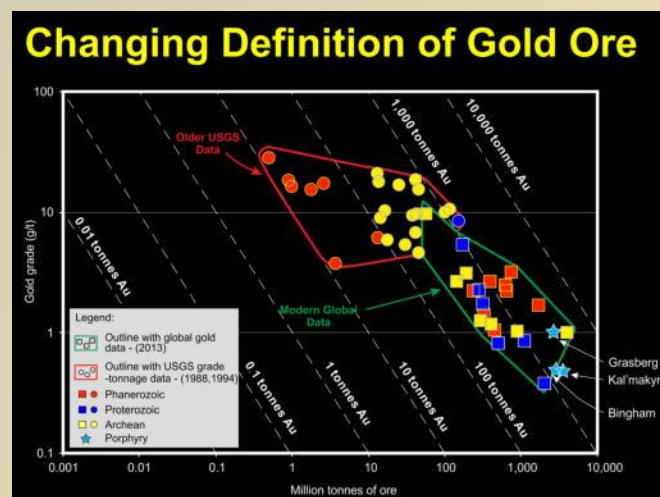


ABSTRACT: Orogenic gold deposits represent the main source of gold in the world's deformed Phanerozoic-Neoproterozoic metasedimentary or Paleoproterozoic-Archean metavolcanic terranes, typically having formed 20-200 million years after their host rock terranes. These deposits are typically characterized by (1) post-peak metamorphic timing; (2) changing far-field stresses in a dominantly subduction/active margin setting; in (3) metamorphosed fore-arc or back-arc locations; (4) a broad thermal equilibrium with country rocks, as indicated by alteration assemblages and lack of telescoped zonation; (5) hydrothermal addition of K, S, CO₂, H₂O, Si, and Au with variable additions of As, B, Bi, Na, Sb, Te, and W; and (6) supralithostatic low-salinity H₂O-CO₂-CH₄-N₂-H₂S ore fluids.

Although these features have been accepted for decades, there has been increased recent controversy over genesis of these deposits. Historically, orogenic gold deposits were high-grade, with gold-bearing quartz-carbonate veins mined underground at 5 to >10 g/t. At higher gold prices, many deposits have produced much lower-grade open-pit ore from hydrothermally-altered rock that would have previously been considered waste, or just distal geochemical anomalies (i.e., <1 g/t). Consequently, interpretation of what is an orogenic gold deposit and what is not has become more difficult. Furthermore, greater complexities tend to be associated with older deposits, such as the spatial overlap of orogenic gold with other deposit types, metamorphism of some giant orogenic gold deposits, and more episodic ore deposition. This likely reflects differences in the Earth's thermal

budget and tectonic processes between the Phanerozoic and Archean.

Whereas our ability to measure many parameters of the ore-forming fluid for orogenic gold continues to improve, and a relatively consistent fluid chemistry continues to be recognized, the interpretation of these data remains equivocal. A magmatic-hydrothermal model, although recently coming back into favor, is incompatible with geological and geochronological data from many regions. Similarly, large gold endowments in numerous juvenile oceanic terranes, indicate an enriched SCLM cannot be the direct gold source. A crustal or subduction-zone metamorphic model remains the most viable ore-genesis model that can be applied globally, with sulfur and gold released from prograde metamorphism of pyrite at depth. In Phanerozoic terranes, metasedimentary rock sequences are potentially an important fluid and metal source, whereas in Archean greenstone belts, the metavolcanic rocks are the only potential source given stratigraphic/structural considerations. The giant Cretaceous orogenic gold deposits in Archean terranes of the North China block indicate that, in some examples, the subducting slab is the only reasonable source for metals and sulfur from metamorphism of pyrite.



Accepting of a universal metamorphic model for orogenic gold adds constraints for targeting. For example, most orebodies will (1) be related to pre-

Continued on page 5.



"PREZ SEZ" by Tim Rynott

Greetings,



The mountain life got the best of us 3 weeks ago when Mother Nature roared and the February dinner meeting was snowed out (or was that a blizzard out?). Great news though, our February speakers have agreed to

come back in September!

As for THIS month.....news flash: Our meeting is ONE WEEK EARLIER. Why, because it was worth it in order to secure Dr Goldfarb as our speaker. His reputation precedes himself and he's a true rock star in the hard rock world.

Speaking of Rock Stars, while president of the Lafayette Geological Society I wrote a column concerning the geo-stud Gordon Rittenhouse. Now that my term with the FCGS is winding down, I thought it befitting to resurrect this column. I hope you read it, believe it, and live it.

Perrins Peak by Tim Rynott



not just happen, but that there is a reason for their being what they are and where they are. What rocks are and where they are is due to a combination of physical, chemical, and biological factors that have acted through time according to definite laws. These factors have left their imprints on the rock in varying degrees and, from these imprints or clues, the history of the rock may be reconstructed with varying degrees of success. This reconstruction of the total history of the rock is to me of paramount importance.

Let's not forget how the elephant appeared to the three blind men—like a wall, like a post, like a snake. Just as we need to consider the entire elephant, we need to consider the entire rock—putting each type of observation and deduction in its proper perspective. We need to ask ourselves 'What properties does this rock have that will tell where it came from, how and under what environmental conditions was it formed, and how has it been changed since it was deposited?' There is a reason why it is like it is today.

With an increasing number of things to observe or measure, it becomes increasingly important to make the proper choice—the choice that will permit us to

Continued on page 5.

Presidents Column, 1995 LGS Newsletter:

I recently reread a speech given by Gordon Rittenhouse in the AAPG bulletin, Vol. 43, No. 7 in 1959. Mr. Rittenhouse was a very enlightened man in his time, and I'd like to share with you the following excerpt from his speech.

"All too often, experience is substituted for thought—not made its partner. Because certain types of observations or measurements have contributed to the successful solution of problems in the past, they are selected and applied indiscriminately to new problems. Here we have one type of "shot gun" approach, based on a philosophy which, in effect, says "If we can make enough observations on enough rocks, put them in a machine and turn the crank, something useful may come out." To some, this is the "modern statistical approach" to geological problems. This maligns statistical methods—which can be valuable in geology—though not as a substitute for thinking. Since this approach does not reach the objective in a minimum of time, if at all, it is wasteful of time, manpower, and money. I prefer the "There is a reason" philosophy.

This may seem quite simple—something that we all do—and therefore you may be wondering why I am talking about it today. It is simple—but it certainly is not something we all do.

What is this way of thinking—this philosophy? It is based on the assumption that rocks as they occur today did

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Abstract, continued.

existing crustal-scale fault systems cutting volcanosedimentary crust; (2) show broadly identical mineralogy and alteration assemblages; (3) have, if present at all, proximal igneous intrusions that will solely represent zones of pre-gold rheologically favorable rock for the location of ore-bearing structures; and (4) be preferentially located in greenschist-facies domains, particularly in Phanerozoic terranes, although several recent Archean discoveries are in amphibolite-facies terranes.



**CALL FOR
ABSTRACTS**

DEADLINE

**April 15, 2019
at 5:00 pm**

**San Juan College
Farmington, NM**

*Animas and San Juan
Watersheds Conference:
Successes and Challenges from
Headwaters to Lake Powell*

Prez Sez continued.

reach our objective in the time available. To me the obvious procedure is to go from the simple to the complex, from the rapid to the slow, from the less expensive to the more expensive. In general, but not always, this will mean going from the large to the small, from the visible to the invisible, from the direct to the indirect. There is no magic formula, no "gimmick", that will indicate what to look for or when. This will depend on the problem, the purpose, the time, the material available, and the way one thinks about rocks. I believe that as we study rocks we should observe, ask "why," and remember "There is a reason".

Interesting, isn't it, the "timelessness" of Mr. Rittenhouse's philosophies? Whether a hundred years in the past or a hundred years in the future, his premise is applicable to any investigative scientist. I agree with his contention that any geoscientist worth their salt is typically a curious person and will invariably ask more questions than they can answer.

But could Mr. Rittenhouse have gone one step further? Could he have taken the philosophical plunge (into pretty deep water, mind you) and added an addendum explaining the potential applicability of his theory to everyday life?

On average, hardly a week goes by that some adverse situation arises which, no matter how trivial, produces an immediate reaction of ire or frustration. But is this negative energy always warranted? Would it be incorrect to say that "jumping to conclusions" and "judgmental" are merely unfortunate expressions which sometimes result from the lack of inquiry? And that this lack of inquiry and the inability to seek alternate solutions frequently start with the inability to consider that "there is a reason". Is it not possible that by considering that "there is a reason", the number of overreactions and false assumptions could be diminished?

Is this being naively simplistic, or conceptually too similar to "fatalistic"? As usual, this will depend on the individual and his or her own personal spin. At a minimum, we're provided with a little food for thought, and the musing that maybe geology does not have to refer exclusively to strikes and dips.

Yes indeed, food for thought. I recommend reading Mr. Rittenhouse's entire speech, which can be found at: <http://archives.datapages.com/data/index.html>.

See you on the 14th.
Rock on.....Tim

NEW MEXICO GEOLOGICAL SOCIETY SPRING MEETING REGISTRATION OPEN



THEME: *Recent Advances in Geophysical Research in New Mexico.*

CHAIRS: Alex Rinehart and Shari Kelly

KEYNOTE SPEAKER: Scott Baldrige, emeritus geoscientist from Los Alamos National Laboratory and one of the founders of the SAGE field program. Dr. Baldrige is the author of numerous papers on the geophysics and volcanology of the Rio Grande Rift.

LOCATION: Macy Center, NM TEch, Socorro, NM

DATE: April 12, 2019

ABSTRACT SUBMISSION: Deadline March 25th.

Abstracts should relate to the theme or to any aspect of the geology of New Mexico or the adjacent area.

GO TO: <https://nmgs.nmt.edu/meeting/>.





SAVE THE DATES, TWO FIELD TRIPS COMING THIS SPRING!!



MAY 11th: FRUITLAND METHANE SEEPS AND HYDROLOGY OF THE DURANGO AREA

Google Earth image south of Durango, CO



Fruitland Fm. outcrop southwest of Durango.



Methane remediation.



Bubbling seep, S. Fork Texas Creek.



Location of Long Hollow dam abutment in Cliff House Fm. and Lewis Shale.

Leaders: Devin Hencman (LT Environmental) and David Schiowitz (SGM), Karen Spray (retired SUIT), Rick Ehat (Ehat Consulting, LLC) and Mike Demming (Retired USBR).

Description: This is a day trip out of Durango. The timing, in mid-May, coincides with spring high water tables that showcase bubbling methane seeps along the Fruitland coal outcrop that rims the northern San Juan Basin. Participants will learn about Fruitland Formation geology, coal bed methane production, historic methane seeps, underground coal fires and how methane seeps are now detected, monitored and mitigated. They will also learn about related hydrology issues spanning Longhollow reservoir in the west to the Pine rivers to the east including Fruitland water rights, litigation and modeling.

Itinerary: Meet 7:40am at Office Depot parking lot to board vans. Stops (from west to east) include Long Hollow Dam, the Cinder Buttes underground coal fires, Valencia gap methane gathering system, lunch at Dallabetta Park, Moving Mountain, Lake Nighthorse Dam, Palmer Ranch seeps, the reverse French drain remediation system on Texas Creek and BP's history at Pine River Ranches. We should be back in Durango by 4:30pm. After the trip relax with a beer at Ska!

Number of Participants: 28. Note - minimal hiking but wear boots or sturdy shoes.

Transportation: Vans. Note - no private vehicles allowed due to stipulations of SUIT crossing permit.

Fee: \$35pp. Includes transportation, snacks & permits. BYO lunch and refillable water bottle.

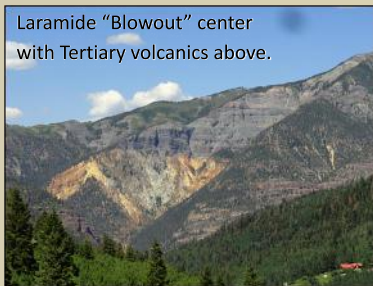
Handouts: Will be available in pdf format on our website. Download and print your own before the trip.

Registration: Opens April 1st through the Four Corners Geological Society website. Must be a member to participate.

Cancellation Deadline for Refund: May 1st.

JUNE 1-2nd: GEOLOGY OF THE OURAY AREA

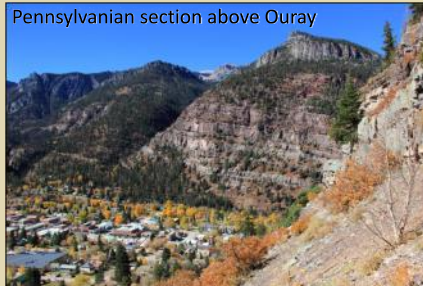
Laramide "Blowout" center with Tertiary volcanics above.



Red Mountain 3



Pennsylvanian section above Ouray



The Great Unconformity



Leaders: David Gonzales, FLC, and Steve Cumella, Consulting geologist.

Description: This will be a 2-day trip run out of Ouray.

Transportation to Ouray and lodging in Ouray are not included in the trip fee. Geologic highlights include Proterozoic basement history, the Pennsylvanian – Permian section, late Cenozoic magmatic events (San Juan volcanic field) and mineralization in the Ouray area.

Number of Participants: 30 including trip leaders and drivers.

Transportation: Carpooling from a meeting location in Ouray.

Lodging: Participants must find their own lodging.

Fee: Not yet determined. Must be an FCGS Member.

Registration: Planned to open May 1st through the FCGS website.

Monument to Miners



Folded Precambrian



PLANNING UPDATE for 2020 RMS-AAPG MEETING CO-HOSTED BY FCGS & GJGS



20/20 VISION

ORGANIZING: FCGS and GJGS now phone conferencing.

DOCUMENT CLOUD: Google Drive site loaded with documents and reports from past RMS meetings, especially the 2012 meeting in Grand Junction.

GEM & 2RCC CONTRACTS: Working on contract with conference planners and Two Rivers Convention Center.

GEM Facilitators Can Do the Following:

- Negotiate 2RCC contract.
- Venue meeting space planning & onsite catering. Oversight of venue during meeting. Exhibit hall management. Signage.
- Registration & packet materials.
- RFP for A/V, security, website & abstract submission.
- Lodging
- Consult w/ steering committee on tasks & timing
- Consult w/ finance committee on budget

Turn HINDSIGHT

to FORESIGHT

at the

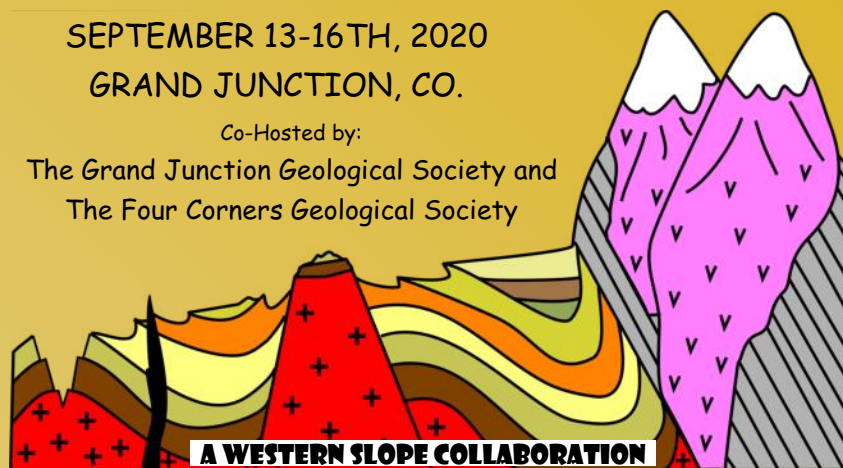
ROCKY MOUNTAIN SECTION AAPG MEETING

SEPTEMBER 13-16TH, 2020

GRAND JUNCTION, CO.

Co-Hosted by:

The Grand Junction Geological Society and
The Four Corners Geological Society



Need volunteers for the following tasks:

(Contact Kim Gerhardt, kim@mydurango.net)

- **SPONSORSHIP:** Solicit sponsors (using lists from past RMS meetings).
- **EXHIBITORS:** Solicit exhibitors & vendors (using lists from past RMS meetings & GEMs list).
- **FINANCE:** Budget & finance committee. Pays up front costs out of RMS meeting account. Estimates income vs expenses to determine registration fees. Collects income. Settles with RMS at end.
- **FIELDTRIPS:** Propose fieldtrips, find leaders, plan logistics, determine participant price.
- **TECHNICAL SESSIONS:** Propose technical sessions, find chairs, find subcontractor to process abstracts (AAPG contact)
- **SHORT COURSES:** Solicit short course instructors. Determine participant pricing.
- **SPEAKERS:** Recruit luncheon speakers (All Convention Luncheon, DPA).
- **AWARDS & JUDGING:**
 - Buy awards to give to last year's winners.
 - Recruit judges via registration form for this year, collect completed forms and determine winners. They will get awards at 2021 meeting.
- **WEBSITE:** Set up meeting website including links to registration & abstract submission.
- **PUBLICITY:** Publicity - use templates from other RMS meetings to make following. (Some help from GEM):
 - Meeting announcement.
 - Call for Abstracts.
 - Info flyers for Sponsors, Exhibitors & Vendors.
 - "Final Announcement" booklet - gets mailed out with opening of registration.
 - "Program with Abstracts" handout with registration material.



2020 RMS-AAPG MEETING

Technical Session and Field Trip Ideas

Need volunteers to work with GJ to revise & finalize list. Find Session Chairs & Field Trip Leaders. Steward the abstract submission process.

Rocky Mountain Cretaceous Shale Plays – Which Way Forward?

- San Juan Basin Mancos Shale play status.
- Piceance Basin Mancos Shale play status.
- Front Range Niobrara Play status.
- Wyoming PRB & BHB shale plays status.
- What affects the producibility of Cretaceous shales and how does it differ between basins?
- Shale core workshop: facies & petrophysics.

Rocky Mountain Conventional Reservoirs & Coal Bed Methane

- New moves in old plays. New information on stratigraphy, structure, petrology, etc.

Paradox Basin Enigmas

- Aneth Field AFTER the release of Resolute cores. Integration of flow unit models with geologic facies models. New insights?
- Aneth core workshop.
- Penn/Perm system – new ideas?
- Is there still life in the Gothic, Chimney Rock, Hovenweep or Cane Creek shale plays?
- Salt tectonics in the Paradox basin – comparison with Gulf Coast.

Structural and Tectonic Reinterpretations in the Rocky Mountain Region

- The creeping overprint of the Cenozoic on the Laramide.
- Fracture patterns and structural histories. Integration of small scale with large scale.

Non-Methane Gas Fields

- Why are they there? Source of the gas.
- McElmo Dome & other CO₂ fields
- Red Mesa & other Helium reservoirs.
- Mississippian carbonate reservoirs for non-methane gas, outcrop and subsurface studies.

Energy Minerals of Western Colorado – A Special Session in Honor of Bill Chenoweth

- Uranium – legacy of the past or path to the future?

Mesozoic Paleoclimates and Non-Marine Depositional Environments

- Recognition of non-marine trace fossils & paleosols in outcrop and core.
- Non-marine reservoirs of the Rockies.

Green River Oil Shale

- Facies studies – Drying cycles, oil shale, Mahogany Bed, microbialites, paleo.
- GR as analog for lacustrine source & reservoirs in other regions.

Fieldtrip Ideas

- San Juan Basin: Mancos Shale facies, conventional reservoirs, CBM, structure & fracturing.
- Piceance Basin: Mancos Shale facies, Williams Fork sands, structure & fracturing.
- Salt tectonics field trip in eastern Paradox Basin.
- Brann Johnson (GJGS) FT in eastern Canyonlands looking at sed / structure / salt movement.
- Arches Park: relay ramp fault style, salt structures, Jurassic sed/strat.
- Mississippian carbonates field trip? Tie-in to non-methane gas fields?
- Fieldtrips looking at eolian and lacustrine environments in Arches, Canyonlands, CO National Monument. Dino prints!
- Green River oil shale – lacustrine facies & analog applications.
- The Book Cliffs: Classic Sequence Stratigraphy of Cretaceous Shorelines.
- CO National Monument – The Uncompahgre Uplift & Great Unconformity.



REGISTER NOW!



DPA Playmakers Series | Moneymakers Business Forum

4 April 2019 | Oklahoma City, Oklahoma, United States

For more information go to:

<https://www.aapg.org/career/training/in-person/forums/details/ArticleId/50878/dpa-playmakers-series-moneymakers-business-forum#1727107-conveners>

The AAPG Division of Professional Affairs is providing new opportunities for professional development and networking through our Playmakers business forums. The new "Moneymakers" format is designed to bring business leaders to speak on their success in developing new plays. Focus is on the business techniques that allowed them to be successful, and in some cases failures that helped them realize their goals. "The business of" will be the primary theme and talks will focus on the major plays in Oklahoma plus other key plays in North America.



FCGS 2019-2020 Elections: Society Officers & Foundation Directors



Nominations will be taken at the March FCGS meeting for officers to serve on the Society Board during the 2019-2020 year. Please let Tim Rynott know if you are interested in standing for election for President-Elect, Secretary, Treasurer or Editor. Descriptions of duties from our Constitution & Bylaws below.

Please let Mary Gillam know if you are interested in serving on the Foundation Board for a term of 1, 2 or 3 years.

Candidates will be announced in April and elections held in May. The new boards will be announced at the May meeting.

Descriptions of the Duties of FCGS Officers

Article IV, Officers. SECTION 3. *President Elect*

The President Elect shall perform the duties of the President in the absence or inability of the President to serve. The President Elect shall assume the office of President in case of a vacancy for any cause in that office. He/she shall serve as Program and Entertainment Chairman and perform such other duties as may be assigned by the President.

SECTION 5. *Secretary*

The Secretary shall be responsible for maintaining the records of the Society, including current copies of the Articles of Incorporation, Constitution, and Bylaws. He/she shall maintain a current list of members and perform other functions related to maintaining membership. The Secretary shall be responsible for recording the actions of the Executive Committee. He/she shall work closely with all officers of the Society in handling incoming and outgoing correspondence and perform other duties as may be directed by the Executive Committee.

SECTION 6. *Treasurer*

The Treasurer shall supervise the receipt of all funds and, under the direction of the Executive Committee, be responsible for all disbursements of funds of the Society. He/she shall recommend for Executive Committee approval a plan of investment for those funds in the Society's treasury generally in excess of those necessary for normal operating expenses, and shall oversee the execution of such an approved plan. The

Submit abstracts to: <https://rmsaapg2019.com/>



**AAPG ROCKY MOUNTAIN SECTION
ANNUAL MEETING**

SEPTEMBER 15-18, 2019, CHEYENNE, WYOMING

CALL FOR PAPERS

DEADLINE MAY 31, 2019

The AAPG Rocky Mountain Section with the Wyoming Geological Association invite abstract submissions for the 2019 meeting in Cheyenne.

TECHNICAL SESSIONS

1. History of Exploration and Production in the Rockies
2. Carboniferous of the Northern Rockies
3. Seismic Application in the Rockies
4. Clastic Resource Plays of the Rockies
5. Exploration and Production in the Powder River Basin
6. Advances in Geologic Storage
7. Total Petroleum Systems
8. Mud Rocks in the Rockies – Lessons Learned and Recent Innovations
9. From Basins to Wells: Structural Geology and Geomechanics
10. Special Topic – A Tribute to Bill Cobban and his Contributions to Stratigraphy
11. Tight Oil Plays
12. Reservoir Characterization and Completions for Tight Plays

TECHNICAL CO-CHAIRS

Mike Bingle-Davis Stephen Whitaker
mikeb@kirkwoodcompanies.com swhitak2@uwyo.edu

Treasurer shall recommend for Executive Committee approval an accounting and audit procedure for Society funds with necessary professional accounting help. He/she shall advise the Executive Committee with respect to the current financial status of the Society for any major expenditure for planned projects and programs. He/she shall make an annual report as Treasurer, arrange for preparation of the Society's income tax filings, supervise book sales and the maintenance of inventory records, and perform such other duties as directed by the Executive Committee. Finally, the Treasurer shall ensure that the Society gives bond, the amount of which shall be determined by the Executive Committee.

SECTION 7. *Editor*

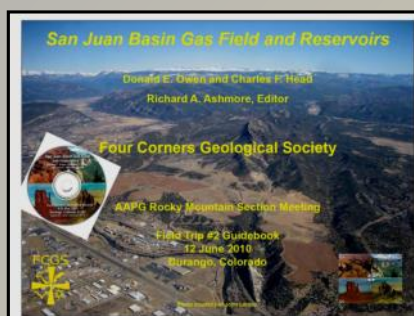
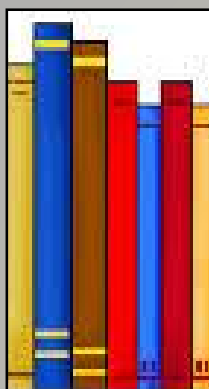
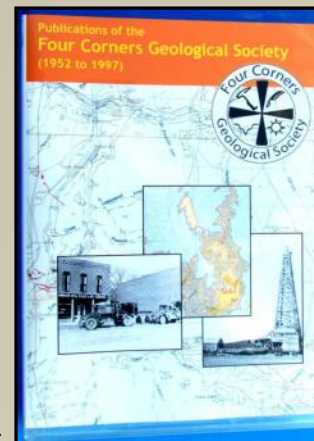
The Editor shall have general supervision and final authority in soliciting, accepting and rejecting all material for publication in the Newsletter and other regular publications of the Society. He/she shall ensure that the Newsletter is published in a timely manner and that it includes all required elements, such as notice of meetings, ballots for electing officers, and notices concerning proposed Society projects. The Editor shall supervise the maintenance of the Society's Website. With the approval of the Executive Committee, the Editor shall appoint, replace and reappoint such other editors and associate editors from among the membership of the Society as may be required to accomplish these activities.



FCGS PUBLICATIONS

Order online at: <https://fourcornersgeologicalsociety.org/bookstore/>

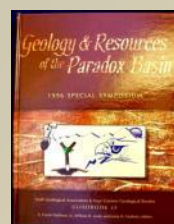
Publications of the Society: 1952-1997. This disk contains all publications of the Four Corners Geological Society (FCGS) from 1952-1997. Includes several which are out of print in hardcopy. Many contain classic papers on the geology of the Four Corners region. Much of the emphasis, but not all, is on exploration for oil and gas. Twenty publications in all. **UPDATED** - now includes Owen & Head, 2010, San Juan Basin Gas Fields and reservoirs. **\$105.**



San Juan Basin Gas Fields and Reservoirs: A Field Guide on CD. 2010, D.E. Owen and C.F. Head. A (CD) field guide of a 200 mile traverse from Durango and back into the heart of the San Juan Basin. Discussion covers Cretaceous and Tertiary reservoir outcrops, landforms, stratigraphy, history of exploration and development, and the hydrocarbon system of the basin. **\$25.**



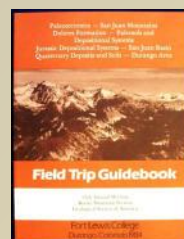
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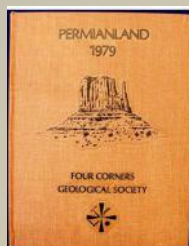
Geology & Resources of the Paradox Basin. Special Symposium with Utah Geological Association. 1996. A.C. Huffman, ed. Thirty-three technical papers and road log. Hardbound. 460p. **\$65.**



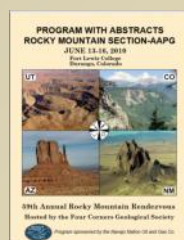
Four-Corners Oil & Gas Fields, Vols I, II, and III. Oil & gas field papers include geologic setting, discovery well drilling and completion practices, and reservoir data for each field. Vol. I&II (1978) includes 242 field papers, 726p. Vol. III (1983) has 95 field papers, 415p. Looseleaf ring binders. **\$60.**



Field Guide - Durango Vicinity. 1984, 37th Annual Meeting of Rocky Mountain Section GSA. Includes excellent road guide. Softbound. 209p. **\$22.**



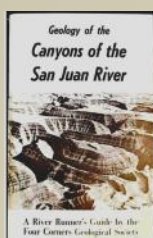
Permianland. 1979. Ninth field conference. Hardbound. 186p. **\$22**



Program with Abstracts: RMS-AAPG 2010. Programs with Abstracts Volume and CD from the 2010 Rocky Mountain Section AAPG 59th Annual Rocky Mountain Rendezvous in Durango, CO, June 13-16th 2010. **\$5.**



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Geology of the Canyons of the San Juan River. 1974. The classic geologic river guide to the San Juan River from Bluff, Utah to Clay Hills Crossing. Softbound, water-resistant. 94p. **\$15.**



Cataract Canyon and Vicinity, 1987, John A. Campbell, Editor. FCGS Tenth Field Conference. Twenty eight papers, Hardbound, 199p. **\$25.**





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