

OCTOBER 2018 NEWSLETTER

FOUR CORNERS GEOLOGICAL SOCIETY

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<https://fourcornersgeologicalsociety.org/about/>

OCTOBER DINNER MEETING

SPEAKER: Jon Thorson, Consulting Geologist

TITLE: *Paradox Basin Natural Resources and the Paleofluid history of the Basin*

DATE: Thursday, October 18th

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

LOCATION: Fort Lewis College, Sitter Family Hall, Rm.710

COST: \$20/person with RSVP by deadline.

25/person post deadline and/or at the door while food lasts.

\$2/person talk only.

10 students can attend for free **IF** they contact Dr. Gary Gianniny (gianniny_g@fortlewis.edu) by deadline.

RSVP: By Tuesday, October 18th at noon.

Please RSVP and pay online using this link:

<https://fourcornersgeologicalsociety.org/event/paradox-basin-fluid-flow-copper-mineralization/>

or RSVP to Kim Gerhardt noaddress.com / (000-0000-2700).



Environmental
Support
Services

**Thank you E.S.S. & Chuck Baltzer
for sponsoring 10 students at the
October meeting!**

Inside This Issue:

Meeting Details	1	Abstract	3	Events & Happenings	7
Speaker Biography	2	Prez Sez	4	Membership Form	8
September Meeting		San Juan College	5		
Pics	2	Sand Cyn. Field Tp	6		

Save the Date!

October 20th

Sand Canyon Fieldtrip
(See notice pg. 6)

November 15th

@ Farmington, San Juan Country Club, Luncheon Meeting: Speaker 1: Guillermo DeHerrera, Jicarilla Oil & Gas, *Stranded Natural Gas in the San Juan Basin*. Speaker 2: Industry professional TBA on *Geology of the San Jan Basin and the Mancos Fm*. PLUS a poster session on the Mancos.

December 13th @ FLC:

Speakers Chris Putnam & Maurice Foye on *Drone Technology*. PLUS Poster session by graduating FLC Geoscience majors.

January 17th @ FLC: Jay LeBeau. Title TBD.

February 21st @FLC: John Lorenz: *Structural geology & fracture studies in San Juan Basin*, title TBD.

March 21st Speaker TBD.

April 25th @ FLC: FLC Geoscience Senior Theses.

BIOGRAPHY: Jon Thorson



Jon Thorson is a consulting geologist from Denver, CO. He has a B.S., 1966, from Washington State University and a Ph.D., 1971, from U.

California, Santa Barbara. His dissertation topic, *Igneous Petrology of the Oatman District, Mohave County, Arizona*, was published in part in USGS Professional Paper 1857-I, Epithermal Gold Deposits – Part I.

He hired on with Exxon Minerals in 1971 working the western US until 1985. He then transferred into petroleum exploration and worked the Rocky Mountain region from 1985 through 1990. In 1990 he left Exxon to become

the sole proprietor of an international consulting practice which continues to the present.

Dr. Thorson specializes in basin analysis, low temperature ore deposits in sedimentary basins and the application of petroleum technology and concepts to minerals exploration. His current activities are in the USA, Canada, South America and Australia.

He also runs educational field workshops in basin analysis and sequence stratigraphy, sandstone-hosted copper deposits, sandstone-hosted uranium deposits, carbonate sequence stratigraphy and Carlin-type gold deposits

September Meeting: Geology of Mars with Kirsten Siebach



PARADOX BASIN NATURAL RESOURCES AND THE PALEO-FLUID HISTORY OF THE BASIN

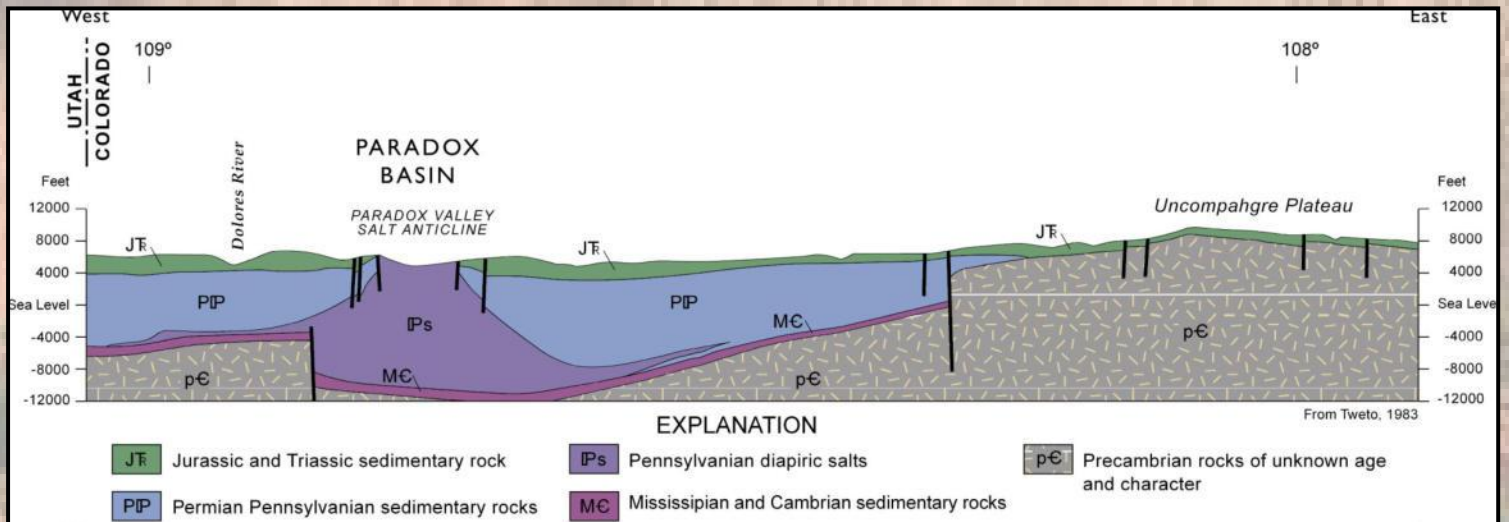
ABSTRACT: The Paradox Basin of SW Colorado, SE Utah, NE Arizona, and NW New Mexico, formed as a Pennsylvanian foreland basin linked to the uplift of the Uncompahgre Plateau. The Basin was periodically isolated and evaporitic, receiving cyclical deposits of dolomite, gypsum, chloride and sulfate salts, and organic-rich fine clastics. The greater Paradox Basin includes marginal carbonate and clastic facies that were time-equivalent to the evaporite facies, and must be included when the paleo-hydrology of the Basin is studied. The connate fluid history of the Basin fluctuated from extremely concentrated saline brines, through moderately saline seawater, to relatively fresh groundwater, and back again to marine seawater.

Most geologists focus on the rocks of a sedimentary basin, or perhaps on the petroleum fluids, but give little attention to the aqueous fluids that saturate the rocks. The Paradox Basin is a treasure-box of natural resources, with production or exploration for potash, lithium, salt, petroleum, natural gas, sulfur, carbon dioxide, bitumen or tar sands, copper, uranium, and vanadium, all of which can be related to the history of fluid generation, fluid expulsion, and fluid circulation within the Basin. Potash, lithium, and salt resources can be related to the Pennsylvanian brine fluid history of Basin, but their production, is probably restricted by the

availability and chemistry of modern groundwater or formation waters. The petroleum products, liquid petroleum, natural gas, sulfur, and bitumen, are first controlled by distribution of petroleum source rocks, but most of their history is controlled by the aqueous fluids that were co-produced under petroleum-generation or petroleum-cracking conditions. The aqueous fluid co-produced during petroleum generation alters the rocks through which it flows, which is a critical rock-preparation step that controls the copper resources of the basin, and possibly controls the source of copper as well. The uranium and vanadium systems of the Basin appear to be controlled by circulation of basinal aqueous fluids and the reduction capacity of hydrocarbons and sour H₂S-rich natural gas. The chemistry of modern groundwater and formation waters in the Paradox Basin reflects that long fluid history of the Basin.



www.emxroyalty.com/asset-portfolio/united-states/copper-projects/copper-warrior/



“PREZ SEZ” by Tim Rynott



Ladies and Gents,

Would you like to know one of the reasons volunteers 'volunteer'?

I have a story to tell, but first some background. At the beginning of my term, it was my humble opinion that our Society had the financial muscle to

increase its philanthropy for this calendar year. Upon querying colleagues, FLC professors and even students, the financial cross-hairs zeroed in on the geology department at Fort Lewis College, and specifically the upcoming Spring Petroleum Geology class and Lab.

I made the recommendation to our Board to approve a \$2500 donation to FLC, to help the momentum for said Petroleum class. After discussion within the FCGS Executive Committee, the leadership of your Society unanimously voted to authorize this contribution. This column does not allow enough space to explain the entire rationale for this decision, but I can say with utmost confidence that we made a well thought out decision. Lest be said, my inbox and old-fashioned telephone are available for anyone's inquiries regarding our decision, our suggestions for future donations.

So back to my story. At our September dinner meeting (which BTW was extraordinary), Gary Gianniny was announcing to the crowd the Petroleum Geology was being added to the Spring curriculum. There was unmistakable cheering from the crowd. In particular my ears took notice of one Mateo Sanabria, who let out a guttural "whoop". How inspiring is THAT.....people cheering for knowledge. Music to Professors ears!

When you are lucky enough to occupy an influential and/or leadership position, whether teacher, volunteer, or even a BOSS –

it's hard to describe the satisfaction of impacting a person's life in a positive way. But the chances for this GREAT FEELING are certainly multiplied when the relationship is symbiotic.

To all the students reading this – there is no substitution for being blessed with a cerebellum sponge. This trait alone will be one of the bigger contributors to a life-long successful career.

And to my buddy Mateo.....thanks for making my day.



It's going to be a real challenge topping last month's speaker (great job Sabina), but we are honored to have Dr Jon Thorson visit us this month from Denver. Dr Thorson has National acclaim via his work at the Lisbon Valley mine, SE of Moab. Since our speaker is in high demand, it's taken us almost a year to get this arranged. As maybe you've read, the Lisbon Valley Mine has become quite the hot topic these days. In fact 4 (count them 4) FLC geology students are currently focusing their Senior Thesis on this area.

Speaking of students, a shout out to Chuck Baltzer for being this month's student sponsor. Chuck is a FLC Alum, a new resident of Durango, and owner of Environmental Support Systems. Thanks Chuck!

PS – Don't forget to read page 6 concerning our Fall Field Trip. Thanks go to our Field Trip Chairman Jim Corken, and to Kim Gerhardt for guiding this trip. Don't forget, last Springs field trip sold out in less than a day, so I wouldn't dawdle.

Rock on –

Tim

Helmet Peak and The Hogback in the western LaPlata Mountains



Constitution & Bylaws Amendments Passed by Vote at September Meeting

The membership approved the amendments described in the September issue of the Newsletter. These changes will take effect immediately. Plans to merge members paid through December into the new June-June dues system will be announced soon. Thank you from the Board!





The Geology Program at San Juan College: Small Department - Big Impact!

By John Burris, Professor of Geology, San Juan College, Farmington, NM

Among its many diverse program offerings, San Juan College has a geology program. It's a small program, with one full-time professor (John Burris), and 2-3 adjunct professors teaching in a given semester. Most of the student enrolled in a geology class are looking to fulfill a lab science requirement for other majors, which gives the faculty a wonderful opportunity to instill a sense of wonder and love for our planet and help them become more aware of the world around them.

San Juan College also offers an Associate of Science in Geology degree. This degree is intended to be a transfer degree, as students



typically transfer to a 4-year college or university to finish their bachelor's degree. The program provides the typical first two years of a geology degree, including Physical Geology, Historical Geology, Mineralogy, and Igneous/Metamorphic Petrology. Because of the wonderful natural laboratory of the Four Corners, field trips



include Ship Rock, Bisti area, Choquecherry Canyon, Geologic history of the San Juan Basin, Harding Pegmatite Mine, and the Valles Caldera and Jemez Mountains.



San Juan College also has the innovative School of Energy, which offers a variety of degrees and training in the energy industry. With a new 65,000 square

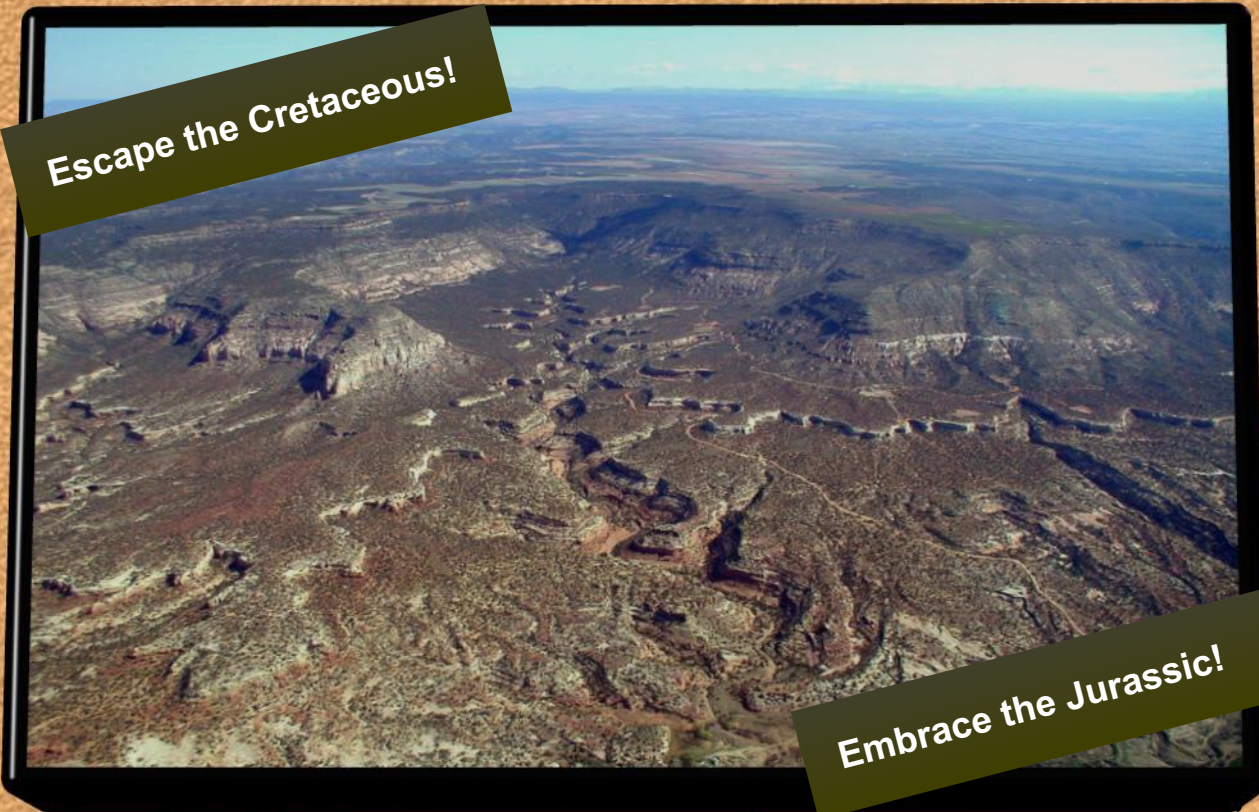
foot facility, students receive training and experience in state of the art labs taught by educators and professionals from the industry, ensuring students achieve their goal of a career. Students come from across the country, many participating in online courses, which enables them to complete a certificate and degree while continuing to work.

Included in the School of Energy is the Sherman Dugan Museum of Geology, which showcases an array of beautiful minerals and fossils from around the world. The museum was made possible by the generous donation of the Dugan Family. The Dugan collection has already inspired gifts and loans, allowing the museum to continue and grow. The museum is open to the public when the School of Energy is open, Monday-Friday from 6:30 AM until 7:00 PM. Stop by for a visit!



Hike Sand Canyon with the FCGS!

Escape the Cretaceous!



Embrace the Jurassic!

Last gasp of the Glen Canyon Fm.
See Navajo SS through Morrison Fm.
Aeolian, sabkah & braided fluvial EODs.

Graben fault system with uranium mine.

Ancestral Puebloan alcove sites.

McElmo Dome CO₂ &
Hydrocarbon plays.

Downloadable fieldtrip guidebook
coming to our website soon.

After trip, participants may wish
to visit the Sutcliffe Vineyards
Tasting Room (\$10pp) or a
microbrewery in Cortez.

DATE: Saturday, October 20th

LEADER: Kim Gerhardt

MEET: To carpool from the Office Depot parking lot in Durango at 8:15am or be at the Lower Sand Canyon Trailhead at 9:45am (12.4mi west of Cortez on County Rd, G). Carpooling **STRONGLY** recommended due to limited parking.

TIMING: Hike starts 10am. Back at cars around 3:00pm

HIKE STATS: This hike is a 4 mile loop ranging from 5400' to 5900' elevation on a sandy and rocky trail. Be prepared for variable weather.

BRING: BYO lunch, water & hiking gear.

RSVP: Kim Gerhardt, noaddress.com/

970-375-2700 or online at <https://fourcornersgeologicalsociety.org/events/>

Please Note:

Likely no cell service
in McElmo Canyon.

EVENTS, MEETINGS & COURSES (by date)

RMAG OCTOBER LUNCHEON: Denver CO, October 10th. Speaker: Tyler Izkowski, "The Role of Geomechanics in Unconventional Field Development Planning". **For more information go to:** <https://www.rmag.org/upcoming-luncheons#Octoberlunch> .

DENVER MUSEUM OF NATURE & SCIENCE, EARTH SCIENCE COLLOQUIUM: Denver, CO. Oct. 12. Tectonics and Stratigraphy of the Denver Basin: Insights from Zircons and Apatites by Glenn Sharman, University of Arkansas. For more information go to: <http://www.dmns.org/science/research/earth-sciences/>

DAN'S USED ROCKS 20TH ANNIVERSARY OPEN HOUSE & MINERAL SALE: Lakewood, CO. Oct. 13, 10 a.m. 4 p.m., 12296 W. Mississippi Ave. Email dansrocks@comcast.net . Celebrating 20 years in business with hundreds of specimens at 50% or more off, dozens of inexpensive flat lots, some one-time only deals, and of course plenty of food and drink.

PTTC (Petroleum Technology Transfer Council) ROCKIES TRAINING: October 15-16th, Durango, CO. Instructors: Trent Green, CSM. "Pipeline Hydraulics: Single and Multiphase Flow in Pipelines and Flow Assurance". For more information and to register go to: <https://www.eventbrite.com/e/pipeline-hydraulics-single-and-multiphase-flow-in-pipelines-flow-assurance-tickets-48767950252> .

COLORADO SCIENTIFIC SOCIETY OCTOBER MEETING: Lakewood, CO. Oct. 18, 7:00 p.m., "Structural Geology of Colorado" by Ned Sterne, plus "Electric log cross sections of Colorado" by Steve Cumella. For more information go to: <http://coloscisoc.org/> .

LITTLETON GEM & MINERAL CLUB AUCTION: Littleton, CO, Oct. 20, Columbine Hills Church, 9700 Old Coal Mine Avenue. Seller setups (club retains 20% commission) at 11, silent auction begins at noon, verbal auction at 1 p.m., checkout starts at 3:30 p.m. All are welcome.

RMAG SHORT COURSE: Denver, CO, October 25. Instructors David Hume and Kory Holmes, Core Labs, "Introduction to Unconventional Play Prospecting and Development". For more information go to: <https://rmag.memberclicks.net/2018-october-short-course> .

GEOMARK HALF-DAY SEMINAR: Denver CO, October 25. Instructors, Dr. John Curtis and Dr. Kevin Ferworn, GeoMark Research. 9:10-10:30: "Thermal Maturity of Produced Oils: Unravelling their Split Personalities". 10:45-11:30: "Cyclic Gas Injection (Huff & Puff) Secondary Recovery in Shale Resource Plays". To register contact Alma Ringer, aringer@geomarkresearch.com, (281) 856-9333.

NMGs 68th ANNUAL FALL FIELD CONFERENCE: October 24-27th, "Geology of the Las Cruces Area". For more information go to: <http://nmgs.nmt.edu/ffc/registration/home.cfm>

RMAG OCTOBER SHORT COURSE: Denver CO, October 25th . "Introduction to Unconventional Play Prospecting and Development". Instructor: David Hume and Kory Holmes. For more information go to: <https://www.rmag.org/2018-october-short-course> .

RMAG OTR FIELDTRIP: October 27-28th. Picketwire Canyonland led by Martin Lockley. For more information go to: <https://www.rmag.org/field-trips-2#octotr>

25th INTERNATIONAL PETROLEUM ENVIRONMENTAL CONFERENCE: Denver, CO. Oct 30 – Nov 1. For more information go to: <https://cese.utulsa.edu/ipec-conference/> .

GEOLOGICAL SOCIETY OF AMERICA 130TH ANNUAL MEETING: Indianapolis, ID, November 4-7th. For more information go to: <https://community.geosociety.org/gsa2018/home> .

RMAG NOVEMBER CORE WORKSHOP: Lakewood, CO, November 5-6th . Siliciclastic and Carbonate Core Description for Reservoir Characterization. Instructors Ali Jaffri and Junaid Sadeque. For more information go to: <https://www.rmag.org/november-2018-core-workshop>

RMAG NOVEMBER LUNCHEON: Denver CO, November 7th . Maggiano's Little Italy - 500 16th Street Mall #150, 11:30am. Speaker: Keith N. Musselman, "Snow Water Resources in a Warmer American West". **For more information go to:** <https://www.rmag.org/upcoming-luncheons#novlunch> .

RMAG PERMIAN BASIN SYMPOSIUM & CORE WORKSHOP, CALL FOR PAPERS: Denver, CO. January 30-31, 2019. For more information go to: <https://rmag.memberclicks.net/2019-symposium---core-workshop> .





FOUR CORNERS GEOLOGICAL SOCIETY

P.O. Box 1501, Durango, CO 81302

MEMBERSHIP RENEWAL or APPLICATION: June 1, 2018 to May 31, 2019



*Name: _____

*Address: _____ City: _____ State: _____ Zip: _____

*Email: _____ Phone: _____

*Employer: _____

Please Identify a Membership Category:

***Please check your interests:**

- Sedimentology & stratigraphy
- Structure & tectonics
- Mineralogy, petrology, geochemistry
- Igneous geology, volcanology
- Ore geology and hard rock mining
- Other mineral extraction
- Petroleum geology
- Geophysics
- Geological engineering
- Geomorphology
- Quaternary geology
- Hydrology & water resources
- Environmental geology
- Geography / GIS
- Other interest (see box)

Active Member	\$25	Any person engaged in the practice or teaching of geology or who holds a Bachelor's Degree in geological science from a college of acceptable academic standards. Degree requirement may be waived if applicant has adequate professional experience. <i>*Highest Degree, Type and Year:</i> _____ <i>*College / University:</i> _____
Associate Member	\$25	Any person who is a graduate of a college of acceptable academic standards with major studies related to, or associated with, geology. Degree requirement may be waived if applicant has adequate professional experience. <i>*Highest Degree, Type and Year:</i> _____ <i>*College / University:</i> _____
Student Member	Free	Any undergraduate or graduate student majoring in geology at a college of acceptable academic standards. <i>*College / University:</i> _____ <i>*Year expected to graduate:</i> _____
Emeritus Member	Free	An Active Member of 65 years old or older who has been a member for 25 years including time spent in military service. <i>*Year emeritus status was awarded:</i> _____
Honorary Member	Free	An Active Member who has contributed distinguished service to the profession of geology and to the betterment of the FCGS. Determination is made by the FCGS Executive Committee. <i>*Year honorarium was awarded:</i> _____.

Other Professional Interests:

** Required information for new members. Current Members, please update.*

Please either print, complete and return this form with your check for dues made payable to: "Four Corners Geological Society" and mail to the address above or go online to fourcornersgeologicalsociety.org .