



**MONTANA GEOLOGICAL SOCIETY**

# NEWSLETTER

**February 2015**

MGS Vol. 59 No. 2

-----  
**MGS Luncheons,**

**Model the Rock!**  
**Using Diagenesis**  
**Simulation for Rock**  
**Property Prediction**  
presented by  
Dr. Robert Lander  
Thursday, Feb 25<sup>th</sup>, pg 4

-----  
**MGS Past President's**  
**Dinner, Feb 20<sup>th</sup>, pg 7**

**An Upcoming Workshop**  
**by PTTC!!**  
**Hydraulic Fracturing –**  
**Measurement,**  
**Characterization,**  
**and Analysis**  
Tuesday, Feb 24<sup>th</sup>, pg 6

-----  
Members can RSVP by email or  
by calling Doretta Brush  
at Ballard Petroleum 406-259-8790

All meetings are held at the  
Billings Petroleum Club at  
11:45 a.m. unless otherwise noted

**MGS HOME PAGE:**  
[www.montanags.com](http://www.montanags.com)  
**MGS EMAIL:**  
[montanageologicalsociety@  
gmail.com](mailto:montanageologicalsociety@gmail.com)

Fellow Montana Geological Society(ers),

February is upon us, and that means it is time for the PAST PRESIDENTS DINNER on February 20<sup>th</sup>. As you all know, this time we will be honoring the one and only Jay Gunderson. As the current president of the MGS, I get the privilege of hosting the night which will include the presentation of various awards to members, and running the annual "roast" of our good president. In preparation for this event I decided to do a little research on the formation of society and some of the traditions that we practice. I came across a paper written by Vern Hunter and published in the 1989 Field Conference Guidebook titled "Montana (Billings) Geological Society: 1949-1989 The First Forty Years." When the MGS celebrated its 40<sup>th</sup> anniversary I was a mere 9 years old, living in Wichita Kansas, unaware of the awesome things that were occurring in Montana. Therefore, in this month's President's Letter I would like to take a few minutes to highlight some of the more interesting points of this article. After reading the article I have a much greater appreciation for obscure things that I have heard mentioned at MGS meetings including: "PUKERBELLEY, Geowives, Stag Night, and Hungry Shark sandstone (Cretaceous)."

Per the Paper:

-The MGS (originally the Billings Geological Society) was first formed in September 1949.

-The first official meeting was in the Green Room at the Northern Hotel February 28, 1950.

-In the early days MGS Luncheons were held twice a month at the Commercial Club or the Belknap grill. The cost was \$1.00 for lunch. Later the lunches were moved to the Northern, and finally back to the Commercial Club which was a "substantial improvement of \$1.00 over the \$1.50 charged by the Northern."

-The first MGS Newsletter was published in the fall of 1956. It was a single sheet printed on both sides. The years of 1985-1987 marked our "entry into the electronic age with a legal-sized format assembled using a word processor."

-The Society's peak membership of 480 was achieved in the 1981-82 fiscal year which corresponds to the average oil price high of \$31.77 per barrel.

## 2013-2014 OFFICERS

### President

Mark Millard 255-8613

### 1<sup>st</sup> Vice President

Riley Brinkerhoff 869-8732

### 2<sup>nd</sup> Vice President

Kevin Chandler 272-1605

### Treasurer

Jessica Renstrom 294-7841

### Secretary/Website Coordinator

Sarah Edwards

### Past President

Jay Gunderson 657-2702

## NEWSLETTER EDITOR

Kevin Chandler 272-1605

## BOARD OF DIRECTORS

Duncan McBane

Steven W. VanDelinder

Betsy Campen

Robert Schalla

## AAPG DELEGATES

### ROCKY MOUNTAIN SECTION

Don French and Robin P. Diedrich

Alternates:

Richard L. Findley and *Vacant*

### NATIONAL

Robin P. Diedrich and Don French

## COMMITTEES

### Awards:

Jay Gunderson

### Continuing Education:

*Vacant*

### RMS-AAPG Foundation:

Rob Diedrich 869-8643

### Field Trips:

Gary Hughes 861-2072

### Social:

Betsy Campen 652-1760

### Christmas Party:

Rob Diedrich 869-8643

Mac Clark 259-2451

### Membership:

Treasurer

### University Liaison:

Steven W. VanDelinder

### Publications:

Duncan McBane 252-3170

### Montana Oil & Gas

### Fields Update:

Jim Halvorson 656-0040

## PUBLICATION SALES

Doretta Brush 259-8790

-The first Past-President's Dinner was held at the Lake Hills Country club on February 13<sup>th</sup>, 1970. That makes this years PPD the 45<sup>th</sup> to be held by the organization (that just happens to be your age doesn't it Jay??).

-The first AAPG Rocky Mountain Section meeting to be hosted by the MGS/BGS was February 14-16<sup>th</sup>, 1995 (Two problems – Difficult to admire Montana rocks in February, and how did their significant others feel about the AAPG meeting overlapping Valentine's day?!?!)

As you may have noticed, I did not touch on Stag Night, Geowives, or the Hungry Shark sandstone. Head on down to the Past President's dinner on the 20<sup>th</sup> to learn about these, and many other traditions of the MGS (Spouses are obviously invited also...Just make sure you RSVP in time!)

Mark Millard

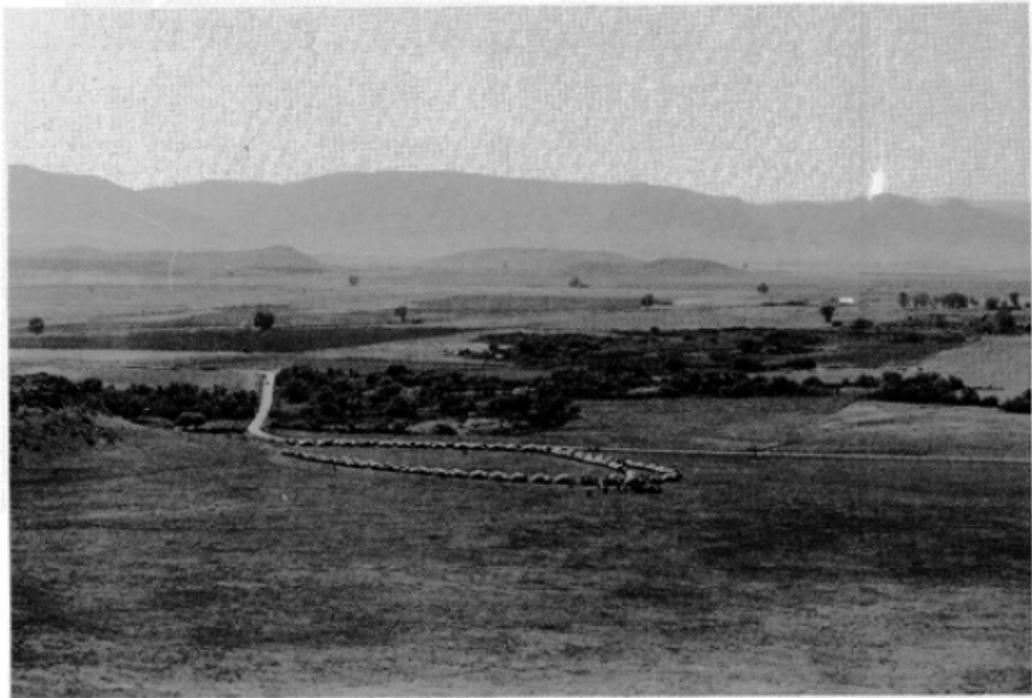
President – Montana Geological Society



*Photo #2. Black Hills & Williston Basin Conference September, 1952 Stop for Mississippian Outcrop. Photo courtesy Jack Fanshawe*



*Photo #6. Big Horn Float Trip Captain "Yellowhair" Garrett First Mate Bill Flanagan; last major float trip: June 1961. Photo courtesy H. L. Garrett*



*Photo #4. "Circle The Wagons!!" 1954 BGS Field Conference Pryor Mtns., Stop #2. Photo courtesy Jack Parker*

# MGS Luncheon Meeting

## Thursday, February 25th

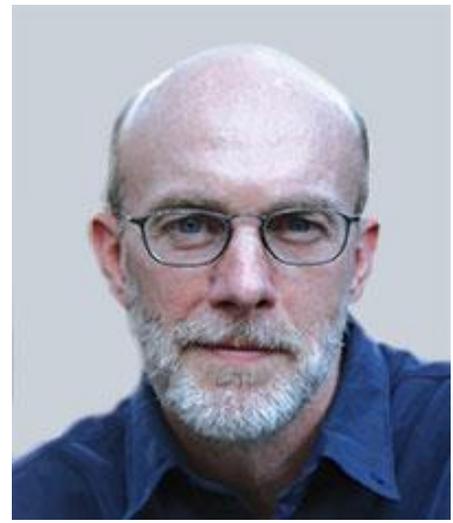
**11:45 am – Billings Petroleum Club**

**Please join us for lunch (\$14) and the talk (no charge)**

RSVP – [montanageologicalsociety@gmail.com](mailto:montanageologicalsociety@gmail.com) , or 406-259-8790

An email reminder will be sent 3 days prior to the talk

---



### **DR. ROBERT LANDER**

Haas-Pratt Distinguished Lecturer

Director of the Consortium for the Quantitative Prediction of Sandstone Reservoir Quality

---

### ***Model the Rock! Using Diagenesis Simulation for Rock Property Prediction***

---

With the growing global attention in shale gas and shale oil plays there has been a renewed interest in source rock geochemistry. This has resulted in a number of key questions concerning source characterization, including: 1) how much internal variability might be anticipated; 2) what is the potential impact of the variability on resource assessment; and 3) how best may a source be sampled to "fully" understand its variability?

These questions were examined, in part, through the detailed sampling of the Kimmeridge Clay at the type locality. A representation of variability was obtained from basic source rock data collected on fresh outcrop samples. Total organic carbon contents, for this world-class source rock, varied between 0.88 and 21.35 wt.%, with a mean of 9.13 wt.%. Samples with greater than 1.0 wt.% TOC had total pyrolysis yields ranging between 6.31 and 126.65 mg HC/g rock, with a mean of 54.16 mg HC/g rock. Hydrogen index values ranged from 240 to 611 mg HC/g TOC, with a mean of 516 mg HC/g TOC.

Even these ranges do not fully capture the variability of the source, if data from elsewhere in the North Sea region are included. For example, TOC values exceeding 40 wt% have been measured. Although the hydrogen index values suggested similar liquid hydrocarbon products at Kimmeridge Bay across the outcrop the variability across the North Sea suggests that there are regions that are more gas-prone character. The differences in organic carbon content and hydrocarbon yields, which range by more than an order of magnitude, would have direct impact on estimates of both conventional and unconventional resources, if assessments were based on individual discrete samples.

Discrete sampling either from an outcrop or a core commonly results in bias. Historically, these biases have been skewed toward the more organically enriched samples. This can be overcome through an increase in the number of samples and the incorporation of lithologic information, so that weighted averages can be generated to obtain a better representation of the unit. The analysis of cuttings samples introduces a different suite of problems, associated with representativeness and positioning. Regional variation also needs to be incorporated through an examination of the depositional systems of the unit, ensuring that the key environments are sampled accounting for the impact of factors such as sedimentary dilution, influence of storms, and oxygen content of the water column

---

### **Biography**

---

Rob Lander's primary interest is in understanding the controls on diagenetic processes in clastic rocks and using this understanding to develop accurate models of rock properties away from well control and through geologic time. He is the inventor or co-inventor of several simulation systems for diagenesis and reservoir quality prediction including Touchstone®, T>Map®, T>Earth®, Prism2D®, Exemplar®, and Cyberstone®.

Rob co-founded Geocosm LLC and co-directs the company's *Consortium for the Quantitative Prediction of Sandstone Reservoir Quality (RQC)*, which was established in 2001 and currently has 23 members. He also is a Research Fellow with

the Bureau of Economic Geology and collaborates with the *Fracture Research and Applications Consortium* at The University of Texas at Austin. Rob established Geocosm in 2000 after a stint as Technical Director of Geologica AS in Stavanger, Norway. Prior to his time in Norway he was a Senior Research Geologist at Exxon Production Research in Houston, Texas.

Rob has published a number of papers on topics involving diagenesis and reservoir quality prediction (including several Notable Papers in the AAPG Bulletin) and received the Wallace E. Pratt Memorial Award for best paper published in the AAPG Bulletin in 2010. He has a Ph.D. in Geology from the University of Illinois at Urbana-Champaign and a B.A. in Geology from Knox College.



*An Upcoming Workshop  
by PTTC!!*



## **Hydraulic Fracturing - Measurement, Characterization, and Analysis**

Petroleum Club, Billings Montana

Tuesday, February 24, 2015: 08:30 AM - 05:00 PM

This one-day workshop is intended to demonstrate recent advances in hydraulic fracturing techniques and how they can be used to characterize the producing reservoir. The basics of hydraulic fracturing are discussed and lead into the complexities associated with treatment design and analysis. Special issues such as non-Darcy flow, G-function analysis, and “mapping” techniques are covered. Case studies demonstrating analysis and various fracturing practices (such as “slickwater” fracs) are presented. The class is designed to be accommodating to all disciplines.

**Fee: \$250 MGS Members, \$275 Non-members, includes food, workbook, and PDH certificate.**

### **Instructor**

Jennifer L. Miskimins is Senior Consulting Engineer for Barree & Associates in Lakewood, CO. Prior to joining Barree & Associates in 2012, she was an Associate Professor in the Petroleum Engineering Department at the Colorado School of Mines (CSM) in Golden, CO, where she still holds a faculty appointment. Dr. Miskimins holds B.S., M.S., and Ph.D. degrees in petroleum engineering. Prior to joining CSM, she worked for Marathon Oil Company in a variety of locations. Dr. Miskimins is the founder and past Director of the Fracturing, Acidizing, Stimulation Technology (FAST) Consortium at CSM. She teaches a variety of short courses including completions and stimulation classes. She is a member of SPE, SPWLA, and AAPG and was an SPE Distinguished Lecturer for 2010-2011 and 2013-2014.



**Register online: [www.pttcrockies.org](http://www.pttcrockies.org)**

**For more information, contact Mary Carr, 303.273.3107, [mcarr@mines.edu](mailto:mcarr@mines.edu)**

# MGS PAST PRESIDENT'S DINNER

In honor of Past President Jay Gunderson, will be held

**Friday February 20<sup>nd</sup>, 2015**

Cocktails @ 6:00 pm; Dinner and Program at @ 6:45pm  
at the Billings Petroleum Club

**Please RSVP by Feb 17<sup>th</sup> to**

**[montanageologicalsociety@gmail.com](mailto:montanageologicalsociety@gmail.com)**

**(Also, please note if you will be eating Chicken or Beef)**

Chicken: Bacon Wrapped Chicken Roulade

Beef: Carved Roast Prime Rib



**This dinner is OPEN TO ALL MGS MEMBERS and their spouses.**

*The Dinner will be free for all members, but we ask that you make a small donation to the MGS  
**Scholarship Fund.***

*Also, if you have any compromising photos of Jay, please forward them to  
[montanageologicalsociety@gmail.com](mailto:montanageologicalsociety@gmail.com).*

*The photos may just make an appearance in his "Roast" that evening*

**We sincerely hope you can join us in one of the most important MGS social functions of the year!  
Please feel free to share stories of Jay, or just come to socialize with other members and thank Jay for  
his tireless service and dedication.**



*Announcing the.....*

## **2015 MGS Teacher of the Year Award!**

The MGS would like to recognize outstanding **K-12 Earth Science teachers** in Montana and reward them for all their hard work. Each year the most deserving candidate is selected by the MGS to receive **\$1000**.

The MGS winner is then eligible to apply for the regional Teacher of the Year Award (an additional **\$2000**) through the Rocky Mountain Section of the American Association of Petroleum Geologists (RMS-AAPG).

The winner of the RMS-AAPG award becomes the RMS-AAPG nominee for the national American Association of Petroleum Geologists award, which is **\$6000** (\$3000 for the teacher; \$3000 for their school).  
That's the potential for **\$9000** in cash awards!

**The Application Deadline is MAY 31<sup>st</sup>, 2015.**

*(Application Form is on the following pages)*

***K-12 teachers deserve to be recognized!***

If you teach and promote Earth Science in your classroom or in the outdoors, the MGS want to hear from you!  
A completed application form and letter of support (*see following page*) is all you need.

*What better way to promote earth science in the state of Montana than to reward and show appreciation toward those who do it every day?*



2012 MGS and Regional Award Winner – Denece Lord

**Application form for  
Montana Geological Society  
K-12 Earth Science Teacher of the Year Award\***

---

*\*\$1000 award for successful applicant and eligibility to apply for additional awards up to \$8000 through the American Association of Petroleum Geologists (AAPG)*

**Qualifications for Nomination**

- Teaching must be at a Montana accredited school, any level from K-12.
- Minimum 3 years teaching experience.
- Teaching at least one unit per year on natural resources, defined as:
  - 1) Organic materials such as petroleum, natural gas, and coal,
  - 2) Inorganic substances such as mineral ores, building stone and aggregates,
  - 3) Energy resources from the earth such as geothermal energy.
- Teaching should relate to the scientific study of natural resources, and may include their origin, extraction, historic use, and present use.
- Teaching should also include the use of earth science for decision making related to the preservation of the environment, reclamation, and conservation of resources.

**Teacher Contact Information**

Name of Teacher	
School	
School Address	
City ST ZIP Code	
Home Phone/Work Phone	
E-Mail Address	

**Teacher Information**

Current Position	
Grades Taught	
Number of Years Teaching	
Degree(s) Earned	

**Letter of Support**

Name	
Phone Number	
Email Address	
Relationship to Nominee	

## **Applicant's Statement**

Please attach a short, succinct statement (no more than 500 words) describing your qualifications. In the statement, please discuss, with regard to the natural resources unit, your:

- Teaching philosophy
- Methods
- Course content
- Creative or innovative projects
- Ability to balance economic, societal, and environmental issues
- Objectivity
- Class size(s)

## **Letter of Support**

Include one letter of support from an administrator, fellow teacher, or other person/organization familiar with your teaching philosophy and style. The letter should describe the applicant's qualifications as "Teacher of the Year" in Earth Sciences. We are particularly interested in what the applicant does to promote geologic education and increase student interest in geology. The statement should include the applicant's name, be signed by the letter's author, and should be returned with the rest of this application form.

MGS can accept applications in any standard format by email to:  
[montanageologicalsociety@gmail.com](mailto:montanageologicalsociety@gmail.com) or by regular mail to:

MGS  
P. O. Box 844 Billings, MT  
59103

**2015 Deadline: Nominations must be RECEIVED by midnight, May 31, 2015**

**MGS expects an award to be made by June 15, 2015.**

Looking for a way to give back? Do you love teaching and sharing your knowledge with growing young minds? Have any ideas on fun exhibits ideas or geology related field trips around Billings for kids? Well here's your chance! Wise Wonders Children's Museum has a new space that will be opening up soon in downtown Billings (110 N 29th St).



They are working hard on getting the space ready to display some hands on interactive exhibits for kids and looking for volunteers to help with renovations, event and exhibit ideas, or donations. What a perfect opportunity for fellow MGS members to inspire young kids (potentially future members) about the world of science and also geology!

Below is a list of some upcoming opportunities for volunteering and fundraising for Wise Wonders. If you're unable to make these meetings or events, feel free to email or call with any ideas related to the following. If you know of someone who wants to get involved with things such as volunteering at events, to help build an exhibit, to make contacts regarding sponsorships/donations, etc. (just as some examples) then please feel free to share:

Thursday, February 19th - 11:30 am  
- 12:30 pm  
Meeting regarding  
Events/Programming  
110 29th Street

Fundraiser on March 14<sup>th</sup>:  
International Pi Day

If you would like to support Wise Wonders by ordering a Pie for our Pi Day event please fill out the order sheet below and mail it to our PO Box by February 20th. Thank you for supporting Wise Wonders!

Again, this is a great opportunity to give back to our community and help develop young minds. If you have any questions or ideas feel free to email [wisewondersmt@gmail.com](mailto:wisewondersmt@gmail.com) or like them on facebook at <https://www.facebook.com/wisewonderschildrensmuseum>.



If you or someone you know is handy and can help with exhibit construction, then please contact us at [wisewondersmt@gmail.com](mailto:wisewondersmt@gmail.com)

## Celebrate Pi (π) Day with Wise Wonders

Pie Choices	Price	Qty	Total
Chicken Pot Pie	\$22	_____	\$ _____
Vegetable Beef Pot Pie	\$22	_____	\$ _____
Huckleberry Pie	\$30	_____	\$ _____
Apple	\$20	_____	\$ _____
Blueberry	\$20	_____	\$ _____
Peach	\$20	_____	\$ _____
Summer-Berry	\$20	_____	\$ _____
Strawberry-Rhubarb	\$20	_____	\$ _____
Additional Donation			\$ _____

Name: \_\_\_\_\_

Phone: \_\_\_\_\_ Email: \_\_\_\_\_

Yes please add me to your newsletter e-mail list

**Grand Total \$** \_\_\_\_\_ **CK#** \_\_\_\_\_

CC# \_\_\_\_\_ CID# \_\_\_\_\_



CC Expire \_\_\_\_\_ Billing Zip \_\_\_\_\_

**Mail this order form and payment to:**

**Wise Wonders**

**PO Box 21415**

**Billings, MT 59102**

Pies can be picked up at our downtown location: 110 N 29<sup>th</sup> St on Saturday March 14<sup>th</sup> between 10:00 am – 3:00 pm. If you would like to order a pie, but cannot pick it up on that day please let us know and we can make other arrangements. Please call (406) 272-9975 if you have any questions.



**INDEPENDENT EXPERTISE IN  
WATER RESOURCES AND THE ENVIRONMENT**

**General Services**

- Hydrology
- Geology
- Engineering

**Oil and Gas Environmental Consulting Services**

- NEPA CATEX/EA/EIS
- Environmental Permitting
- Environmental Compliance
- GIS/Database
- Water Management
- Environmental Due Diligence
- Expert Testimony Services
- Remediation



HELENA, MT (406) 443-6169  
BILLINGS, MT (406) 655-9555

HSI@HYDROSI.COM

WWW.HYDROSI.COM

**SES**



**Geosteering  
Software**

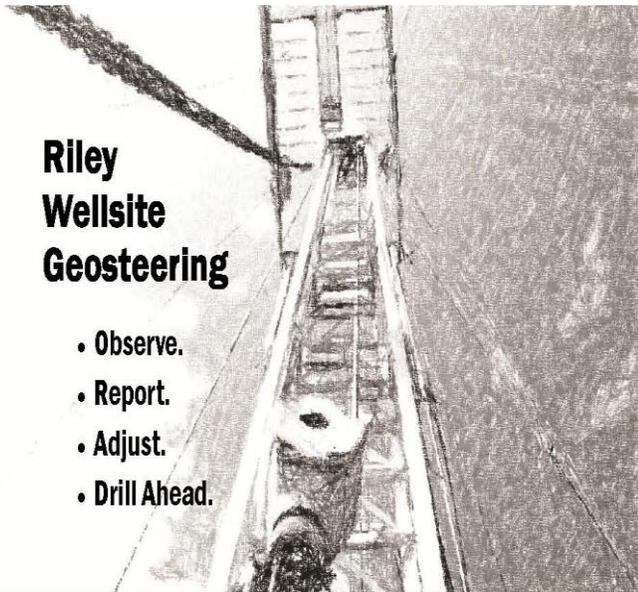
**If horizontal wells affect your bottom line, visit us online or call. You'll be glad you did!**

SES is for geologists who are dissatisfied with drafting-tool methods of geosteering horizontal wellbores. SES is 3D technical geosteering software that makes wellbore stratigraphic tracking quick-n-easy, accurate, and easily shared. Unlike any other geosteering software, SES provides a complete suite of software features to handle your horizontal drilling needs.

Ph. 720-279-0182

**SES** Geosteering Software

[www.makinhole.com](http://www.makinhole.com)



**Riley  
Wellsite  
Geosteering**

- Observe.
- Report.
- Adjust.
- Drill Ahead.

Jackson Riley, Geologist

406.780.0627 (cell) • 406.633.9487 (office)

[geology@rileywellsite.com](mailto:geology@rileywellsite.com)

**Hydrometrics, Inc.**

[WWW.HYDROMETRICS.COM](http://WWW.HYDROMETRICS.COM)

Founded in 1979, Hydrometrics provides an expansive range of science and engineering services. We have serviced many projects, large and small for the petroleum and mining industries, ranging from the Arctic Circle to South America.

For more information Contact:

Billings, MT - Al Hilty, P.G.  
(406) 656-1172 [ahilty@hydrometrics.com](mailto:ahilty@hydrometrics.com)

Helena, MT - Mike Wignot, P.E.  
(406)443-4150 [mwignot@hydrometrics.com](mailto:mwignot@hydrometrics.com)

Missoula, MT - Doug Parker, P.G.  
(406) 721-8243 [dparker@hydrometrics.com](mailto:dparker@hydrometrics.com)

- Environmental/Civil Engineering
- Geotechnical Engineering & Soil Testing
- Water Resources Engineering
- Storm Water Management, Dam Design & Investigation
- Hydrogeology & Geochemistry
- Design Plans & Specifications
- Graphic/Drafting Services
- Data Management Services
- Regulatory Compliance
- Environmental Analysis
- Industrial & Mining Services
- Solid & Hazardous Wastes
- Soil & Water Field Testing
- PowerProbe & Auger Drilling

**2013 Advertising Rates:**  
**Full Page \$100/month;**  
**1/2 Page \$50/month;**  
**1/4 Page \$25/month;**  
**Business Card \$10/month.**

All ads must be prepaid.  
 Send ad and payment to:  
 MGS, P.O. Box 844  
 Billings, MT 59103.

## MGS PUBLICATIONS

AAPG - MGS Datapages DVD - (MGS publications from 1950-2006)	(members) -----	\$ 150.00
	(non-members) -	\$ 180.00
2006 Montana Oil & Gas Fields CD-----		\$ 65.00
MGS - NRGDC Northwestern Geologic Service Sample Logs (MT, ND, SD) -----		\$ 2500.00
Over 2500 sample logs on CD-ROM, regional sets also available		
2000 Guidebook: Northern Montana & the Montana-Alberta Thrust Belt (2 Vol. Set) -----		\$ 125.00
50 <sup>th</sup> Anniversary Symposium		
1998 8 <sup>th</sup> International Williston Basin Symposium -----		\$ 55.00
1998 Core Workshop Guide for Williston Basin Symposium -----		\$ 30.00
1997 Bighorn Symposium Guidebook -----		\$ 50.00
1997 MGS-TRGS Field Conference Guide -----		\$ 25.00
"The Edge of the Crazyies: Where the Mountains Meet the Plains"		
1996 AAPG Rocky Mountain Section Meeting Expanded Abstracts Volume -----		\$ 25.00
1995 Guidebook: Seventh International Williston Basin Symposium -----		\$ 100.00
1993 Guidebook: Energy and Mineral Resources of Central Montana -----		\$ 54.00
1991 6 <sup>th</sup> International Williston Basin Symposium -----		\$ 55.00
1991 Guidebook: Geology and Horizontal Drilling of the Bakken Formation -----		\$ 50.00
1991 Field Trip Guides: Beartooth Mountains -----		\$ 7.50
Sequence Stratigraphy of the Eagle Sandstone at Billings -----		\$ 7.50
1989 Guidebook: Geologic Resources of Montana -----		\$ 80.00
1986 Guidebook: Geology of the Beartooth Uplift and Adjacent Basins -----		\$ 45.00
1985 Symposium: Montana Oil and Gas Fields -----		\$ 55.00
1978 Economic Geology of the Williston Basin -----		\$ 100.00
1971 Catalog of Stratigraphic Names -----		\$ 10.00
1969 Guidebook: Economic Geology of Montana -----		\$ 8.50
1951 BGS 2 <sup>nd</sup> Annual Central Montana Field Conference -----		\$ 12.50
1950 BGS 1 <sup>st</sup> Annual Field Conference -----		\$ 12.50

To place an order please contact Doretta Brush (406) 259-8790 [dbrush@ballardpetroleum.com](mailto:dbrush@ballardpetroleum.com)  
 S & H charges are not included in prices. Add \$6 US shipping or \$12 Canadian for each book ordered. For 1985 guidebooks add \$15 US shipping or \$25 Canadian.