



# FOUR CORNERS GEOLOGICAL SOCIETY NEWSLETTER

April 2006

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## Next Meeting and Presentation

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# Four Corners Geological Society

## April Meeting and Presentation

### DATE:

Friday, April 28, 2006

### SPEAKERS:

Fort Lewis Students- Brian Turner, Katie Potter, Nick Nelson and Serene Wardinsky (abstracts pg. 4)

### TOPICS:

Really Cool Geology Stuff!!!!

### PLACE:

College Union Building, Fort Lewis College, Durango, CO

Members, this months meeting is in the CUB Pub, Lower Level College Union Bldg.

### AGENDA:

5:30 PM Social Hour

6:30 PM Dinner ----- **Buffet of tasty Barbeque**

7:30 PM Presentation

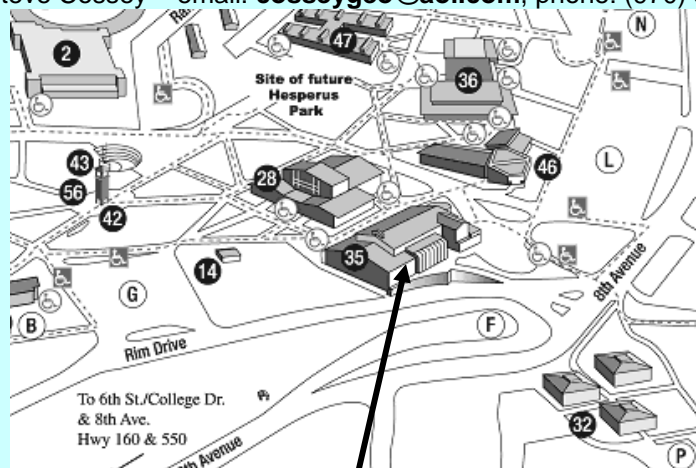
### COSTS:

\$20.00 per person (dinner and talk), \$2.00 per person (talk only), students free (talk only)

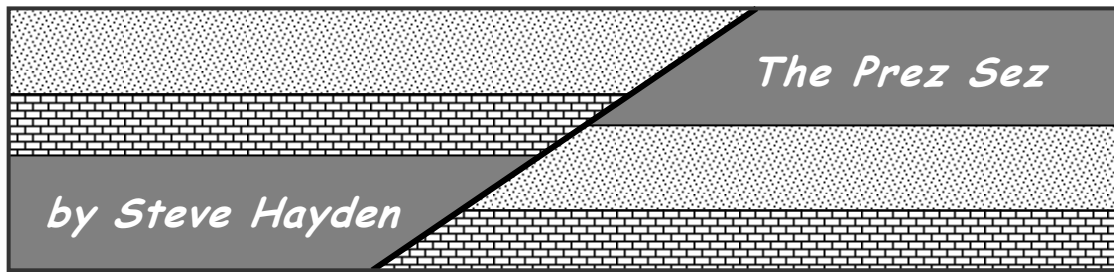
**Reservations** for the meeting and presentation should be made by Wednesday, April 26.

Durango Contact: Mike Dawson – email: [mdawson@br-inc.com](mailto:mdawson@br-inc.com), phone: (505) 326-9770

Farmington Contact: Steve Cossey – email: [cosseygeo@aol.com](mailto:cosseygeo@aol.com), phone: (970) 385-4800



**“CUB Pub”, Lower Level College Union Building**



Greetings. Our April meeting will be on the 28<sup>th</sup> in the Ft Lewis College Union Building in Room 35 (the Memorial Student Lounge), which is a different room than we usually have. Check out the map provided.

We are having an exciting program this month with four talks by Fort Lewis students on their senior thesis projects. The society provided money to help support student speaker attendance at the Rocky Mountain GSA Meeting this spring in Gunnison, CO. This program is a reward for our support. I hope many members will turn out for the meeting.

There are still many members who have not gotten current on 2006 dues. Please contact Steve Cossey to take care of this.

Ed Heath has taken the lead in forming a steering committee to develop a plan for the society to host the 2010 AAPG Rocky Mountain Section meeting. Anyone who is interested in participating, please contact Ed or me (Ed may be out of town).

[Steve](#)

April 28, 2006 Presentations



**AN INVESTIGATION OF THE GEOLOGY AND EMPLACEMENT  
HISTORY OF THE WETHERILL MESA DIATREME,  
SOUTHWESTERN COLORADO**

**TURNER, Brian E.** and GONZALES, David A.,  
Geosciences, Fort Lewis College, 1000 Rim Drive, Durango, CO 81301,  
[BTURNER@fortlewis.edu](mailto:BTURNER@fortlewis.edu)

The Wetherill Mesa diatreme is located at the northeast edge of the Oligocene Navajo volcanic field (NVF), and is one of several diatreme-dike complexes that are exposed in southwestern Colorado. The Wetherill Mesa complex contains a series of northeast-trending potassic minette dikes that form a linear core to an elliptical apron of minette breccia that was emplaced in Late Cretaceous sedimentary rocks about 2000 feet below the surface. A detailed investigation of this complex has established that the breccia apron dips 40° to 60° away from the central dikes to the east and west, forming a dome-shaped deposit. Bedding within the breccia deposits is thin to medium and contains well-preserved sedimentary structures such as graded bedding, cross lamination, and scour surfaces. We propose that this complex formed by subsurface lateral blasts that were emplaced along areas of structural weakness in the country rock, driven by decompressive gas release as the magma reached depths where gas pressures exceeded lithostatic lodes. Explosive emplacement caused fragmentation of the minette dikes feeding the system, and brecciation of the country rock surrounding the dikes. Our interpretation is not consistent with previous models for diatreme emplacement in the NVF that rely on phreatomagmatic eruptions at depth where magma would interact with groundwater systems. Convincing evidence for phreatomagmatic interaction between minette dikes at Wetherill Mesa was not found.





## **A PETROCHEMICAL TEST OF COMPETING IDEAS ON THE EMPLACEMENT HISTORY OF SOUTH MOUNTAIN RHYOLITE, VALLES CALDERA, NEW MEXICO**

**POTTER, Katherine E.**<sup>1</sup>, GONZALES, David A.<sup>1</sup>, GOFF, Fraser<sup>2</sup>, and GOFF, Cathy J.<sup>3</sup>, (1) Geosciences, Fort Lewis College, 1000 Rim Drive, Durango, CO 81301, KEPOTTER@fortlewis.edu, (2) Earth and Planetary Sciences, University of New Mexico, Albuquerque, NM 87131, (3) 5515 Quemazon, Los Alamos, NM 87544

South Mountain is one of eight post eruptive rhyolite dome complexes (1.23 Ma to 0.52 Ma) that were emplaced along ring fractures after formation of the c.a. 1.25 Ma Valles caldera. Early workers proposed that South Mountain (0.52 Ma) consisted of one eruptive phase, whereas more recent geologic mapping established four possible eruptive flows from the dome complex. A detailed field and petrochemical study of the South Mountain dome and flow complex was conducted to test these competing ideas.

The mineral assemblages of samples from the four different flows are similar. They contain phenocrysts of quartz, sanidine, albite-oligoclase, biotite, and minor oxyhornblende that are set in a glass matrix that varies from spherulitic to flow laminated. The variable textures of the groundmass in the four identified flows, possibly reflects different mechanisms of emplacement and cooling histories. Major and trace element geochemistry of these samples indicates that they are calc-alkaline, high-silica rhyolites. The similar mineral assemblages and geochemical signatures of all flow phases from the dome indicate a rather homogeneous magma composition. The four morphologically different flows can be explained as four different eruptive events from the same magma body. Additional major and trace element geochemical data are being applied to try and further understand the magmatic history of the flows, and to assess fractionation mechanisms.





**LIMITATIONS ON THE LATERAL CONTINUITY OF TONSTEINS,  
SAN JUAN, LA PLATA AND NAVAJO COAL MINES, LATE  
CRETACEOUS FRUITLAND FORMATION; NORTHWESTERN  
SAN JUAN BASIN, NEW MEXICO**

[NELSON, Nicholas M.](#) and GIANNINY, Gary L.,  
Geosciences, Fort Lewis College, 1000 Rim Drive, Durango, CO 81301,  
nmnelson@netzero.com

The lateral continuity of coals containing ash, or tonstein layers in Cretaceous coal deposits of the western interior seaway has been a topic of much debate and has economic importance for both the coal, and the oil and gas industry. These facies variations have been mapped from the coal bed methane producing areas of the northwestern San Juan Basin into several active coal mines situated on the western edge of the basin. The correlation of these ashes was achieved by using outcrop, core, and wire line logs. Based on these high resolution correlations of several tonsteins located within the Cretaceous Fruitland Formation it appears that there are two principle sources of lateral facies variability: 1) strike-parallel channel to interfluvial facies transitions, and 2) dip-parallel tonstein bearing coal terminations due to the stratigraphic rise of the Pictured Cliffs Sandstone shoreface. The lateral variation of the tonsteins within the Fruitland was found to be dependant on the orientation of the cross-section. Within strike-parallel (NW-SE) cross sections, the tonsteins could not be found for more then a 1-4 km once they entered the fluvial dominated channels. In contrast, in dip-parallel (SW-NE) oriented cross sections, an ash layer was traced for over 25 km before it left the southwestern edge study area. This study quantifies the scale of lateral variation in coal horizons of the Lower Fruitland Formation on the western and northwestern flank of the San Juan Basin. These reservoir scale data, and those of previous studies, are significant in that this basin has served as an important analog to other coal bearing regions of western North America.





## **Spatial Analysis of Soils, Septic Tank Density, and Assessment of San Juan River Fecal Coliform Counts, using GIS, Farmington, NM**

**Serene H. Wardinsky**

Department of Geosciences  
Fort Lewis College

Reconnaissance monitoring of fecal coliform was conducted along the San Juan River, Farmington, NM from 2002 through 2005. Four hundred twenty seven, random, mid-stream samples were collected on five float trips during Spring, Summer, and Fall months and were processed using the IDEXX bacteria enumeration system. Fecal coliform values, along a 14.5 mile stretch of the San Juan River through Farmington, NM, consistently exceeded 400 cfu/100 mL. These elevated values exceed EPA standards for acceptable coliform counts (monthly average < 200 cfu/100mL, seven day average < 400 cfu/100mL). Possible sources of fecal coliform include septic tanks, animal waste, or waste water treatment plants - all of which occur along the corridor of the San Juan River. The objectives of this study were to: (1) establish a septic tank contaminant hazard zone, (2) locate existing septic tanks using GPS, (3) determine if septic tanks along the San Juan River corridor through Farmington, NM are a significant source of contamination and, (4) establish criteria needed for the second phase of the study. The septic tank contaminate hazard zone was determined by using soil permeability (in/hr) and the life expectancy of the coliform bacteria (buffer distance = soil permeability \* bacteria life expectancy). ArcGIS was used to create a series of maps showing geographic locations of the septic tanks, fecal coliform river data, Farmington city boundary, and tributary rivers in Farmington. Analysis of soil type, permeability, land use, and proximity of the septic tanks to the San Juan River suggest that septic tanks may be contributing to the fecal coliform contamination. The combination of highly permeability soil and septic tank density and proximity to the river resulted in the highest contaminate potential. Criteria needed for the second phase of the study include: systematic testing of the San

Juan River for fecal coliform, greater instrumentation detection limits for fecal coliform, and soil testing for fecal coliform adjacent to potential contaminant sources such as: (1) areas zoned for livestock, (2) sites containing an increased density of septic tanks, and (3) zones adjacent to waste water treatment plant effluent.



General Announcements/News from other Geo-Societies



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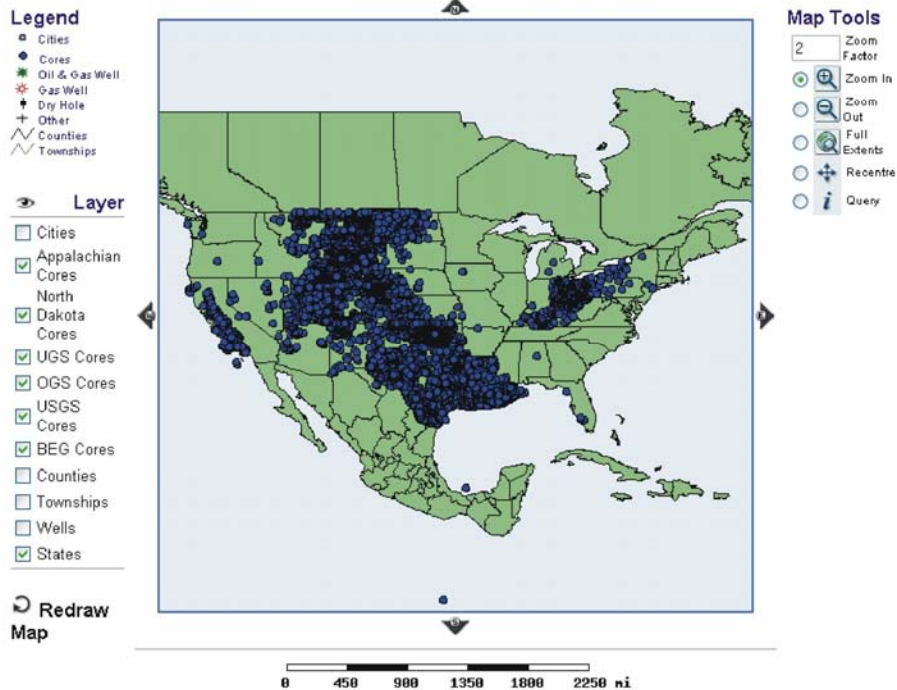
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# Four Corners Geological Society

## MEMBERSHIP RENEWAL or APPLICATION for 2006

PAGE 1

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### Please Identify a Membership Category:

- |                          |                           |                |  |
|--------------------------|---------------------------|----------------|--|
| <input type="checkbox"/> | <b>ACTIVE MEMBER 1</b>    | <b>\$20.00</b> | Person holding a degree in geology or an allied science and receiving the FCGS Newsletter via <u>email</u>                             |
| <input type="checkbox"/> | <b>ACTIVE MEMBER 2</b>    | <b>\$25.00</b> | Person holding a degree in geology or an allied science and receiving the FCGS Newsletter via <u>U.S. mail</u>                         |
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| <input type="checkbox"/> | <b>STUDENT MEMBER</b>     | <b>\$5.00</b>  | Undergraduate student majoring in geology or an allied science<br>Year you expect to graduate: _____                                   |

# Four Corners Geological Society

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## MEMBERSHIP RENEWAL or APPLICATION for 2006 PAGE 2

My professional interests are:

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I would like to include a Tax Deductible Contribution to the Four Corners Geological Society Foundation.

Amount of Donation: \_\_\_\_\_  
(Please include a separate check made payable to the Foundation.)

In Memory of (optional): \_\_\_\_\_

To be used for (optional): \_\_\_\_\_

SIGNATURE: \_\_\_\_\_ DATE: \_\_\_\_\_

Please print, complete and return **both pages** of this form with your check for dues made payable to:

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

**The dues year begins on January 1.**  
For dues paid after March 1, add a \$5 late fee (does not apply to new members).

**Advertising rates for the Four Corners Geological Society newsletter:**

Full Page Ad (7½" x 9½") \$100/mo. or \$1000/yr.    Half Page Ad (7½" x 4½") \$50/mo. or \$500/yr.  
¼ Page Ad (3½" x 4½") \$25/mo. or \$250/yr.    Business Card (3½" x 2") \$10/mo. or 100/yr.

Odd sizes are \$3.50 per column inch per month, minimum \$10.00

**For more information, please contact the FCGS Treasurer, (vacant). Proceeds will go toward the further development of the Society (i.e., offset meeting costs, publications, etc.).**

**Four Corners Geological Society**

P.O. Box 1501, Durango, CO 81302

<http://www.canyonwinds.com/FCGS/index.html>

**2005-06 Officers**

**President** – Steve Hayden: phone: 505.334.6178, email: Steve.Hayden@state.nm.us

**Vice President** – Mike Dawson: phone: 505.3269770, email: mdawson@br-inc.com

**Secretary** – Kim Gerhardt: Phone: 970.375.2700, e-mail: kd@mydurango.net

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**Newsletter Editor** – Luke Titus: phone: 505.324.6108, email: ltitus@cedarridgellc.com

**Past President**– Ed Heath: phone: 970-375-1997, email: ewheath@frontier.net

**Web Coordinator**– Tom Getts email: getts@mindspring.com

**Field Trip Coordinator**– Kim Gerhardt: Phone: 970.375.2700, e-mail: kd@mydurango.net

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