Greetings from the Chair

It was great to see so many of you at the GSA Annual Meeting in Denver! For those of you who couldn’t be at the meeting, I’m happy to say that the Coal Geology Division (CGD) sessions were outstanding and well-attended. Thanks to all the presenters who made the CGD sessions a success. The discussions in the CGD sessions were stimulating, and presentations in both oral and poster sessions drew a high level of interest.

The “Advances in Clean Technology: Carbon Sequestration and Enhanced Resource Recovery” session, chaired by Jack Pashin and Steve Greb, focused on a number of highly relevant topics including CO$_2$ storage capacity, supercritical CO$_2$ injection, enhanced methane and/or oil recovery, underground coal gasification, geothermal resources, and CO$_2$ sequestration assessments. The “Frontiers in Coal Science: Basic Research to Applied Technology”, chaired by Ron Affolter and myself, highlighted recent advances, spanning several fields of coal geology. Underground coal gasification, coal bed methane, mercury reactivity in flue gas, coal mine fires, wildfire history in coal, and coal utilization were among the diverse topics discussed in the sessions.

The highlight of the CGD Business Meeting and Reception was the presentation of the Gilbert H. Cady Award to Colin Ward, of the University of New South Wales. As you know, the Cady Award is one of the most prestigious awards in the field of coal geology, and Colin’s exemplary career easily qualifies him for this special honor. His contributions related to mineral matter in coal and many other aspects of coal science are well known. Congratulations, Colin!

I would also like to congratulate Mike Kennedy (University of Wisconsin, Milwaukee), who gave an excellent presentation and received the Antoinette Lierman Medlin Award, for his research on “Testing extinction as a mechanism for environmental disruption at the Cretaceous-Paleogene boundary (MT, USA)”.

The CGD Reception ended with good food, drink, and a large crowd. I’m looking forward to my role as Chair in the coming year… if you have ideas or suggestions for the Division, please feel free to contact me or any of the other officers.

Time certainly flies by….we are already arranging for technical sessions in Minneapolis in 2011. If you have an idea for a session, please contact Sue Rimmer as soon as possible (the deadline for submission of proposals for sessions is January 11). And last but not least…we are very happy to have Margo Corum (U.S. Geological Survey) as our new 2nd Vice-Chair. Margo has years of experience related to coal and peat research, and she will be a great asset to the CGD. Welcome aboard, Margo!

Happy Holidays and Best Wishes for the New Year!

Sharon Swanson
The 2010 Gilbert H. Cady Award Recipient, Dr. Colin Ward is a leading expert on mineral matter in coal, and his research has extended into many other fields of coal science as well. In his work at the University of New South Wales, he has made major contributions in studies of the coal deposits of Australia. He has worked closely with industry throughout his career, as demonstrated by his extensive publication list and the workshops that he has conducted worldwide. His enthusiasm and dedication to coal science have led him to conduct research in many coal-bearing areas of the world. In the 1970’s, he conducted research on the coal deposits of Borneo and Thailand. He also spent a significant amount of time studying coal in Kentucky and Illinois. His research interests are not focused on a single area of coal geology; instead, he has studied and published on a range of topics including coal seam gas, organic composition, geomechanics, coal ash, and mining hazards. At this time, Dr. Ward has published over 300 publications, a testament to his willingness to work with other coal scientists and his dedication to the field of coal geology.

Particularly notable contributions by Dr. Ward include his book “Coal Geology and Coal Technology” (1984), which covers the depositional environments of coal, petrographic composition, coal quality variation, and implications for the beneficiation of coal. Another major contribution is his paper “Analysis and significance of mineral matter in coal” (2002), which is one of the most cited and downloaded publications in the history of the International Journal of Coal Geology.

Graduate student Michael Kennedy was awarded the Antoinette Lierman Medlin Scholarship Award for his research project titled “Testing extinction as a cause of environmental disruption at the Cretaceous-Paleogene boundary (MT, USA)”. Michael is pursuing a Master’s Degree in the Department of Geosciences at the University of Wisconsin-Milwaukee. Upon graduation in May 2011, he plans to pursue a PhD. Michael’s research interests include sedimentology and stratigraphy. In the future, he would like to work in the oil and gas industry or teach.
Background

Two Coal Geology Division members, Cortland Eble and Steve Greb, of the Kentucky Geological Survey, have been involved with a project to test the capability of injecting CO$_2$ into unmineable coal beds in SW Virginia for sequestration and enhanced coal bed methane (ECBM) potential. The study is part of the Southeast Regional Carbon Sequestration Partnership (SECARB), funded by the U.S. Department of Energy (USDOE).

The most favorable areas identified for the proposed Central Appalachian sequestration field test are located within the coal bed methane (CBM) production region of Buchanan, Dickenson, Russell, Tazewell and Wise Counties, Virginia, and in Fayette, McDowell, Raleigh and Wyoming Counties, West Virginia (Fig. 1). Economic production of CBM in the Central Appalachian region began in 1988 with the development of the Nora CBM field by Equitable Production Company, located primarily in Dickenson County, Virginia. CONSOL Energy later commenced drilling CBM wells in the

Figure 1.

Position of the Nora and Oakwood CBM fields in SW Virginia, showing the location of the CO$_2$ injection test well site. Map from http://www.netl.doe.gov/publications/proceedings/08/rcsp/factsheets/1-SECARB_Black%20Warrior%20Basin_Coal.pdf.
prolific Oakwood Field, located in Buchanan County, Virginia, in 1990 (Fig. 1). Since that time, over 4,000 CBM wells have been drilled and completed through year-end 2005 in the Central Appalachian Basin. In both of these fields, the coals are known to be high in rank (high volatile A to low volatile bituminous), have high gas contents and occur at favorable depths for potential CO$_2$ storage. CBM development in the area has provided extensive geological, engineering and production data, which has been made available for reservoir modeling. The CBM productivity of the province indicates that coal permeabilities should be acceptable for CO$_2$ injection and storage.

The sequestration capacity assessments for the Central Appalachian basin indicate 1,341 million tons (MT) of potential carbon dioxide storage capacity in coal beds, with 398 MT deemed technically feasible for sequestration projects. The corresponding enhanced CBM recovery potential of these coals is estimated to be 0.79 – 2.49 trillion cubic feet (TCF) of gas production. Sources of CO$_2$ in the area are large coal-fired power plants and the Eastman Integrated Combined Cycle Coal Gasification (IGCC) plant in nearby Kingston, Tennessee (Fig. 1). If the technology proves successful, the possibility exists for large economic development gains in the form of enhanced CBM production and carbon sequestration industries for the region (data from http://www.netl.doe.gov/publications/proceedings/08/rcsp/factsheets/1-SECARB_Black%20Warrior%20Basin_Coal.pdf).

**Introduction**

The study area is located in the Pocahontas Coal Field of SW Virginia, which occurs in the Central Appalachian Basin, a NE-SW trending basin encompassing approximately 10,000 square miles in southwestern Virginia, southern West Virginia and eastern Kentucky. The coal beds evaluated in this investigation include those of the Lower Pennsylvanian Pocahontas and Lee Formations (Fig. 2). Two target intervals, one in the Lee Formation (8.2 ft of cumulative coal in three beds) and one in the Pocahontas Formation (6.4 ft of cumulative coal in four beds), were selected for test injection (Fig. 3). The target intervals were chosen primarily based on having the greatest cumulative coal thickness over vertically-limited parts of the overall stratigraphic section. Another consideration was that several of the coals are overlain by shales that may act as barriers to help prevent upward leakage of injected CO$_2$.

In the study area, coal beds of both formations are typically high in rank, high volatile A to low-volatile bituminous (average Ro$_{random}$ = 1.03, Fig. 4), but are thin, ranging from 0.6 ft to 2.2 ft (avg. 1.3 ft) in thickness. They also exhibit considerable variability in ash yield and total sulfur content (Figs. 5, 6). Collectively, these three attributes render them poor targets for mining. However, canister desorption testing indicates that they do contain substantial amounts of coal bed methane, ranging from 111 to 452 scf/ton (as-received basis) with an average gas content of 290 scf/ton (Fig. 7); indeed, the bore hole is located on the southern end of the Oakwood CBM field (Fig. 1).
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**Upper Left: Figure 4.**
Vitrinite reflectance (Ro random) of SW Virginia coals. Average Ro = 1.03.

**Lower Left: Figure 5.**
Figure 5 – SW Virginia coal samples – ash yields.
Coal Petrography

All of the desorbed samples (26) were analyzed for maceral content, which is summarized in Table 1.

Table 1

<table>
<thead>
<tr>
<th>Maceral Type</th>
<th>Maximum</th>
<th>Average</th>
<th>Minimum</th>
</tr>
</thead>
<tbody>
<tr>
<td>Vitrinite*</td>
<td>87.6</td>
<td>76.3</td>
<td>56.4</td>
</tr>
<tr>
<td>Liptinite*</td>
<td>14.0</td>
<td>6.1</td>
<td>0.8</td>
</tr>
<tr>
<td>Inertinite*</td>
<td>30.8</td>
<td>17.6</td>
<td>6.4</td>
</tr>
</tbody>
</table>

*Maceral percentages reported on a mineral matter free basis

Upper Left: Figure 6.
SW Virginia coal samples – total sulfur contents.

Lower Left: Figure 7.
SW Virginia coal samples – total desorbed gas content (scf/ton, as received basis).
Overall, the samples are high in vitrinite, with subordinate amounts of liptinite and inertinite (Fig. 8), a characteristic that agrees well with the petrographic composition of coals of similar rank from other Appalachian CBM-producing areas (e.g., Black Warrior basin, AL; Carroll and Pashin, 2003). High vitrinite content coals are generally considered to have an increased adsorption capacity for methane (CH₄) (Chalmers and Bustin, 2007, and references therein), though exceptions have been noted (Ettinger et al., 1966). Thus, the overall high vitrinite contents of the coals, and concomitant high volumes of desorbed CBM from SW Virginia is a relationship that is not unexpected.

CO₂ behaves in a similar way to methane in coal (i.e., adsorbs onto the porous surface structure), except that coal has a higher affinity for CO₂ than it does methane. It can also hold roughly twice as much CO₂ as it can CH₄ (White et al., 2005), though even higher ratios have been cited (Stanton et al., 2001; Mastalerz et al., 2004). This fact makes coal an attractive target for both CO₂ storage, and enhanced coal bed methane production.

Summary

Many geologic and logistical factors were considered prior to selecting a site in the Central Appalachian basin for test-injecting CO₂ into target coal beds for CO₂ storage and enhanced coal bed methane production. In doing so, a considerable amount of time, effort on the parts of many talented people, and money was expended to determine the best possible, and practical, location for a test.
injection into coal at depth. To this end, 1000 tons of compressed, liquefied CO\textsubscript{2} were injected into the two target intervals in the spring of 2009 over a period of about 1 month. Despite some technical difficulties, the initial injection test was successful. However, much more work lies ahead to monitor the reservoir for integrity of capture.

**Additional Information**

For more information regarding this project, please visit the SECARB website at [http://www.secarbon.org/](http://www.secarbon.org/) and the SECARB Coal Group website at [http://www.energy.vt.edu/secarb/](http://www.energy.vt.edu/secarb/).

**References**


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Nino Reppei, *Virginia Center for Coal and Energy Research*

Ryan Grimm, *Virginia Center for Coal and Energy Research*

Matthew Conrad, *Marshall Miller and Associates*

Mike Miller, *Marshall Miller and Associates*

Peter Clark, *University of Alabama*

R. Marc Bustin, *RMB Earth Science Associates*

George Koperna, *Advanced Resources International*
The Coal Geology Division of the GSA seeks nominations for the 2011 Gilbert H. Cady Award, made for outstanding contributions in the field of coal geology. The award will be made for contributions considered to advance the field of coal geology within and outside North America and will be presented at the Coal Geology Division Business Meeting at the GSA Annual Meeting in 2011.

Nominations will be evaluated by the Gilbert H. Cady Award Panel and should include the name, office or title, and affiliation of the nominee; date and place of birth; education, degree(s) and honors and awards; major events in his or her professional career; accomplishments that warrant nomination. **Send three copies of the nomination by February 28, 2011**, to the Cady Award chair, Jack Pashin, Geological Survey of Alabama, P.O. Box 869999, Tuscaloosa, AL 35486-6999. If you wish to contact Jack regarding your nomination, his email address is jpashin@gsa.state.al.us. The award recipient will be notified in early May.

The Coal Geology Division Antoinette Lierman Medlin Scholarship provides monetary support and recognition to deserving students in coal science. Monies from the scholarship are used towards successful completion of student's research projects. Each year, one award is presented for the completion of laboratory/analytical research and a second award is presented for the completion of fieldwork. Full-time graduate students are strongly encouraged to submit applications for these scholarships. **The deadline for submission is February 15, 2011.** For complete information about the A.L. Medlin Award, refer to GSA Today, January 2011 issue. Please contact Sue M. Rimmer, Scholarship Committee Chair, at srimmer@siu.edu if you have any questions.

### Membership Update

The table below shows our current number of members as of December 1, 2010. The table also indicates the number of members by type of membership.

<table>
<thead>
<tr>
<th>Member Type</th>
<th>Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>Recent Graduate</td>
<td>16</td>
</tr>
<tr>
<td>Member/Fellow</td>
<td>164</td>
</tr>
<tr>
<td>Student Member</td>
<td>27</td>
</tr>
<tr>
<td>Senior Member/Fellow</td>
<td>68</td>
</tr>
<tr>
<td>Affiliate</td>
<td>1</td>
</tr>
<tr>
<td><strong>Total Members</strong></td>
<td><strong>276</strong></td>
</tr>
</tbody>
</table>

### Upcoming 2011 Coal-Related and GSA Meetings to Place on Your Calendar

- **GSA Northeastern / North-Central Section Meeting** Pittsburg, Pennsylvania, USA, March 20-22
- **GSA South-Central Section Meeting** New Orleans, Louisiana, USA, March 28-29
- **GSA Southeastern Section Meeting** Wilmington, North Carolina, USA, March 23-25
- **GSA Rocky Mountain / Cordilleran Section Meeting** Logan, Utah, USA, May 18-20
- **AAPG Annual Convention & Exhibition** Houston, Texas, USA, April 10-13
- **U.S. Shale Plays Meeting** Fort Worth, Texas, USA, August 2-4
- **The Society for Organic Petrology Annual Meeting** Halifax, Nova Scotia, Canada, July 31-August 4
- **International Committee for Coal and Organic Petrology Meeting** Porto, Portugal, September 10-16
- **World of Coal Ash Meeting** Denver, Colorado, USA, May 9-12
TSOP is short for The Society for Organic Petrology and is a society for scientists and engineers involved with coal petrology, kerogen petrology, organic geochemistry and related disciplines. TSOP was founded in the United States; however we have over 200 members from around the globe, representing 30 countries. TSOP members come from many different employment backgrounds, including a combination of industry, university, government agencies and consultancy work. Fields of work range from oil and gas to coal and coal bed methane to the environmental sciences. If you are part of these communities, we invite you to join TSOP. For more information please visit our website: http://www.tsop.org.

TSOP provides:

- Contact with leading edge research and researchers in the field of organic petrology, organic geochemistry, petroleum geochemistry, analytical and environmental geochemistry, and several other related subjects.
- A forum for disseminating research findings and ideas among peers;
- A small Society where you can easily find a way to participate and get to know fellow members.
- A quarterly newsletter featuring Society business, along with contributions from members including meeting notices, book reviews, and short technical contributions, among other items.
- A variety of high-quality publications including the Abstracts and Proceedings volumes from our annual meetings, and special publications including short course notes and research committee reports.
- Exciting international meeting venues like Sydney, Australia; Beijing, China; Oviedo, Spain, and Gramado, Brazil, as well as locations throughout North America.

Calling all Students!

- Connect with experts in your field of interest/study, from academia, government and industry, student representatives on the TSOP Council.
- Meet fellow students in the organic petrology field from around the world.
- Awards and grants are available, including the Spackman Award grant, along with Best Student Paper and poster awards.
- Financial assistance available to student members for meeting attendance, and discounted meeting registration fees, low dues fees.

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Sarah Shearer would like to thank the following persons for contributing photos/information/editing for the newsletter: Cortland Eble, Steve Greb, Sharon Swanson, Jack Pashin, and Rachel Walker.