

The Coal Geologist

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Newsletter of the Coal Geology Division of the Geological Society of America

Message from the CGD Chair



The International Year of Planet Earth (IYPE), beginning in 2007 and extending into 2009, is the largest ever international effort to promote the earth

sciences. All major international earth science organizations, including GSA, are participating. The IYPE emphasizes interconnection of the solid earth with the biosphere, hydrosphere and atmosphere. In addition, a major goal is to promote sustainable use of resources for future generations.

Although coal is not a sustainable resource, as coal scientists we have a responsibility to understand how coal is used and to work with our engineering counterparts to minimize its impact on the environment. The net result is to substantially broaden the scope of our discipline and our Division. For example, atmospheric pollutants such as mercury, derived in part from coal combustion, span international boundaries to be taken up in ecosystems far from the source of their emission. This interaction is but one global-scale connection between solid fossil fuels and the biosphere.

As coal scientists, we are engaged in understanding everything from coal-forming paleoenvironments to the use and geologic distribution of coal resources. Managing the materials resulting from present and projected use of coal presents a big challenge that must take into account the Nation's energy needs, environmental stewardship, and commercial

interests. All aspects of coal research are important to society, and by virtue of our participation in these studies, we all work within the spirit of the International Year of Planet Earth. I encourage everyone to celebrate the Earth as well as the International Year of Planet Earth.

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Editorial



Welcome to the Fall 2007 issue of The Coal Geologist. As you may have noticed, I have revamped the look and feel of the newsletter. I now look forward to receiving your feedback on all aspects on the newsletter. Should you like to see some other sections in the newsletter, please let me know?

To celebrate the International Year of Planet Earth, I encourage you to share your thoughts, ideas, achievements, and experiences with your fellow colleagues through this newsletter.

I especially like to see contributions coming from our senior members on historic aspects of the Divisional activities. Should you have any old photos, anecdotes, or simple memories, please share them with the wider membership through this newsletter to leave a legacy that future members can continue to cherish.

Anupma Prakash prakash@gi.alaska.edu



Announcements: 2007 Awards

Gilbert H. Cady Award: Dr. Andrew Scott, Professor of Applied Paleobotany at the Royal Holloway College of the University of London, was voted the recipient of this prestigious award for his significant contributions to research, teaching, and service in the field of coal geology. Dr. Scott was nominated by Dr. John C. Crelling, Department of Geology, Southern Illinois University, Carbondale.



Dr. Scott is also an Honorary Professor, Jilin University, China; Honorary Research Associate University of Southern Illinois; Visiting Professor, Yale University (2006-7); and Visiting Fellow

Berkeley College, Yale University.

More information on his research can be found at www.gl.rhul.ac.uk/staff/acs.html.

Antoinette L. Medlin Award: The A.L. Medlin Scholarship Award of US \$ 2000 goes to Denis Pone, Department of Energy and Geo-Environmental Engineering, Pennsylvania State University, State College, for his project entitled 'Coal-Matrix Behavior and its Affect on CO₂/CH₄ Flow and CO₂ Sequestration.'

A.L. Medlin Field Study Award: Two field awards, each for US \$1500, go to:

1. Lindsey Henry, Department of Geosciences, University of Wisconsin Milwaukee, for her project entitled 'Late Paleozoic glaciation in western Argentina: What influence did Gondwana glaciation have on the development of northern hemisphere coal-bearing cyclothem?'
2. Ryan Grimm, Department of Geosciences, Virginia Polytechnic Institute and State University, for his project entitled 'Sequence stratigraphic analysis of coal-bearing Lower Pennsylvanian strata, central Appalachian foreland basin, southwestern Virginia: Controls on coal attributes.'



New Book

A new book entitled "Geology of Coal Fires: Case Studies from around the World," edited by CGD First Vice-Chair Glenn B. Stracher, is being published by the GSA Engineering Geology Division (Reviews in Engineering Geology, V. 18). This book includes chapters devoted to spontaneous combustion, greenhouse gases, mineralogy and petrology of coal fires, geophysics of coal fires, and public policy. It will be available in November or December 2007.



Kentucky Coal Fire Field Trip

In March 2007, Dr. Glenn B. Stracher and Janet L. Stracher of East Georgia College, Dr. Jim Hower and John Hiatt of Kentucky's Center for Applied Energy Research, and graduate student Sarah Mardon of the University of Kentucky carried out a reconnaissance survey of coal fires associated with former auger-hole mining in eastern Kentucky.

The team recorded fire temperatures (as high as 336°C or ~637°F); toxic concentrations of gases based on in situ analysis (f CO as high as 100 ppm); collected mineral and coal-tar samples associated with coal-fire gas; and collected coal-fire gas samples, using stainless steel canisters and extraction line inserted into gas vents, which are being analyzed by Dr. Donald Blake at the University of California, Irvine.



Figure: Gas vent from an underground coal fire in Hazard, Kentucky (photo by Glenn Stracher)



Featured article: Novel Application of Minnesota Peat

Raw peat is known to have natural ion exchange properties. We have taken peat deposits near Aitkin, Minnesota, and incorporated them into a hardened granular media which allows a high fluid permeability and resists breakdown in water. In the past, peat has been utilized in natural and engineered wetlands for extraction of dissolved metals. The engineered wetlands approach has met with some success, although the low permeability of raw peat has reduced the effectiveness of this approach, requiring a large areal footprint. Our peat based ion-exchange media can be deployed in a sand filter, allowing conventional filtration of solids as well as adsorption of dissolved metals.

The process employed starts by field-drying and harvesting the peat, and is followed by a pelletization step (Figure 1.1) which irreversibly alters the peat by redistributing the natural waxes and resins within the peat. The pellets are dried further, crushed and sized. The final step involves partial activation in a low-oxygen environment, which increases internal surface area, hardness and porosity, while retaining most of the ion exchange capacity (Figure 1.2).



Figure 1. Processing steps. Peat after 1) pelletization 2) partial activation.

Peat from the harvest area contains 28% humic acid, of which carboxylic acid is a significant subset. Carboxylic acid groups are located on the cell walls of partially decayed plant matter, and are responsible for the ion exchange reactions. The reaction involves the displacement of hydrogen ions in these groups by cations with a +2 charge.

Research has demonstrated the effectiveness of this product for removing dissolved metals, including copper, cobalt, nickel, lead, cadmium and zinc. Ongoing research has shown positive initial results on mercury extraction, while other metal solutions still remain untested.

The test area, Soudan Mine in northern Minnesota, has effluent water which contains an average of 10 ppb dissolved cobalt and 16 ppb dissolved copper. The discharge limits are 5 ppb and 17 ppb for cobalt and copper, respectively. Figure 2 shows the effectiveness of the partially activated peat at reducing both copper and cobalt values to levels well below the discharge limits.

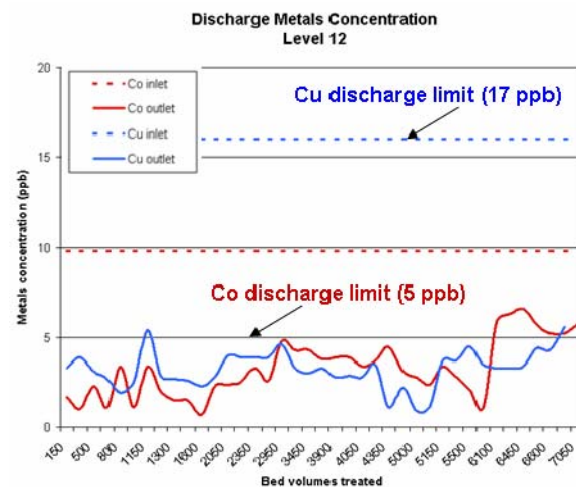


Figure 2. Metal removal characteristics for processed peat. Both copper and cobalt levels were reduced below discharge limits for over 6000 bed volumes.

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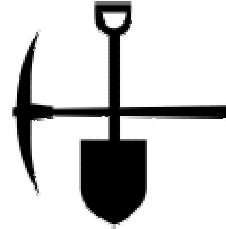


The activities of the Coal Geology Division are possible due to the generous contributions from our members and sponsors, and we remain indebted for this support. Should you wish to sponsor any of our activities, please send an email to Dr. Anupma Prakash prakash@gi.alaska.edu.



Humor: Coal Miner's Confusion

Question: Do you know how to confuse a coal miner?



Answer: Show him two shovels and then ask him to take his pick.



Coal Geology Related Special Sessions at the GSA Annual Meeting, 2007

T5. **Materials Flow in Coal Utilization:**

Allan Kolker, James C. Hower, Ronald H. Affolter

This session tracks the disposition of materials from “cradle to grave” during coal utilization for electric power generation. Relevant topics include coal quality, utility emissions, fate of coal combustion products, and related environmental issues.

T6. **Microbial Origin of Hydrocarbon Gases in Coal Beds and Sedimentary Basins:**

Donald Klein, Kevin W. Mandernack, Romeo M. Flores

Recent contributions from biogeochemistry, sedimentary geology, isotope geochemistry, and molecular biology will be discussed, in relation to better understanding biogenic gas formation in subbituminous coal beds in the Powder River Basin and other sedimentary basins.

T71. **Modern and Ancient Fire Systems: Implications for Geomorphology, Sedimentology, Coal Geology and Paleontology:**

Andrew C. Scott, Susan Cannon, Ian J. Glasspool

Widespread occurrence of charcoal contributes to our understanding of ancient fire systems and also impacts on coal quality. This session highlights current understanding of modern and ancient fire systems and its relevance to earth science.