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COALBED METHANE EXTRA

A publication of the Coalbed Methane Outreach Program (CMOP)

www.epa.gov/coalbed

In this issue

International CMM/CBM Activity

Throughout the 1990s, coal mine methane (CMM) and coalbed methane (CBM) activity in the U.S. grew rapidly due to a combination of factors, including a well-developed gas infrastructure, a large drilling and associated gas services industry, and relatively high prices for gas and electricity. In contrast, most of these factors are absent in other countries which has tended to slow the pace of CMM/CBM development internationally. Recently, however, a worldwide increase in energy prices coupled with the potential carbon credits associated with CMM/CBM projects has sparked new interest in developing CMM/CBM projects globally.

The following article reviews CMM/CBM project activity in several major coal-producing countries: Australia, China, India, South Africa, and Ukraine. These countries are profiled here because they each have significant potential for CMM and CBM projects, with important developments underway.

AUSTRALIA

Coal production and emissions. The world's fourth-largest coal producer, Australia ranks sixth globally in fugitive methane emissions from coal mining activities. In 2000, Australia's coal mine methane emissions were 18.4 million metric tons CO2 equivalent.

Overview of current CMM projects and activities. Australia continues to be a leader in CMM development. The Australian Government has made a strong commitment to methane recovery and use by awarding AUS $30 million (US $21 million) to CMM projects through two rounds of solicitations. In addition, COAL21, a collaborative partnership between industry, government, and the research community to address greenhouse gas (GHG) emissions from the coal sector, has identified CMM recovery as an important and viable GHG abatement option.

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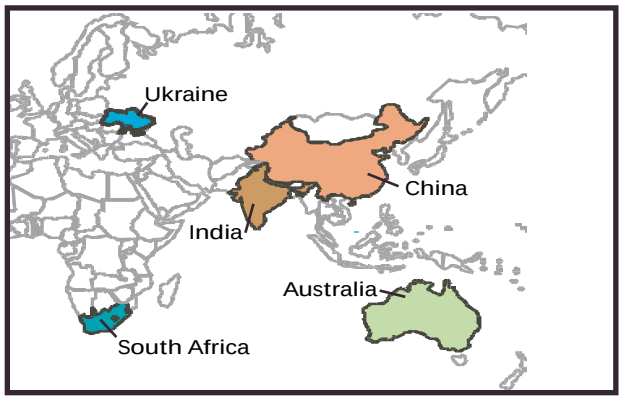

International CMM/CBM Activity (cont'd from page 1)

The best known Australian CMM project is located at the BHP Billiton Appin and Tower collieries operated by Energy Developments Ltd. (EDL) in New South Wales (NSW). Begun in the mid-1990s, this project utilizes 94 one-megawatt (MW) Caterpillar 3516 engines to generate power from 23 million cubic feet per day (MMcfd, or 651,000 M3) of CMM. In addition, 54 of the engines utilize mine ventilation air, which contains low concentrations (<1%) of methane, as combustion air. This process destroys the ventilation air methane (VAM) before it is vented to the atmosphere. The project captures nearly 3 million tons of carbon dioxide (CO_2) equivalent, making it one of the largest greenhouse gas (GHG) reduction projects in Australia.

Other CMM projects planned or operating in Australia that use CMM from the mine degasification systems include the following:

- a planned 32 MW project at Anglo Coal's German Creek Coal Mine to be operated by EDL using 3 MW gas turbines;
- Envirogen's 10 MW of generation at the Teralba and Bellambi Mines in New South Wales; and
- 10 MW project at the North Goonyella Mine with each project using 1 MW gensets.

Australia is also at the forefront of development projects using ventilation air methane (VAM). BHP Billiton has been awarded up to AUS $6 million (US $4.2 million) towards a AUS $10.7 million (US $7.4 million) project to install a specialized combustion unit that can burn low concentration VAM at the West Cliff colliery in Illawarra, NSW. [See related insert box] Powercoal has been awarded up to AUS $15 million (US $10.4 million) towards a AUS $26 million (US $18 million) project to link the air intake of the Vales Point power station to the mine ventilation systems of the Endeavour and Munmorah collieries, located south of Newcastle, NSW. Methane gas currently vented to the atmosphere will be used as combustion air.

Future potential. With a strong government and industry commitment to methane capture and use, in conjunction with continued growth in coal production, Australia's CMM/CBM industry will likely remain vibrant for the foreseeable future.

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WORLD'S FIRST COMMERCIAL VAM OXIDATION PROJECT TO LOCATED BHP BILLITON MINE IN AUSTRALIA

BHP Billiton, MEGTEC Systems AB, and the Australian Government have announced that the world's first commercial VAM oxidation project will be developed in Australia and is expected to begin operation in 2006.

According to press releases, the project, referred to as WestVAMP, will be located alongside existing surface facilities at West Cliff Colliery, and will use MEGTEC VOCSIDIZER™ technology developed by Swedish emission control specialist MEGTEC System AB. In addition to reducing carbon emissions from the mine, the project will generate 6 MW of electricity from a steam turbine which will be a source of energy to be used within the West Cliff Colliery. Construction is scheduled to commence later this year with commercial operation planned for mid 2006.

For more information visit:

http://bhpbilliton.com/bb/newsCentre/newsAtBhpBillitonDetail.jsp?id=News/2004/News@BHPBilliton290604.html

http://www.megtec.com/HTML/news/press/PR30June2004.pdf

International CMM/CBM Activity (cont'd from page 2)

CHINA

Coal production and CMM emissions. Currently the world's largest coal producer and consumer, China will likely remain in this position for at least the next decade given its phenomenal economic growth. China also leads the world in CMM emissions, emitting 172 million metric tons of CO2 from coal mining activities in 2000. CMM emissions are projected to increase dramatically in the next several decades.

Overview of current CMM projects and activities. China has a long history of CMM recovery. Underground methane drainage began in China in the 1950's, and surface CMM development began in the 1990's. By year-end 2002, the China Coal Information Institute reported that 196 coal mines in China have drainage systems in place. Total methane drainage in 2002 was 1.15 billion cubic meters with approximately 500 million m3 used, mostly as boiler fuel and town gas (Huang et al November, 2003).

The large Coal Mining Authorities (CMA) of Yangquan (Shanxi Province), Fushun (Liaoning Province) all produced over 100 million m3 in 2002.

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April 2004 China Workshop Summary

The International Workshop on CMM Utilization in China co-sponsored by State Administration of Coal Mine Safety Supervision of China and US Environmental Protection Agency, and organized by China Coal Information Institute was held in April 22-24 2004 in Guilin Hotel, Guilin.

More than 50 participants from USA, Germany, Sweden, Canada and Japan as well as leaders, technical personnel from relevant departments, coal enterprises and research institutes in China attended this workshop.

The main theme of this workshop focused on techniques related to CMM utilization. Experts from Jim Walter Resources, USA,Raven Ridge Resources Incorporated, MEGTEC Sweden, CANMET of Natural Resources Canada Department and Deutz AG Germany, gave presentations on special topics involving purification of CMM, CMM power generation, utilization of VAM, and commercial application, etc.

Note: 4th China International CBM/CMM Symposium now has a website: http://www.coalinfo.net.cn/coalbed/coalbed.htm

International CMM/CBM Activity (Cont'd from page 3)

As in many countries, CBM production has proved much more challenging in China. The seams in many areas are highly fractured with severe faulting, permeability is low, and coal seams are soft and prone to collapse. With the enormous CBM resource base and potential markets in China, however, several developers have continued efforts to produce CBM. In addition, with China's rapidly growing economy and demand for energy, interest in CMM/CBM projects in China has increased significantly over the last few years. Both private industry and multi-lateral agencies have recently stepped up their efforts and investments in CMM/CBM projects.

The largest CMM effort underway in China is the Jincheng CMM project in Shanxi Province, which is expectd to be funded in part by a $100 million loan from the Asian Development Bank. The Jincheng mine complex currently vents a relatively concentrated methane-air stream (40% CH4) with a volume of about 202,000 m3/day (5.7 MMcfd or 2,300 tons of CO2) of methane. This vented stream is forecast to increase to about 290,000 m3/day (10.2 MMcfd or 4,000 tons of CO2) by 2005. Improvements in mining technology, such as steerable horizontal boreholes, could further improve the quality and quantity of CMM produced at Jincheng. A feasibility study conducted by Advanced Resources International, REI Drilling and EDL, Ltd., found that an array of up to 51 small (1-MW) reciprocating engines that would generate about 50 MW of power was the most effective CMM utilization option at Jincheng. These engine types are able to handle variations in gas quality and quantity that often characterize CMM gas production streams. The ADB is also supporting development of another large-scale project at the Fushun CMA. Other notable projects include the following:

Drilling at Jincheng CMM Project, Shanxi Province, China. Photo Courtesy of ARI.

- A 6- MW power projects at Shuicheng
- GEF Project in mid 1990's at Tiefa, Songzao and Kailuan mines demonstrated improved methane drainage techniques. Project total was US$10 million.
- 5-MW power project at Songzao
- UK Department of Trade & Industry (DTI) Cleaner Coal Technology Program has launched a series of collaborative CBM/CMM projects in China.
- JCOAL/APEC project at Tiefa Coal Mine Group in Liaoning Province has recently been completed that drains gas for delivery to nearby Tieling City as a municipal gas supply.

The largest CBM development attempted in China to date consists of 30 vertical CBM wells recently drilled at Jincheng on close (20-acre) spacing. Anthracite coal seams in this area average about 350 m deep and 6 m thick, with high gas content and low to moderate permeability. Jincheng plans to frac the wells later this spring and put them into production. Located very close to the Sihe Mine, these wells could be mined through in less than 10 years

Future potential. China's economic growth, coupled with its vast coal reserves, is likely to continue to attract companies and investment to China's emerging CMM/CBM industry.The China Coalbed Methane Clearinghouse is an excellent source of information for more information on CMM/CBM in China. They can be reached at cbmc@public.bta.net.cn.

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International CMM/CBM Activity (Cont'd from page 4)

INDIA

Background. Coal production and CMM emissions. India is the world's third-largest coal producer (399 million short tons in 2001), ranking just ahead of Australia. The bulk of the country's high rank coal resources (~95%) are located in the Damodar Valley coalfields, the site of the majority of India's mines. Several of this region's mines are known to be highly gassy, with gas contents of up to 500 cf/ton.

Overview of current CMM projects and activities. Currently, there is some drainage of coal mine methane, but no projects for recovery or utilization of CMM in India.

An $18 million project, jointly funded by the Global Environment Facility (GEF), United Nations Industrial Development Organization (UNIDO), and the Government of India, seeks to demonstrate technology for producing methane in advance of and during mining. The recovered methane will be used both for electricity generation and as a fuel for CNG in mine trucks. This program will include purchase of equipment for underground drilling as well as surface borehole drilling. In addition, Indian crews will be trained to perform all aspects of a CMM development project. The Central Mine Planning and Design Institute is the lead implementing agency in India.

In May 2001, the Indian government announced the first round of leases for CBM blocks. Three groups were awarded blocks: Essar Oil and Gas, Reliance Industries, and the Oil and Natural Gas Corporation (ONGC). All three groups are actively conducting drilling and testing programs under the first phase of their development programs.

Future potential. Recently, the Bureau of Energy Efficiency (part of the Ministry of Power) announced a request for proposals to utilize CMM. This program, jointly conducted by the governments of India and Germany, seeks projects for generating electricity from CMM from active and abandoned coal mines using containerized internal combustion engines. To be considered for the program the CMM projects should meet three criteria: (1) a production potential of 1,500 m3/day (1.3 MMcf/day) equivalent of 100% methane; (2) considerable potential for follow-up projects; and, (3) industrial electricity consumers close to the project site. These projects may qualify to generate certified emissions reduction (CERs) under the clean development mechanism (CDM).

SOUTH AFRICA

Coal production and CMM activities. In the mid-1990's, South Africa was ranked as one of the world's top five CMM emitters due to the large volumes of coal produced in the country and estimates that placed South Africa's gas content factors on par with Australia. Since then, it has been shown that these original estimates were vastly overstated, and now South Africa ranks 11th worldwide. A detailed industry-funded empirical study, "Coal Tech 2020", is currently underway to accurately assess the country's CMM emissions. This study, which is being conducted by CSIR of South Africa, has measured methane concentrations in the vent air from most of the major mines as well as gas content from core samples. CSIR expects to complete the study later this year.

Most underground mining today occurs in the Witbank coal area to the southeast of Johannesburg and Pretoria, but the abandoned mines in the Natal basin in KwaZulu Natal Province may also provide an excellent resource for developing Abandoned Mine Methane (AMM) projects. Several of these mines were very gassy when operating. In addition to coal mines, gold mines could also present methane development opportunities.

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International CMM/CBM Activity (Cont'd from page 5)

The gold mines of South Africa have a long history of utilizing the methane removed from the mines. The methane originates from coal seams and other gassy strata that overlie or abut the gold reefs, and must be removed for the same reason it is extracted from coal mines. For CBM development, the most promising area is the Waterberg Basin in the north. The Waterberg is largely untapped due to its distance from coal markets, but there is some belief that South Africa will eventually mine the Waterberg, as the Witbank Mines are depleted as well as to alleviate local and regional environmental impacts.

Future potential. Although there are not a large number of gassy mines in the country, there is definite potential for CMM/CBM projects at selected mines and coalfields. There is also government, multi-lateral, and industry support for CMM/CBM development. From the governmental perspective, one of the primary attractions of CMM/CBM is the possibility of using coal mine methane to replace coal for cooking and heating in rural and densely populated township areas. CMM/CBM-based power production could also supplant some peaking electrical generation. There are some predictions of a looming power crisis as Eskom, the state-owned electric utility, will reach capacity in a few years. South Africa has a very low marginal cost of power, less than US $0.01 per kWh, which has served as a disincentive for alternative energy projects. The Government's desire to see more independent power projects and the possible short-fall in generating capacity could be driving forces for the implementation of CMM/CBM projects.

UKRAINE

Coal production and CMM emissions. The world's ninth-largest coal producing nation (114 million short tons in 2001), Ukraine is the fourth-largest emitter of methane emissions from coal mining activities (31.9 million metric tons CO2 equivalent in 2000).

Overview of CMM projects and activities. The CMM/CBM industry in Ukraine appears poised to move forward with several significant projects in the near future. As identified in a workshop sponsored by EPA on Ukraine CMM/CBM, one of the biggest impediments to CMM/CBM development in Ukraine has been the lack of involvement by major Ukrainian companies, a situation that changed in 2003 by the formation of the company "Ecometan".

Ecometan is a Ukrainian joint venture between the Industrial Union of Donbass and two other large industrial firms. The venture will seek to develop both CMM and CBM in the Donetsk region, the largest coal producing region in Ukraine. Presently, two CMM pilot projects are planned, one at the Krasnomeyrsk Mine and the other at the Komsomolets Mine. Geologic work has also been completed for locating three, five-well pilot CBM pilot projects.

CMM activity is also picking up in the Lugansk coal mining region of Ukraine as well. In late 2003, Zeppelin Ukraine, the Ukrainian dealer for Caterpillar, sold two generator sets (Models G3516 and G3508, a combined 1.5 MW) to the Don Ukraine company, which is developing coal seam methane utilization projects in the Lugansk region.

Coal Mine, Donetsk Region. Photo courtesy of IUD.

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International CMM/ CBM Activity (Continued from Page 6)

Future potential. A major CMM project in the Donetsk region at the Sasyadko Mine was recently announced by GE Jennbacher Energy. The project, reported to be the world's largest in terms of total power output, will utilize 22 complete gas engine cogeneration systems to generate 131 MW of electrical and thermal output. The cogeneration systems will be GE Jenbacher JMS 620 GS-S-LC engines manufactured at GE Jenbacher's facilities in Jenbach, Austria. The projected electrical efficiency of the units is 42.9%, and the thermal efficiency is 41.3%, yielding a total project efficiency of 84.2%. The equipment will be installed in 10 stages, beginning June 2004.

CONCLUSIONS

Globally, the outlook for CMM/CBM development appears bright. As both energy demand and prices increase, the opportunity for energy recovery from CMM utilization projects will present an attractive option for mines and local markets. The continued development of new extraction and utilization technologies may help to lower production costs, while the environmental benefits associated with CMM projects as well as the potential for "green" financing opportunities may make these investments more attractive. ■

NEW PUBLICATIONS

COAL SEQ III FORUM Proceedings from the Coal Seq III Forum recently held in Baltimore, Maryland http://www.coal-seq.com/Forum_III.htm

US Environmental Protection Agency. 2004. Methane Emissions from Abandoned Coal Mines in the United States: Emissions Inventory Methodology and 1990 - 2002 Emissions Estimates. EPA-430-R-04-001.

Available online at:

http://www.epa.gov/ coalbed/ or by calling +1.800.782.7937, or emailing

energystar@ optimuscorp.com.

Proceedings from the 3rd International Methane & Nitrous Oxide Mitigation Conference

Available on CD (English only) by calling +1.800.782.7937 or email energystar@optimuscorp.com. Hard copies are available by contacting the China Coal Information Institute at cbmc@public.bta.net.cn. CD contains all papers including poster presentations. For hard copy specify Oral Presentations (English or Chinese) and Poster Presentations (English only)..

Proceedings from the 2004 International Coalbed Methane Symposium

Available http://bama.ua.edu/~coalbed/cm_11_08.html

COALBED METHANE EXTRA

Reducing Greenhouse Gas Emissions Using Geologic Sequestration of CO2 in Coal Seams

Efforts to reduce methane emissions from coal mining activities have focused on promoting the profitable recovery and use of coal mine methane (CMM). In this context, coal seams are primarily viewed as a potential source of greenhouse gas emissions. Coal seams, however, can also be utilized to reduce atmospheric concentrations of greenhouse gases - by sequestering carbon dioxide (CO2). This article briefly describes the principles of CO2 sequestration and its application in unmineable coal seams.

What is Geologic Sequestration?

Approximately one-third of all anthropogenic CO2 emissions come from the burning of fossil fuels to generate electricity. Many other industrial facilities, such as gas processing facilities, refineries, and fertilizer plants, also emit large amounts of CO2. CO2 emissions can be reduced in a number of ways, such as increasing the efficiency of these facilities or by switching from carbon-intensive fuels, such as coal, to less-carbon intensive fuels, such as natural gas, to generate electricity. In addition, CO2 emissions could also be reduced substantially by capturing and permanently sequestering the CO2 in secure locations from which it can no longer be emitted to the atmosphere.

Geologic formations, such as oil and gas reservoirs, unmineable coal seams, and deep saline reservoirs, are structures that have stored crude oil, natural gas, brine and CO2 over millions of years. These geologic formations are attractive candidates for the permanent sequestration of CO2. Moreover, many large industrial emitters of CO2 are located near geologic formations that are amenable to CO2 sequestration. In many cases, injection of CO2 into a geologic formation can enhance the recovery of hydrocarbons, providing value-added byproducts that can offset the cost associated with CO2 capture and sequestration.

More research and development on geologic sequestration is required to establish its credibility and acceptability as a safe, reliable, long-term option for reducing greenhouse gases in the global atmosphere. A key priority for development of CO2 capture and sequestration technology is cost reduction, as projections based on current technologies indicate that sequestration would be very expensive.

Sequestering CO2 in Unmineable Coal Seams

Coal seams typically contain large amounts of methane-rich gas that is adsorbed onto the surface of the coal. The current practice for recovering coal bed methane (CBM) is to depressurize the coal seam, usually by pumping water out of the reservoir.

An alternative or complimentary approach for recovering CBM is to inject CO2 into the coal seam. Recent laboratory and field studies (http://www.coal-seq.com) have demonstrated that coal adsorbs roughly twice as much CO2 as methane. Although much more work is necessary to understand and optimize this process, it offers the potential for CO2 to displace the adsorbed methane and remain sequestered in the coal bed. The methane, which can be recovered and utilized, would provide a value-added revenue stream to the sequestration process.

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Clark Talkington at talkington.clark@epa.gov or Pamela Franklin at franklin.pamela@epa.gov

What is EPA doing about geologic sequestration?

EPA is actively participating in a number of national and international efforts to promote the sequestration of CO2 in geologic formations, including coal seams.

EPA is involved in geologic sequestration because it may present an important option for reducing atmospheric concentrations of carbon dioxide, thereby mitigating impacts of global climate change. EPA's Office of Atmospheric Programs (OAP) serves as the principal entity within EPA that is responsible for carbon sequestration policy and program development.

EPA has been involved in a number of activities related to geologic sequestration. In early February 2004, EPA held a workshop to discuss ongoing research and development activities focusing on sequestration, with an emphasis of efforts to ensure that the sequestered CO2 is accounted for accurately, and to ensure that human health and the environment are adequately protected. EPA is also evaluating the extent to which these CO2 sequestration activities may be significant enough to impact the overall U.S. greenhouse gas inventory, and how to adequately quantify the estimated emissions reductions associated with geologic sequestration of CO2.

Most recently, EPA co-sponsored the Third Annual Conference on Carbon Sequestration, which was held in Alexandria, Virginia, in May 2004. This conference was sponsored by the Department of Energy (DOE)'s National Energy Technology Laboratory (NETL) in conjunction with other federal agencies. The meeting included plenary addresses, with keynote speakers from the Department of Energy, the State Department, US EPA, Princeton Environmental Institute, BP North America, the Natural Resources Defense Council, and others. The conference sessions focused on the challenges and opportunities for CO2 sequestration in the U.S. In addition, the conference included technical poster sessions that focused on specific topics including CO2 capture and separation, geologic sequestration, and other advanced sequestration technologies. Additional information on the conference can be found at http://www.carbonsq.com.

Reducing Greenhouse Gas Emissions Using Geologic Sequestration of CO2 in Coal Seams (Cont'd) from page 8)

The cost of geological storage in coal seams is site-specific, depending on the characteristics of the storage formation, especially location and depth. Costs are uncertain, as CO2 injection in coal seams for enhanced coal bed methane production is not yet commercial. Well costs are expected to be the major factor driving costs.

The U.S. has considerable potential for CO2 sequestration in unmineable coal seams. U.S. coal resources are estimated at 6 trillion tons. Yet 90 percent of this coal resource is considered unmineable due to unfavorable geological characteristics including seam thickness, depth, and structural integrity. Many large unmineable coal seams are located near electricity generating facilities that are significant point sources of CO2. Integration of coal bed methane with a coal-fired electricity generating system can provide an option for additional power generation with low emissions.

Conclusion

Many technical experts believe that the sequestration of carbon in geologic formations, including coal seams, represents a potentially viable option for substantially reducing CO2 in the atmosphere. However, significant technical, economic, and environmental challenges remain. It is critical that research and development efforts regarding geologic sequestration address a broad range of environmental concerns through risk analysis and other appropriate tools. ■

For more information on EPA's activities related to geologic sequestration, contact Ms. Anhar Karimjee, EPA's Geologic Sequestration Program Manager, at (202) 343-9260 or via email at karimjee.anhar@epa.gov.

China Coalbed Methane Clearinghouse Announces International CBM/CMM Conference December 1-2, 2004

The China Coalbed Methane Clearinghouse has released the First Announcement and Call for Papers for the 4th International China CBM/CMM Symposium. This Symposium, scheduled for December 1-2, 2004 at the Hotel Kunlun in Beijing, China, follows on the success previous three Sino-US International CBM/CMM symposiums held in 2000, 2001, and 2002. The conference series presents an excellent forum for discussion of a wide range of topics related to CBM/CMM development. Abstracts, not more than 400 characters, should be submitted no later than July 1, 2004. The Organizing Committee of the Symposium will review the abstracts and notify the authors, if the abstract is accepted. All the papers should be submitted to the Organizing Committee either by email or fax before September 1, 2004. Papers submitted within the specified time period will be included and published in the proceedings. The registration fee for the conference is $300. Please forward abstracts and any questions or comments to Mr. Liu Wenge at cbmc@public.bta.net.cn. ■

Address inquiries about the Coalbed Methane Extra or about the U.S. EPA Coalbed Methane Outreach Program to:

Clark Talkington
Phone: +1 (202) 564-8969
E-mail talkington.clark@epa.gov
or
Pamela Franklin
Phone: +1 (202) 343-9476
E-mail: franklin.pamela@epa.gov

Our mailing address is:

U.S. Environmental Protection Agency
Coalbed Methane Outreach Program, 6202J
1200 Pennsylvania Ave., NW
Washington, DC 20460 USA

Please notify us if your contact information (address, e-mail, or phone/fax number) changes.

Proceedings of the 3rd International Methane and Nitrous Oxide Mitigation Conference Now Available

Proceedings from the 3rd International Methane and Nitrous Oxide Mitigation Conference held in Beijing, China are now available online, in hard copy, and on CD. The conference attracted 300 participants from 29 countries to address methane reductions from the coal, agriculture, landfill, and natural gas/oil sectors. The Proceedings contain 41 papers on coal mine methane including country and regional updates, market analyses including papers on the markets for carbon reductions, and various technology applications.

To access the Proceedings on-line, go to http://www.coalinfo.net.cn/coalbed/meeting/2203/papers/index.html. To order a copy of the CD, call +1.800.782.7937 or email energystar@optimuscorp.com.. For a hard copy, contact Ms. Liu Xin at the China Coal Information Institute, the conference organizer, at cbmc@public.bta.net.cn. ■

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www.epa.gov/coalbed

Upcoming Events

CANADIAN INSTITUTE'S 3RD ANNUAL COALBED METHANE SYMPOSIUM.

June 21- 22, 2004. Calgary, Alberta. www.CanadianInstitute.com

2005 INTERNATIONAL COALBED METHANE SYMPOSIUM

May 16-20, 2005, Bryant Conference Center, The University of Alabama, Tuscaloosa, Alabama, www.bama.ua.edu/~coalbed; abstracts due October 31, 2004

Call for Papers: **OHIO DMRM APPLIED RESEARCH CONFERENCE 2004: CONSERVATION AND RESTORATION INNOVATIONS.** December 8 - 9, 2004, Athens, Ohio. Topics include Surface/Groundwater Interactions in Mining Operations and Mine Dewatering Impacts and Modeling. Available at http://www.dnr.state.oh.us/mineral/arc/index.htm. Abstracts due June 15, 2004.

4TH INTERNATIONAL CHINA CBM/CMM SYMPOSIUM

December 1-2, 2004, Hotel Kunlun, Beijing China, contact Mr. Liu Wenge at cbmc@public.bta.net.cn; Abstracts due July 1, 2004

SOCIETY OF PETROLEUM ENGINEERS ANNUAL TECHNICAL CONFERENCE AND EXHIBITION

26 - 29 September 2004, Houston, Texas, www.spe.org

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