



COALBED METHANE EXTRA



A publication of the Coalbed Methane Outreach Program (CMOP)

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MSHA Approval Granted for U.S. VAM Mitigation Project: *Biothermica to Test VAMOX™ at an Active Coal Mine in Alabama*

Biothermica Technologies Inc. (Montreal) has received authorization from the U.S. Department of Labor's Mine Safety and Health Administration (MSHA) to proceed with a greenhouse gas (GHG) emission reduction project at an active U.S. underground coal mine. Currently in the final detailed design phase, this innovative ventilation air methane (VAM) destruction project will be located at Jim Walter Resources' Mine No. 4, in Brookwood, Alabama. Fabrication and equipment acquisition is underway, and construction is slated to begin by next fall. The system is expected to be operational by the end of 2008.

The system will utilize Biothermica's VAMOX™ regenerative thermal oxidation (RTO) system to destroy ventilation air methane before it is released to the atmosphere.

The demonstration phase of the project will last 4 years and is estimated to achieve GHG emission reductions of 40,000 tons of CO₂ equivalent (tCO₂e) annually.

Background: Ventilation Air Methane

A potent greenhouse gas, methane is over twenty times more effective than carbon dioxide at trapping heat in the atmosphere. Methane emissions from coal mines represent about 10% of U.S. anthropogenic methane released to the atmosphere. The largest source of this coal mine methane is dilute methane emitted from mine ventilation shafts, accounting for over 55% of all methane emitted by U.S. coal mines.

see *BIOTHERMICA*, page 2

In this issue...

- 1 *MSHA Approval Granted for U.S. VAM Mitigation Project: Biothermica to Test VAMOX™ at an Active Coal Mine in Alabama*
- 1 *Methane to Markets Update*
- 4 *EPA Presents 2008 Climate Protection Award to MEGTEC Systems: Company Recognized for Innovative Work with Ventilation Air Methane*
- 7 *CBM/CMM News*
- 9 *New Publications*
- 11 *Upcoming Events*

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Methane to Markets Update

U.S. EPA awards funding to methane projects through M2M Partnership

In support of the Methane to Markets Partnership, in 2007, U.S. EPA awarded a total of nearly 30 direct assistance agreements totaling \$2.9 million. These projects, located in 11 countries, will produce technology transfer, technical reports, feasibility and pre-feasibility studies, methane emissions databases, information clearinghouses, training and capacity building, study tours, and workshops. Six projects were awarded in the coal mine methane (CMM) sector, 3 in China and one each in India, Mexico, and Nigeria.

EPA is in the process of reviewing and processing applications received under the 2008 solicitation for projects that support the Methane to Markets Partnership. EPA plans to announce these awards in the next few months.

China

1. *Technology Demonstration: Power Generation from Low-Quality CMM*

In recent years, gas engines and turbines have been developed in
see *M2M UPDATE*, page 3

Biothermica from page 1

This dilute methane, known as ventilation air methane (VAM), is difficult to capture and use because it has a low methane concentration, typically ranging from 0.3-1.5% methane. Further adding to the complexity of mitigating VAM is the large airflow volumes associated with mine ventilation systems, typically on the order of 100,000 to several 100,000 cubic feet per minute (cfm). One approach to reducing VAM emissions is to oxidize (burn) the dilute methane gas, converting it to carbon dioxide and water. It is also possible to recover and transfer the heat produced from this oxidation to generate electricity.

Technology Description

Biothermica's VAMOX™ system converts VAM into carbon dioxide and water vapor using regenerative thermal oxidation (RTO). RTO is based on the cyclic reversal of the airflow through multiple vessels filled with heat absorbing media to minimize heat loss during the oxidation process.

The VAMOX™ regenerative thermal oxidation system does not use catalysts. The

system for this demonstration project consists of a single oxidizing unit with a throughput of 30,000 cfm. A typical large commercial mine ventilation fan in the U.S. has a flow rate of around 180,000 cfm. The capacity of a single VAMOX™ oxidizer unit can be as high as 100,000 cfm and the system can be scaled up further by adding additional units. Figure 1 shows a schematic diagram of a typical VAMOX™ system.

The VAMOX™ system can be configured to recover the energy from oxidation of methane as heat or electricity. However, the demonstration project at JWR's Mine No. 4 will be configured as a destruction-only project since there is no need for heat (hot water or low grade steam) in the immediate vicinity of the system, and because the small scale of the demonstration project precludes electricity generation as a viable option.

Project Financing

According to Biothermica Director of Development Nicolas Duplessis, the project at JWR's Mine No. 4 is expected to generate an income stream from carbon credits generated by VAM destruction. In future VAM mitigation

projects around the world, Biothermica plans to monetize carbon credits through different GHG emission reduction schemes and markets. These include the Clean Development Mechanism (CDM) and Joint Implementation (JI) under the Kyoto Protocol, voluntary emission reduction initiatives such as the Chicago Climate Exchange (CCX) and the Voluntary Carbon Standard (VCS) that facilitates "over-the-counter" bilateral trades.

In addition to financing from the sale of carbon credits, the funding for the demonstration project consists of equity from Biothermica, in-kind contribution by JWR, and public funding by the Quebec Ministry of Economic Development, Innovation, and Export Trade.

VAMOX™ System Features	
▶	Unit capacity up to 100,000 cfm (170,000 Nm ³ /h)
▶	Methane concentration range: 0.2% to 1.2%
▶	Up to 98% destruction efficiency
▶	Outstanding reliability
▶	Low parasitic power consumption



Figure 1. Typical VAMOX™ System

MSHA Approval

The Biothermica project at JWR's Mine No. 4 is on track to be the first of its kind at an active mine in the U.S. As such, Biothermica had to demonstrate to MSHA that a potentially explosive gas mixture would not enter the VAMOX™ unit. According to Biothermica, they successfully demonstrated the system's compliance to MSHA through the system's design elements. Continuing compliance will be demonstrated through periodic functional tests. A fast-response methane analyzer will be installed upstream of the VAMOX™ unit. If the methane concentration in the ventilation air entering the VAMOX™ system gets too high, a system is tripped where a damper is released, which stops airflow to the VAMOX™ unit. The reaction time between analyzer detection and deployment of the



Methane to Markets

M2M Update *from page 1*

China to use “low quality” CMM (low methane concentration) as fuel. Through an EPA-funded project, the China Coal Information Institute (CCII) will demonstrate power generation in China, using low quality CMM (5 to 25 percent methane). It is expected that the project will help promote power generation with low quality CMM in China and reduce emissions of a potent greenhouse gas. As part of its work plan, CCII will identify an appropriate demonstration site, setup and operate a demonstration station, and develop a feasibility study of power generation using low quality CMM. The project started in late 2007 and will be accomplished over 3 years.

2. Feasibility Study of Technology to Mitigate Ventilation Air Methane

The Australian Commonwealth Scientific and Industrial Research Organization (CSIRO) received funding from U.S. EPA to conduct a feasibility study on mitigating and utilizing dilute coal mine methane with a monolithic catalytic combustor at Tiefu Coal Industry Group Co. Ltd. (also known as Tiemei Group), one of the largest coal mining groups in China. This project will address the lack of technology to recover and utilize ventilation air methane (VAM). CSIRO will survey coal mine resources and methane emissions at Tiefu, identify technical options for maximum methane mitigation and utilization at the mines – including determination of plant capacity and availability, and conduct economic analysis for different options. The project started in late 2007 and will be accomplished over 2 years.

3. Capacity Building in Guizhou Province

Supported with U.S. EPA funding, the Guizhou International Cooperation Center for Environmental Protection (GICCEP) will promote CMM recovery and utilization among gassy coal mines in Guizhou Province,

China. This initiative is designed to fill the information gap that exists between international CMM project developers interested in Guizhou and local coal mines that are willing to host cooperative CMM projects.

Guizhou Province produces more than 100 million tons of coal annually, but CMM is rarely recovered and utilized. This is due largely to a lack of CMM project information that identifies and promotes international cooperation opportunities. Under this project, GICCEP will develop a database of 45 medium sized coal mines and an informative website (www.gzcmm.org). The initiative enabled Guizhou coal mine representatives to participate in the Methane to Markets Partnership Expo in October 2008, in addition to hosting a conference in Guiyang, Guizhou (July 16 – 17, 2008). The project started in 2007 and will be accomplished over 18 months.

India

Quantification of Ventilation Air Methane (VAM) Emissions from Gassy Underground Coal Mines in India

U.S. EPA provided funding to Southern Illinois University (SIU) to study VAM emissions at two underground mines in eastern India, Monidih and Sudamdih. These extremely gassy mines (categorized as “Degree III” mines) are located in the Damodar Basin Jharia Coalfield. Through this study, SIU will quantify VAM emissions at the two mines and conduct technical and economic pre-feasibility (PFS) studies of the VAM utilization options.

The work at Monidih mine includes evaluation of the most current mine plans and the mine ventilation system. The project also includes detailed measurements of airflow and methane concentrations over a six-month period. Estimated methane emissions are in excess of 1.2 million cubic feet per day, despite very low coal production (approximately 800 tons per day). The survey found that significant sources of methane are the mined out and sealed off areas. At Sudamdih mine, monthly measurements have started, and the mine-wide survey will be conducted in 2008.

Nigeria

Pre-Feasibility Study of Electricity Generation from Nigerian Coal Mine Methane

see M2M UPDATE, page 5

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EPA Presents 2008 Climate Protection Award to MEGTEC Systems *Company Recognized for Innovative Work with Ventilation Air Methane*

On May 19, 2008, the U.S. Environmental Protection Agency (U.S. EPA) honored 39 individuals, organizations, and companies from around the world for their outstanding efforts to protect the Earth's climate and stratospheric ozone layer. The 10th annual Climate and Ozone Layer Protection Awards were presented at the Kennedy Center in Washington, DC. The award recipients have demonstrated ingenuity and leadership by reducing greenhouse gas emissions, negotiating international agreements to protect the ozone layer and climate, and spreading awareness about the importance of these issues.

The 2008 Climate Protection Award recipients included MEGTEC Systems, which was honored for their work to develop and implement an innovative technology to capture and recover energy from the dilute methane emitted from coal mine ventilation shafts (Photo 1). MEGTEC's technology, a thermal oxidation system, is currently the world's only commercially-operating technology converting coal mine ventilation air methane to electricity at a site in Australia. MEGTEC has additional projects underway in Australia, China, Europe, and the United States.

Worldwide, coal mining activities release about 8% of all anthropogenic emissions of methane, a potent green-

house gas that is also a clean-burning source of energy. Underground coal mine ventilation shafts emit more than 50% of coal-mining-related methane emissions.

EPA began the Climate Protection Awards in 1998 and has so far recognized 154 recipients from 18 countries for outstanding efforts to reduce greenhouse gas emissions.

"Efforts to help restore the ozone layer and fight climate change will benefit the planet for generations to come," said Bob Meyers, principal deputy assistant administrator for EPA's Office of Air & Radiation. "We commend the 2008 Climate and Ozone Layer Protection Award winners for their work to protect our environment."

In April 2008, EPA Administrator Stephen L. Johnson conducted a site visit of the WestCliff Colliery in Wollongong, Australia, site of the world's only commercial-scale project to convert ventilation air methane to electricity (Photo 2). The project, which uses MEGTEC's "Vocsidizer" technology, produces 6 MW using only about 20% of the mine's ventilation air.

U.S. EPA and U.S. Department of Energy are funding a technology demonstration project featuring MEGTEC's Vocsidizer at an abandoned coal mine, hosted and operated by CONSOL Energy. The technology demonstration



Photo 1: Accepting EPA's Climate Protection Award at the Kennedy Center in Washington, DC, on May 19, 2008, are (left to right), Richard Mattus, Lars Sundback, Mohit Uberoi, and Ake Kallstrand, all of MEGTEC, with Kathleen Hogan, Director of EPA's Climate Protection Partnerships Division.



Photo 2: EPA Administrator Stephen L. Johnson visited the West Cliff Colliery in Australia in April 2008, and conducted a site tour of the world's only commercial-scale project producing electricity from ventilation air methane. Pictured from left to right: Lars Sundback, MEGTEC; Mohit Uberoi, President of MEGTEC Systems; Administrator Johnson; Colin Bloomfield, President of Illawarra Coal, BHP Billiton; and Richard Mattus, MEGTEC. Photo courtesy of Richard Mattus.

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Biothermica *from page 2*

damper needs to be sufficient to guard against a potentially explosive gas mixture from entering the unit.

Future Activities

Biothermica's continued efforts have recently been recognized and supported by a contribution from Sustainable Development Technology Canada for a second North American VAM oxidation project. The project involves the design, construction, and operation of a 5,000 cfm (8,500 Nm³/h) demonstration system at the Quinsam coal mine (Hillsborough Resources Limited) near Campbell River, in British Columbia. The demonstration project, which is planned for commissioning in 2009, will use an alternative configuration of the VAMOX™ system, based on the same technology.

Project Partners

Founded in Montreal in 1987, Biothermica Technologies Inc. is a leader in the design, construction, and delivery of turn-key engineering solutions for air pollution control and landfill gas collection and utilization around the world. The company is a new player in the coal mine methane (CMM) field. Their CMM business grew from the firm's technical background and expertise in RTO

technology used in non-traditional applications, such as condensable pitch and tar fumes. Biothermica has the capacity to manage all aspects of VAM projects, including capital expenditure investments. The company offers coal mines a royalty-based approach to project development to mitigate VAM. *Website:* www.biothermica.com

Jim Walter Resources (JWR) is a U.S. coal company based in Alabama's Warrior Basin, and is a leading producer and exporter of metallurgical coal. JWR is one of the leaders in CMM drainage, recovery, and utilization both in the United States and around the world, and JWR was also the first coal company to join CCX. JWR is a wholly owned subsidiary of Walter Industries, based in Tampa, Florida, which is a leading producer and exporter of metallurgical coal to the global steel industry and also produces steam coal, coalbed methane gas, furnace and foundry coke, and other related products. *Website:* www.jimwalterresources.com

The relationship between Jim Walter Resources and Biothermica was cultivated partly through interaction with CMOP network contacts at Methane to Markets-sponsored events. This illustrates the effectiveness of the Methane to Markets Partnership in bringing together interested parties to facilitate methane project development and implementation around the world. 🌱

M2M Update *from page 3*

EPA awarded funding to the Centre for People and Environment (CPE) and Tryby Energy, Minerals & Environment Corp. (TEMEC) to conduct a pre-feasibility study at two Nigerian coal mines. The CPE/TEMEC team is currently collecting and analyzing data from the underground mines, Onyeama and Owukpa, both owned by the Nigerian Coal Corporation. The purpose of the study is to determine if either of the mines would be a good candidate for a coal mine methane electricity generation project.

Mexico

CMM / CBM Demonstration Project

EPA awarded funding to the Instituto Tecnológico y de Estudios Superiores de Monterrey (ITESM) to conduct a coal mine/coalbed methane (CMM/CBM) demonstration project in the Sabinas and Saltillito Coal Basins, located in the State of Coahuila. ITESM is working with CleanMetFuel to demonstrate the technical and economic feasibility of a combined coal mine methane, abandoned mine methane, and coalbed methane recovery project. This project involves the use of new technologies such as small-scale liquefaction or direct on-site industrial applications. The ITESM/CleanMetFuel team will be working with the Montemayor Family coal company, Covalent Energy, and Idaho National Lab to carry out the

see M2M UPDATE, page 6

What do you want to know about?

If you have suggestions or requests for future CBM Extra content, please drop us a line.

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M2M Update from page 5

study. The ultimate goal is project implementation.

Methane to Markets Partnership Coal Subcommittee Meeting

The Methane to Markets (M2M) Partnership Coal Subcommittee met April 29 – 30, 2008 in Cagliari, Sardinia, Italy. Over 30 participants present included representatives of 12 M2M Partner countries and numerous private sector partners. Partner countries presented updates on coal mine methane (CMM) project developments and activities in their country, as well as their proposed strategies for encouraging further CMM project development and implementation, and their plans to work through the Partnership.

Project Network participants from multilateral groups such as the United Nations Economic Commission for Europe and the International Energy Agency provided updates on their ongoing activities, and private sector participants provided updates on their projects. Meeting

participants discussed ways to more effectively engage the private sector and recommended more emphasis on highlighting successful projects through case studies presented on the M2M website, included in outreach materials, and showcased at meetings, including future M2M Partnership Expos. The meeting featured presentations and discussion about the current status and future of carbon finance mechanisms for CMM projects after 2012 and under voluntary regimes. Carbosulcis SpA hosted a mine site tour and field trip.

For detailed meeting minutes and presentations, please see: www.methanetomarkets.org/events/2008/coal/coal-29apr08-2.htm

The next Subcommittee meeting will be held in conjunction with a meeting of the Steering Committee and technical workshop in Guadalajara, Mexico, the week of January 26, 2009. 🗨️

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MEGTEC from page 4

project, which has been operating since spring of 2007, simulates ventilation air methane flowrates using methane from an abandoned mine. Officials from the U.S. Department of Labor's Mine Safety and Health Administration (MSHA) visited the demonstration project in West Liberty, West Virginia in June (Photo 3). CONSOL hopes to move the equipment from Windsor to an active U.S. coal mine next year.

For more information and a complete list of the 2008 EPA Climate Protection Award winners, see: yosemite.epa.gov/opa/advpress.nsf/names/hq_2008-5-19_award_winners and www.epa.gov/cppd/awards/2008winners.html 🗨️



Photo 3: Site of the CONSOL Energy Windsor mine (closed mine), West Liberty, WV, host of the EPA- and DOE-funded technology demonstration project featuring MEGTEC's Vocsidizer technology.



CBM/CMM News

CBM/CMM Power Generation Workshop Held in Dalian, China

A training workshop entitled "Coalbed Methane and Coal Mine Methane Power Generation" was successfully held in late May in Dalian, Liaoning Province, China. The four day event – sponsored by U.S. Trade and Development Agency (TDA), China's National Development and Reform Commission (NDRC), and EPA's Coalbed Methane Outreach Program (CMOP) – was attended by almost one hundred technical officials from the coal and gas industries in China and from the investment and carbon credit communities.

Energy Systems Associates, REI Drilling, and Ruby Canyon Engineering each conducted a portion of the training based on their areas of expertise. Together, they detailed the steps in CMM project development: assessment of the CMM resource in place, proper drainage of the methane resource to generate acceptable qualities and quantities of gas, and options for utilization of the recovered gas to generate power. Officials from Caterpillar, Inc. provided additional material on internal combustion engines. The audience had many questions especially about destroying or utilizing low quality methane and about adapting proven drainage techniques to challenging Chinese conditions. The event was organized by the U.S. Energy Association.

The 12th U.S./North American Mine Ventilation Symposium took place in Reno, Nevada June 9-11. CMOP sponsored, attended, and pre-

sented a paper at the Symposium, which was well-attended by a diverse international group. The Symposium included workshops, exhibits, and sessions on mine methane and other ventilation topics such as dust and diesel emissions. In addition, tours to coal and trona mines in nearby states were arranged. More information on the 12th Mine Ventilation Symposium can be found at www.unr.edu/ventsymp2008 EPA's paper, titled "Thermal Oxidation of Coal Mine Ventilation Air Methane," can be found online at www.epa.gov/coalbed/docs/2008_mine_vent_symp.pdf

The 13th U.S./North American Mine Ventilation Symposium will be held in Sudbury, (Ontario) Canada, in June 2010.

EPA Continues Work on Greenhouse Gas Reporting Rule

EPA continues to work on the development of a draft rule to require mandatory reporting of greenhouse gas (GHG) emissions above appropriate thresholds in all sectors of the economy as authorized by Congress. EPA has met with over 100 associations or individual companies since January, including the National Mining Association and individual coal mining companies, to hear stakeholder feedback. EPA expects to publish the proposal in September 2008 and the final rule in June 2009. See the website for more information: www.epa.gov/climatechange/emissions/ghgrulemaking.html

BG Group's Bid for Origin Energy Highlights Growing Importance of CBM

BG, a British energy firm, offered to buy Origin Energy, Australia's largest coalbed methane firm, for \$13.2 billion on June 24, 2008. Origin's

board rejected the bid, on the grounds that it undervalues the firm. The two companies disagree about the latent value of Origin's rights to coalbed methane in Australia. Origin said that it would pursue separate deals with joint venture partners to generate value from its coal seam gas, including partnerships with liquefied natural gas companies. BG Group seeks access to Origin's gas resources in eastern Australia to feed a proposed LNG plant at Gladstone that BG plans to develop with Queensland Gas Company Ltd (QGC).

The debate over the size of Origin's resource could excite general interest in the potential for Australian coalbed methane as energy companies scout for new gas reserves in a rising market for the fuel, according to *The Times (UK)*. The coalbed methane reserves in Eastern Australia are vast and energy companies see an opportunity to liquefy and export the gas to Asia.

References: *The Economist*, June 26, 2008 www.economist.com/business/displaystory.cfm?story_id=11632845

The Times (UK), July 5, 2008 business.timesonline.co.uk/tol/business/industry_sectors/natural_resources/article4272383.ece

BLM Defers Oil and Gas Lease Sale on Land Overlying West Elk Mine

In early June the Bureau of Land Management Colorado announced it would offer to lease for oil and gas development 15 parcels covering 18,366 acres on Forest Service lands in the Grand Mesa, Uncompahgre, and Gunnison National Forests. The parcels overlie existing Federal coal leases, including the West Elk Mine. On July 15, 2008, the U.S. Forest Service announced the defer-



ral of these 15 parcels for further analysis. Eleven (11) of the 15 parcels being withdrawn from the August 2008 sale include lands within the West Elk Inventoried Roadless Area (IRA). After further review, it was determined that the stipulations in those leases could potentially result in surface use and occupancy that may be inconsistent with the outcome of the Forest Service's current efforts to promulgate regulations for the protection and management of National Forest roadless areas within the State of Colorado.

See the Spring 2008 edition of the *CBM Extra* for background on expansion and degasification plans at the West Elk Mine. Additional information on the proposed lease sale can be found at www.blm.gov/co/st/en/BLM_Programs/oilandgas/leasing.html

BPI and Blue Source form Coalbed Methane Reduction Partnership

BPI Energy Holdings, Inc. (Solon, Ohio), an energy company engaged in the production and sale of coalbed methane in the Illinois Basin, has signed a non-binding letter of intent to form a partnership with Blue Source, LLC (Holladay, Utah), an aggregator and marketer of carbon credits. According to the proposed 5-year agreement, Blue Source will fund BPI projects and become a 50/50 partner with BPI on those projects. Blue Source will serve as the exclusive marketer of all carbon offsets generated by the joint projects. The first project to be pursued under the partnership would be BPI's Western Fuels Project, which was announced on June 18. In that project, BPI entered into a lease agreement with Western Fuels of Illinois, Inc., for the rights to Herrin and Springfield coalbed methane and coalmine methane over an

area of approximately 5,600 acres overlapping BPI's Delta field in Saline County, Illinois.

References: *Climate Change Business Journal (CCBJ) Weekly News*, July 3, 2008

www.climatechangebusiness.com/products.html

BPI Energy Press Release, July 1, 2008

[www.b2i.us/profiles/investor/ResLibrary.asp?](http://www.b2i.us/profiles/investor/ResLibrary.asp?BzID=1320&ResLibraryID=25204&GoTopage=1&Category=1251)

[BzID=1320&ResLibraryID=25204&GoTopage=1&Category=1251](http://www.b2i.us/profiles/investor/ResLibrary.asp?BzID=1320&ResLibraryID=25204&GoTopage=1&Category=1251)

CNX Joins the Chicago Climate Exchange

Virginia Governor Timothy M. Kaine accompanied representatives of CNX Gas Corporation on June 11, 2008, to announce CNX's new membership in the Chicago Climate Exchange (CCX) as an offset provider. The company said that it has registered with CCX 8.4 million metric tons of carbon-dioxide equivalent offsets from its operations in Virginia and elsewhere.

CNX is a publicly traded Pittsburgh-based company that produces coalbed methane and coal mine methane. In 2006, CNX produced 59% of the 102 billion cubic feet of natural gas produced in Virginia, according to a state report. It was created in a spin-off three years ago from Consolidation Coal, which operates Virginia's largest coal mine, Buchanan No. 1. In the future, CNX hopes to work with coal companies other than Consolidation to produce coalbed methane, according to CNX President and CEO Nicholas J. Delulis.

CCX offers a market-based approach for combating climate change by providing financial incentives to companies that reduce greenhouse gas emissions. According to Richard

Sandor, CCX chairman and CEO, companies representing 16% of U.S. greenhouse gas emissions are exchange members, including Jim Walter Resources and Cleveland Cliffs (formerly PinnOak Resources).

The state of Virginia has recently established a goal of cutting greenhouse gas emissions 30% by 2025.

References: *Richmond Times Dispatch*, June 12, 2008 www.inrich.com/cva/rich/news/business.apx.-content-articles-RTD-2008-06-12-0107.html

CNX Gas, June 11, 2008

www.cnxgas.com/newsitem.aspx?nid=28

Rio Tinto Announces Pilot Project to Capture Fugitive Emissions from a Surface Mine in Australia

Rio Tinto, one of Australia's leading mining organizations, announced a pilot program to capture fugitive emissions at one of its open-pit mines in Queensland. Rio plans to harness methane gas from its open-pit coal operations and has committed \$A5.5 million (US\$ 5.3 million) towards a pilot program for the gas collection.

Still in its early stages, no estimates have been made on how much gas could be collected through the trial, but a Rio spokesman told International Longwall News (ILN) the company knew a significant proportion of its greenhouse gas emissions came from fugitive emissions. Initially the gas captured in the trial will be flared. If the project yields a significant amount of methane, Rio said it might look at harnessing the gas resource. During the two-year trial, four production wells will be drilled and the gas flow will be monitored to decide the viability of a larger-scale project.

see *CBM/CMM NEWS*, page 9

CBM/CMM News *from page 8*

While underground mines have been pre-draining methane for years, it has been considered a challenge to mitigate or recover methane emissions from open-pit coal mines. These methane emissions comprise a significant part of Australia's greenhouse gas emissions. Surface mining in the U.S. contributes about 22% of total national methane emissions from coal mining, according to EPA's Greenhouse Gas Emission Inventory. Total U.S. annual CMM emissions represent about 10% of national anthropogenic methane emissions.

Reference: *International Longwall News (ILN)*, June 17, 2008
www.longwalls.com/storyView.asp?StoryID=264967
(subscription required)

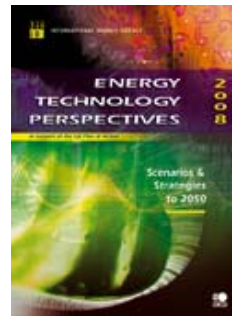
Cleveland-Cliffs to Buy Alpha for Nearly \$10B, Pending Shareholder Approval

Cleveland-Cliffs and Virginia-based Alpha Natural Resources announced that they will merge in a US\$10 billion deal to become one of the largest mining companies in the United States. If the deal is approved by shareholders, Cleveland-Cliffs will acquire all of Alpha's outstanding shares in a move that will give the new combined company, to be called Cliffs Natural Resources, a portfolio of nine iron ore mines and more than 60 coal mines in North America, South America, and Australia. Harbinger Capital Partners, Cleveland-Cliffs' largest shareholder opposes the deal and may approach the company with alternatives to maximize shareholder value, including changes to management or the board.

A significant position in both iron ore and metallurgical coal would make the combined company a major supplier to the global steel industry, as well as provide a platform for further diversification both geographically and in terms of the mineral and resource products it sells. At the close of the transaction, Cliffs Natural Resources estimates it will have combined pro forma revenue for 2008 of approximately \$6.5 billion. Revenue for 2009 could reach \$10 billion, it said. The combined entity's reserve base is estimated to be 1 billion tons of iron ore and another 1 billion tons of metallurgical and thermal coal. Sales volumes could exceed 18 million tons (Mt) of coal and 30Mt of ore annually, perching it at the top of steel industry suppliers globally.

see CBM/CMM NEWS, page 10

New Publications!



New EIA Publication: Energy Technology Perspectives 2008

EIA's new report provides guidance for decision makers on how to plan for a competitive energy future. The report uses a MARKAL-based model to look at energy technology investments in various sectors at different carbon price pathways, and includes a chapter on methane to which U.S. EPA staff contributed. To order the book or to download the Executive Summary visit: www.iea.org/Textbase/techno/etp/index.asp

Three New EPA Publications

EPA recently posted on the CMOP website three new documents that highlight some of the best CMM project opportunities in the United States.

U.S. Abandoned Coal Mine Methane Recovery Project Opportunities www.epa.gov/cmop/docs/cmm_recovery_opps.pdf

This report includes three case studies of existing AMM projects and 14 mine profiles.

U.S. Surface Coal Mine Methane Recovery Project Opportunities
www.epa.gov/cmop/docs/cmm_recovery_opps_surface.pdf

This report includes 10 mine profiles.

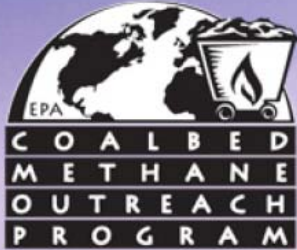
Thermal Oxidation of Coal Mine Ventilation Air Methane
www.epa.gov/cmop/docs/2008_mine_vent_symp.pdf

This technical paper presented at the 2008 North American Mine Ventilation Symposium in Reno, Nevada, highlights technologies to mitigate or recover energy from dilute ventilation air methane.

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Don't Miss CMOP's 2008 U.S. Coal Mine Methane Conference!



2008 U.S. Coal Mine Methane Conference

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Sign up online: www.epa.gov/cmop/conf/cmm_conference_oct08.htm

U.S. EPA is pleased to announce this year's U.S. Coal Mine Methane Conference, which will take place October 28-30, 2008, in Pittsburgh, PA. After a successful 2007 conference in St. Louis, the EPA's Coalbed Methane Outreach Program (CMOP) aims to bring you a dynamic event in 2008 with an in-depth look at new projects and technologies, emerging opportunities, updates on critical policy issues, and more.

We'll also take discussions about coal mine methane out of the conference room and into the field, with a can't-miss field trip to a nearby Consol Energy site to observe the first technology demonstration project of ventilation mitigation on U.S. soil.

Visit our website to review the draft agenda and register. Sponsorship opportunities are available www.epa.gov/cmop/conf/cmm_conference_oct08.htm

CBM/CMM News *from page 9*

Cliffs Natural Resources' world headquarters would be in Cleveland, Ohio, according to officials. The iron ore business would be controlled from that office, while coal mining would be directed from Abingdon, Virginia.

References: *International Longwall News (ILN)*, July 17, 2008 www.longwalls.com/storyview.asp?storyid=266500 (subscription required)

Cleveland-Cliffs News Release, July 16, 2008 www.b2i.us/profiles/investor/ResLibraryView.asp?BzID=1041&ResLibraryID=25339&Category=1250

Mining Weekly, July 18, 2008 www.miningweekly.com/article.php?a_id=138470

CMOP Contacts

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Coalbed Methane Outreach Program, 6207J
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Washington, DC 20460



Upcoming CBM/CMM Events

Coal Bed Methane

28 – 30 July 2008
Intercontinental Singapore
Contact: Rita Parasuram
Phone: 65 68355 160
Fax: 65 6733 5087
Website: www.abc-asia.com/cbm

7th European Coal Conference

26 – 29 August 2008
Lviv, Ukraine
Contact: Dr. Andriy Poberezhskyy
Phone: (0322) 635-047
Email: igggk@mail.lviv.ua
Website: www.iggcm.org.ua

Carbon Markets USA

16 – 17 September 2008
Washington, DC
Phone: +44 207 801 6333
Email: info@greenpowerconferences.com
Website: greenpowerconferences.com/carbonmarkets/carbonmarkets_USA_2008.html

2008 Asia Pacific Coalbed Methane Symposium

22 – 24 September 2008
Brisbane, Australia
Website: www.uq.edu.au/apcbm2008/

MINExpo International 2008

22 – 24 September 2008
Las Vegas Convention Center
Las Vegas, Nevada
Phone: 630-434-7779
Email: minexpo@heexpo.com
Website: www.minexpo.com

U.S. Carbon Finance Forum

24 – 25 September 2008
The Metropolitan Club
New York, New York
Website: www.uscarbonfinance.com

The 25th Annual International Pittsburgh Coal Conference

29 September – 2 October 2008
The Westin Convention Center
Pittsburgh, Pennsylvania
Website: www.engr.pitt.edu/pcc/2008%20Conference.htm

Unconventional Gas International Conference & Exhibition

30 September – 2 October 2008
Hilton Fort Worth
Fort Worth, Texas
Website: ug08.events.pennnet.com/fl/index.cfm

2008 Rocky Mountain Unconventional Gas Conference

15 – 17 October 2008
South Dakota School of Mines and Technology
Rapid City, South Dakota
Phone: 605-394-2693
Email: epcc@sdsmt.edu
Website: www.hpcnet.org/learn/professional/GasConference

2008 U.S. CMM Conference

Sponsored by EPA's Coalbed Methane Outreach Program
28 – 30 October 2008
Omni William Penn Hotel
Pittsburgh, Pennsylvania
Email: meetings@erg.com
Website: www.epa.gov/cmop/conf/index.html

China Coal Expo 2008

4 – 7 November 2008
National Agriculture Exhibition Center
Beijing, China
Phone: +852 2881 5889
Fax: +852 2890 2657
Email: info@together-expo.com
Website: www.chinacoalexpo.com/

9th International Conference on Greenhouse Gas Control Technologies

16 – 20 November 2008
The Omni Shoreham Hotel
Washington, DC
Phone: 617-258-0307
Fax: 617-253-8013
Email: ghgt9@mit.edu
Website: mit.edu/ghgt9

10th Annual Unconventional Gas Conference

19 – 21 November 2008
Telus Convention Centre
Calgary, Alberta
Website: www.csug.ca/dl/RegistrationBrochure2008.pdf

2008 Unconventional Gas and Coal Bed Methane Conference

20 – 21 November 2008
JW Marriot Denver at Cherry Creek
Denver, Colorado
Contact: Miles Markovic
Phone: 416-777-2020 ext. 6261

Methane to Markets Steering Committee, Subcommittee meeting, and technical workshops

26 – 30 January 2009
Guadalajara, Mexico
Website: www.methanetomarkets.org