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THE USE AND DISPOSAL OF COAL COMBUSTION BY-PRODUCTS AT COAL MINES: A TECHNICAL INTERACTIVE FORUM

Held at
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FOREWORD

Beginning in May of 1994, the Office of Surface Mining (OSM) took an active role in encouraging and promoting technological advances, research, and technology transfer related to the use and disposal of those material residues remaining after the combustion of coal to produce electrical power. The primary activities and accomplishments of OSM in this area have been the establishment of a multi-interest group steering committee that has: (1) conducted one national interactive forum in October of 1996 at Southern Illinois University at Carbondale; (2) published and distributed hundreds of copies of the forum proceedings; (3) developed and managed an Internet Website dedicated to providing a user friendly guide to coal combustion by-products (CCB) literature, organizations, and events; and (4) conducted a second national technical interactive forum on "The Use and Disposal of CCBs at Coal Mines" in April of 2000 at the National Energy Technology Laboratory in Morgantown, West Virginia.

In addition, OSM has signed a Memorandum of Understanding with the U.S. Department of Energy, National Energy Technology Laboratory (NETL) to collaborate on CCB research and issues. OSM also participated in the interagency discussions with the U.S. Environmental Protection Agency that lead up to its May 22, 2000 rule making where EPA concluded that fossil fuel combustion wastes do not warrant regulation as hazardous wastes under Subtitle C of the Resource Conservation and Recovery Act (RCRA) and is retaining the hazardous waste exemption for these wastes. OSM staff also serve on the (1) national steering committee of the Combustion By-Products Recycling Consortium in order to assist in directing CCB research efforts; and (2) technical program committee for the biennial International Ash Symposium conducted by the University of Kentucky Center for Applied Energy Research.

One of the needs identified during the 1996 interactive forum was that there should be better access to existing scientific and technical literature and new developments in scientific research associated with CCBs. In response to this need, a steering committee was assembled that cooperated in development of the CCB Information Network Website hosted by OSM. Many of the other questions and concerns, however, have not yet been addressed. In response to these additional concerns, the steering committee resolved to conduct an additional technical interactive forum in the year 2000 to address the more important concerns and new developments related to coal mining and CCBs that were identified at the 1996 forum or since that time.

This purpose of the April 2000 forum was to provide (1) an organized format for discussion of issues concerning the use and disposal of CCBs at coal mines; (2) an easily understood, state-of-the-art summary talk by knowledgeable speakers; (3) a published proceedings that summarizes the presentations and participant discussions; (4) access to the discussions for all interested participants at the forum; (5) an opportunity for poster presentations on CCB projects and research; and (6) an opportunity for exhibits of CCB use, technology, services, and equipment.

Based on the results of the above efforts, OSM will assess the outcomes of the forum and other CCB activities and make recommendations for potential revisions to OSM policy and plans for enhancement of additional technology transfer efforts.

I would like to sincerely thank the speakers, authors, steering committee members, and participants for their time and efforts to making this program a success.

STEERING COMMITTEE MEMBERS

Kimery C. Vories (Forum Chairperson)
Mid-Continent Region
USDI Office of Surface Mining

Dr. Barry Stewart
American Coal Ash Association

Dan Wheeler
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Debra Pflughoeft-Hassett
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USGS Minerals Information Team

COAL COMBUSTION BY-PRODUCTS STEERING COMMITTEE RECOMMENDATIONS

The following are recommendations made by the Coal Combustion By-Products Steering Committee immediately following the end of the forum. The recommendations represent areas that have the potential for future efforts.

1. The next forum should have a more regional focus. The committee should consider a regional forum, possibly in 2002, that would focus on CCB and mining issues in the western United States.

2. The committee needs to get more specifically involved with the U.S. Environmental Protection Agency, the Association for Standard Testing Methods, and other interested parties to develop recognized standard testing methods for CCBs that are used or disposed of on mine sites.

WHAT IS A TECHNICAL INTERACTIVE FORUM?

Kimery C. Vories
USDI Office of Surface Mining
Alton, Illinois

I would like to set the stage for what our expectations should be for this event. The steering committee has worked hard to provide you with the opportunity for a free, frank, and open discussion on issues related to the use and disposal of coal combustion by-products on coal mine lands in an atmosphere that is both professional and productive. Our rationale for the format of the technical interactive forum is that, unlike other professional symposia, we measure the success of the event on the ability of the participants to question, comment, challenge, and provide information in addition to that provided by the speakers in the hope that by the end of the event, a consensus will emerge concerning the issues discussed.

We realize that we hold this discussion in the shadow of the current debate surrounding the U.S. Environmental Protection Agency rule making on whether or not CCBs will require regulation under the hazardous waste provisions of the Resource Conservation and Recovery Act. It has been my experience that most of the heated controversies I have been aware of, related to coal mining and reclamation, have been a result of the lack of sufficient scientific and technical information on the issue and the lack of the means to communicate such information to all of those concerned with the issue. Therefore, one of the main purposes of this event is to bring as much scientific light as possible to bear on this issue in the hopes of dispelling as much of the current heat and confusion on the subject as possible.

It also has been my personal experience that the most progress I have seen toward making advances in the field of surface mining reclamation has come when we have been able to work as a team of professionals toward a consensus on:

- the facts related to the actions we have proposed, and
- the state of the science in terms of our most workable options and alternatives.

During the course of these discussions, we have the opportunity to talk about technical, regional, and local issues, while examining new and existing methods for finding solutions, identifying problems, and resolving issues. The forum gives us the opportunity to:

- share our experiences and expertise concerning the use and disposal of CCBs,
- outline our reasons for taking specific actions, and
- give a rationale for why we should or should not be promoting the use or disposal of CCBs at coal mines in a specific manner.

A basic assumption of the interactive forum is, that no person present has all the answers or understands all of the issues. It is also assumed that some of these issues, solutions, and concerns may be very site, regional, or State specific.

The purpose of the forum is to:

- present you with the best possible ideas and knowledge during each of the sessions,
- promote the opportunity for questions and discussion by you the participants, and
- let each person decide what is most applicable to his/her situation.

<u>We are not here</u> to come up with new policies or regulations, <u>but to empower you the participants</u> with better knowledge, new contacts, and new opportunities for problem solving and issue resolution.

The format of the forum strives to improve the efficiency of the discussion by providing the following:

- A copy of the abstract for each speaker's talk which you may want to read before hand in order to improve your familiarity with the subject matter.
- Tape recordings of the talks and discussions for later inclusion in a post forum publication so that you do not

have to worry about taking notes. For this reason, we will require that all participants speak into a microphone during the discussions.

- A post forum publication categorizing issues raised during the discussions by affiliation such as government, industry, academic, or public and will not identify individual names. All registrants will receive one copy of this publication. This publication will be very similar to the proceedings of earlier forums conducted by OSM. The proceedings also will be made available electronically on the CCB Information Network Website.

In order for us to make the most efficient use of time, we require our session chairpersons to strictly keep to the schedule. One of the reasons for providing refreshments during the breaks and lunch is to keep people from wandering off and missing the next session. In addition, the breaks and lunch provide a better atmosphere and opportunity for you to meet with and discuss concerns with the speakers or other participants. Please take advantage of the opportunity at break time to visit the exhibits and posters in the break area. When the meeting adjourns today all participants are invited to a reception where refreshments will be provided.

It is important to remember that there are three separate opportunities for you the participants to be heard:

- Five (5) minutes will be provided for questions at the end of each speaker's talk.
- Twenty (20) minutes of participant discussion will be provided at the end of each topic session. The chairperson will recognize each participant who wishes to speak; participants will be required to identify themselves and speak into one of the portable microphones so that everyone can hear the question.
- A blue forum evaluation form has been provided in your folder. This will help us to evaluate how good a job we did and recommend improvements for future forums or workshops. Please take time to fill it out and provide any additional comments or ideas.

Finally, the steering committee and I would like to thank all of the speakers who have been so gracious to help us with this effort and whose only reward has been the virtue of the effort. I would also like to thank all of you for your willingness to participate and work with us on this important issue.

COMBUSTION BY-PRODUCTS RECYCLING CONSORTIUM (CBRC)

Paul F. Ziemkiewicz, Tamara F. Vandivort, and D. Courtney Black
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Morgantown, West Virginia

Abstract

In order to comply with recent amendments to the Clean Air Act, many utilities, particularly those in the eastern United States, are retrofitting existing generating stations with flue gas desulfurization (FGD) units. Others are controlling acid forming nitrogen oxides (NOx) with low NOx burners. These technologies produce new by-products which, depending on how they are handled, can be environmental liabilities or marketable materials.

The U.S. Department of Energy's (USDOE) National Energy Technology Laboratory has recently funded a research program to develop technologies for use by the coal utilities and their suppliers. The technologies will be useful in solving problems related to the handling of by-products from their clean coal processes. These processes would include, but are not limited to, flue gas desulfurization and low NOx burner technologies.

The implementation strategy of the program recognizes the unique role of the private sector in commercializing technology. It also recognizes the key role within the Federal governmental office of the U.S. Department of Energy Fossil Energy Program. The Emission Control By-products program will be guided by the coal utilities, their suppliers, and the USDOE National Energy Technology Laboratory at Morgantown. The National Mine Land Reclamation Center at West Virginia University will coordinate the research and technology dissemination programs.

All coal utilities and their suppliers are invited to serve on one of the subcommittees within the organizational structure of the program. The committees will focus research by developing requests for proposals and reviewing technical research proposals. The organizational structure of the program will be given during the presentation.

Background

The mission of the Combustion By-products Recycling Consortium (CBRC) is to promote and support the commercially viable and environmentally sound recycling of coal combustion by-products for productive uses through scientific research, development, and field testing. The goal of the CBRC is to develop and demonstrate technologies for finding solutions related to recycling by-products associated with coal combustion processes. It is hoped that these technologies, by the year 2005, will lead to a:

- doubling of the current rate of FGD by-product use,
- 10% increase in the overall national rate of by-product use, and
- 25% increase in the number of uses considered "allowable" under State regulations

Advantages of the Consortium include:

- Joint industry/government structure facilitates development of partnerships,
- Streamlined Federal contract management,
- Exposes committee members to variety of ideas,
- Projects not funded by the Consortium may be supported by individual members, and
- Spreads risk of funding "innovative" research.

The CBRC is funded by the U.S. Department of Energy National Energy Technology Laboratory with Scott Renninger as the NETL project manager. The national center is located at the National Mine Land Reclamation Center at WVU with Paul Ziemkiewicz as Director and Tamara Vandivort as Consortium Manager. The responsibilities of the national center include:

- Program management,

- Research project development,

- Reporting to the funding agency,
- Technology archive and transfer, and
- Soliciting members to serve on the National Steering Committee.

The CBRC has a free quarterly newsletter called the Ashlines. It highlights CBRC projects, program news, and has a calendar of events. First issue hardcopies are currently in production and can now be downloaded from the CBRC web site at http://cbrc.nrcce.wvu.edu.

Organization

There are three regional research centers. D. Courtney Black is the Director of the Eastern Regional Center at West Virginia University; Dr. Paul Chugh is the Director of the Midwestern Regional Center at Southern Illinois University, Carbondale; and Debra Pflughoeft-Hassett is the Director of the Western Regional Center at the University of North Dakota. The regional center responsibilities include:
- Subcontract management,
- Managing regional research projects,
- Reporting research project activities to National Center,
- Compiling and ranking regional proposal evaluation results,
- Providing technical information to regulatory agencies and industry, and
- Technology archive and transfer.

The national steering committee is chaired by Robert Dolence of the Pennsylvania Department of Protection and is made up of representatives from the following organizations:
- American Coal Ash Association
- Interstate Mining Compact Commission
- National Mining Association
- Office of Surface Mining
- U.S. Army Corp of Engineers
- U.S. Department of Energy
- U.S. Environmental Protection Agency
- Ohio Coal Development Office
- Illinois Department of Commerce and Community Affairs
- Edison Electrical Institute
- Public Service Company of Colorado

The national steering committee responsibilities include:
- Identifying national research priorities,
- Authorizing Requests for Proposals,
- Reviewing program performance annually,
- Ranking proposals for funding consideration,
- Advising the National Mine Land Reclamation Center on strategic direction, and
- Selecting, from its membership, chairs for regional reviewers/advisors.

There are three regional advisors/reviewers. Jackie Bird with the Ohio Coal Development Office is the chair of the Eastern Region. Wayne Bahr with the Illinois Department of Commerce and Community Affairs is the chair of the Midwestern Region. David Goss with the Public Service Company of Colorado is the chair of the Western Region. The responsibilities of the regional advisors/reviews includes:
- Identifying regional research priorities,
- Evaluating proposals for funding consideration,
- Identifying funding opportunities for research projects,
- Reviewing technical progress on funded projects, and
- Reporting important results to the National Steering Committee

Results of the 1999 RFP

Table 1 Phase II Funding		
DOE-NETL	**Cost-Share**	**Total**
$1,266,667	$2,316,417	$3,583,084

Table 2 Eastern Region Projects			
Organization	**CBRC**	**Cost-Share**	**Total**
Waynesburg Col.	$68,673	$98,476	$167,149
GAI Consultants	$84,969	$69,486	$154,455
Ohio State Univ.	$48,650	$48,650	$97,300
Univ. of Florida	$75,466	$42,354	$117,820
Univ. of Georgia	$59,553	$19,851	$79,404
USGS	$60,000	$20,000	$80,000
Lehigh University	$83,188	$56,263	$139,451
WV DEP	$25,071	$27,656	$52,727
Ohio State Univ.	$25,258	$924,542	$949,800

Table 3 Midwestern Region Projects			
Organization	**CBRC**	**Cost-Share**	**Total**
SIUC	$116,180	$405,331	$521,511
SIUC	$66,795	$51,446	$118,241
Univ. of Wisconsin	$101,310	$34,624	$135,934
Univ. of Wisconsin	$66,190	$40,000	$106,190
SIUC	$113,880	$299,094	$412,974

Table 4 Western Region Projects			
Organization	**CBRC**	**Cost-Share**	**Total**
Varra Corp.	$18,765	$23,754	$42,519
AeRock, Inc.	$42,052	$79,780	$121,832
OK Cons. Com.	$85,890	$55,110	$141,000
Ish, Inc.	$45,000	$20,000	$65,000

Table 5 ECBC Project Totals			
Region	**CBRC**	**Cost-Share**	**Total**
Eastern	$530,828	$1,307,278	$1,838,106
Midwestern	$464,355	$830,495	$1,294,850
Western	$191,707	$178,644	$370,351
TOTAL	$1,186,890	$2,316,417	$3,503,307

Table 6 States With CBRC Projects	
California	1
Colorado	2
Florida	1
Georgia	1
Illinois	3
Ohio	3
Oklahoma	1
Pennsylvania	2
West Virginia	2
Wisconsin	2

2000 RFP

The CBRC is sending out a new request for proposals in 2000. It is expected for release May 1, 2000 with not less than $1 million that will be awarded by the U.S. DOE – NETL. A minimum cost-share of 25% is required. The applicant must provide some portion of the 25% cost-share.