DOE/FE-0215P-7 Issue No. 8, Fall 1992

Clean Coal Today

An Update of the U.S. Clean Coal Technology Demonstration Program Office of Fossil Energy, U.S. Department of Energy

Notable First Annual Clean Coal Conference

-Technology Developers Linked with Wide Range of Users-

Clean Coal Briefs

Much of the Department of Energy's attention this summer in the Clean Coal Technology Program focused on a series of public "scoping" meetings that were held across the nation. These meetings are one of the first steps needed for the Department to complete an **Environmental Impact Statement**, a comprehensive analysis required by the **National Environmental Policy Act** (NEPA) for certain projects. While a requirement of law, these meetings—as well as the entire NEPA process—provide excellent opportunities for the Department and the industrial project sponsors to work with local communities, both educating them about the benefits of clean coal technologies and assuring that all environmental concerns are thoroughly addressed.

The first scoping meeting of the summer was held in Pleasant Hill, a suburb of **Des Moines, Iowa** on July 8.

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Coal has a bright future both in the United States and around the world—a future that will be heralded by a new generation of clean, efficient and economical coal technologies that are now emerging from the Clean Coal Technology Program. That was the central message emanating from the First Annual Clean Coal Technology Conference held in Cleveland, Ohio, September 22-24, 1992.

The Cleveland Conference attracted more than 400 men and women from utilities, independent power producers, industries, federal and state governments, the international community, regulatory agencies, coal producers and technology vendors, and brought them together with sponsors of the 41 ongoing projects in the landmark government/industry program. According to Jack Siegel, DOE's Deputy Assistant Secretary for Coal Technology, the conference successfully met its objectives. "For the first time," he said, "operating data from commercial-scale projects that are showcasing innovative technologies were unveiled to the full range of potential users and policymakers who will be setting the groundwork for coal use in the 1990s and beyond."

"And," Siegel continued, "we achieved an important secondary objective as well

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Moderator Jack Siegel, Deputy Asst. Secretary, U.S. DOE, addressing the Plenary Session. Seated L to R: Donald Jakeway, Dir., Ohio Dept. of Dev.; The Hon. Craig Glazer, Chairman, Pub. Util. Comm. of Ohio; Girard Anderson, Pres. & COO, Tampa Elec. Co.; Gary Neale, Pres. and COO, Northern Indiana Public Service Co.

***Conference**...continued from pg. 1*

. . . helping to educate our participants on the full range of policy issues that may influence this program and the technologies used by our industrial participants in the future."

A total of 38 papers were presented in 15 technical sessions that covered topics ranging from advanced power generation and sulfur dioxide and NO_x emissions control, to new ways to convert coal into other clean fuels. In addition to a plenary session, attendees heard two panel discussions—one of state regulatory officials and the other of utility companies. And in separate sessions, panels of government (moderated by Peter J. Cover U.S. Department of Energy) and industry (moderated by Ben N. Yamagata, Executive Director, Clean Coal Technology Coalition) discussed the potential for exporting U.S. clean coal technologies—what the industry needs and what the government has to offer.

"We were especially pleased to see the enthusiastic international participation in the conference," Siegel said. A Polish delegation, led by the Minister of the Environment and the Mayor of Krakow, as well as representatives from Tokyo Electric, Korea Electric, ENEL (the electric utility of Italy), Thailand and the United Kingdom were among the international participants.

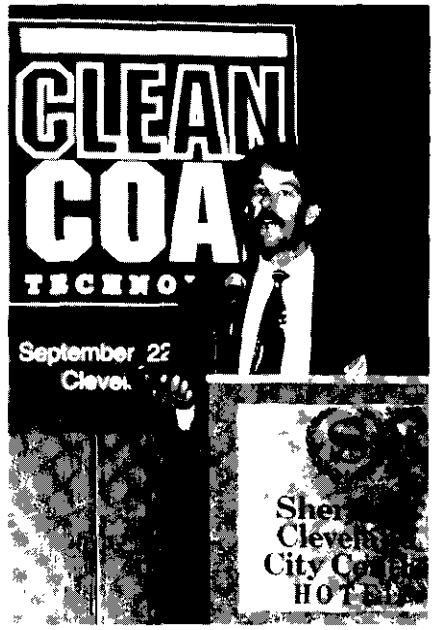
James G. Randolph, Asst. Secretary for Fossil Energy, U.S. DOE discusses the role of clean coal technologies in the international marketplace.

The two-day conference began with an opening session hosted by Siegel, who described the program's progress and its international importance. Siegel was followed by Donald E. Jakeway, the Director of Ohio's Department of Development, who welcomed the group to Ohio on behalf of Governor Voinovich. Six projects valued at $330 million are located in Ohio, in large part because of the state's own $100 million clean coal initiative.

Craig A. Glazer of the Public Utilities Commission of Ohio then discussed Clean Air Act Amendment compliance activities in Ohio. The key issue in Ohio, he said, is how to protect the state's coal industry while minimizing the overall cost of compliance. The state will require the use of pollution control equipment for compliance—rather than fuel switching—as a "bridge" to new, more advanced clean coal technologies. Glazer also advocated regulatory incentives for the deployment of clean coal technologies to lessen the risk for their commercial use.

The opening session concluded with remarks by executives of two major utilities that have incorporated Clean Coal Technology projects into their company's overall business strategies. Girard F. Anderson, President and Chief Operating Officer of Tampa Electric Company, described the process which led to their decision to build a 260 megawatt coal gasification combined cycle project. Anderson said the decision was made after concluding that the utility would need additional generating capacity power before the year 2000 and an exhaustive evaluation of other technical options. He called coal gasification combined cycle—with its extremely low SO_2 emissions and high efficiency—the natural solution to the challenges posed by the Clean Air Act

Luncheon keynote speaker Thomas Altmeyer, Sr. V.P., National Coal Assn. emphasizes coal's critical role in global economics.



Luncheon keynote speaker Robert Brenner, Dir., Air Policy Office, U.S. EPA, presents the status of Clean Air Act implementation.

Amendments such as the lack of allowances for new plants and the need to offset SO_2 emissions after the year 2000.

Anderson then described Tampa Electric's commitment to building what

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he sees as critical to the success of the project—broad public support. Tampa Electric began by setting up a 17 member siting force, including representatives of all major environmental, educational, and other community groups, to pick a site for the new plant. Periodic newsletters to all nearby residents bring citizens up to date on project activities. Community meetings, led by the project technical team, are held often. Anderson attributed the project's smooth progress to this policy of an open public communication. He concluded by saying that Tampa Electric is committed to playing a strong role in the commercialization of the technology—a key objective of the CCT Program.

Gary L. Neale, President and Chief Operating Officer of Northern Indiana Public Service Company, then described his company's decision to take on the challenges of a major retrofit technology—Pure Air's advanced scrubber. Unlike Tampa Electric, NIPSCO was not looking for new capacity but rather for the least expensive way to meet anticipated acid rain standards. Neale recounted that, because of its close proximity to Lake Michigan and Chicago, NIPSCO must operate under the Nation's strictest clean air standards.

By the time the acid rain legislation was finalized, NIPSCO already had considerable experience with scrubbers—both a complex Wellman Lord scrubber and a dual alkali system that was reliable, but needed large amounts of landfill space for waste disposal.

Why the Pure Air scrubber?

According to Neale, the utility was haunted by unreliable operations due to pluggage and chemical problems, high redundant costs to help assure reliability, and waste disposal problems. Among the benefits of the Pure Air approach were the production of a usable byproduct, low costs, high reliability, and operation by a knowledgeable and experienced chemical firm (Air

*See "**Conference**" on page 4*

Above: Jack Siegel, Dep. Asst. Sec., U.S. DOE addresses the State Regulatory Panel Session. Seated L to R: The Hon. Ashley Brown, Comm., PUC of Ohio, Moderator; The Hon. Daniel Fessler, Pres. CA PUC; The Hon. James Monk, Chmn., IN Util. Reg. Comm.; The Hon. Bill Tucker, Chmn., WY PUC; and The Hon. Karl McDermott, Comm., IL Commerce Comm.

Below: Dr. James Markowsky, Sr. V.P. and Chf. Engr., Amer. Elec. Power Service Corp. addressses the Utility Panel. Seated L to R: Howard Couch, Mgr., Envir. & Spec. Proj. Dept., Ohio Edison Co.; George Green, Mgr. Elec. Supply Resources, Pub. Svc. Co. of CO; Randall Rush, Dir., Clean Air Act Compliance, Southern Co. Services, Inc.; Stephen Jenkins, Sr. V.P., Comm. Dev., Destec Energy Inc.; Moderator, Dr. George Preston, V.P., Generation & Storage Div., Elec. Pow. Res. Inst.; and The Hon. James G. Randolph, Asst. Sec. for Fossil Energy, U.S. DOE.

Ms. Jackie Bird, Dir., Ohio Coal Dev. Office addresses the group on the tour of Babcock & Wilcox's 35 MWe SNOX plant located at Ohio Edison's Niles Station, Niles, Ohio.

Success Continues at Cement Kiln Project

The Passamaquoddy Tribe's Recovery Scrubber continues to operate successfully at the Dragon Products Company's cement plant in Thomaston, Maine.

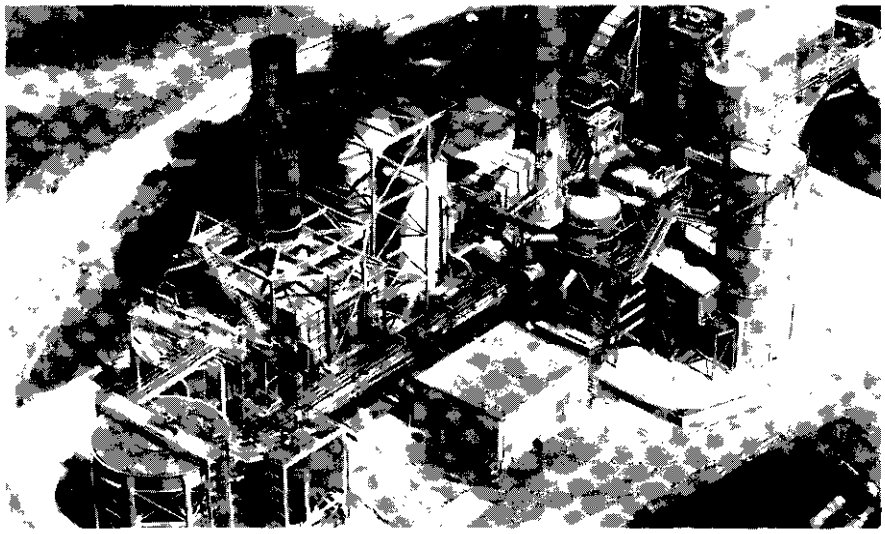
The Recovery Scrubber began its operations in August 1991. Operations were interrupted by temporary plant shutdowns for normal kiln repairs and a more lengthy shutdown from January to May, 1992, due to poor economic conditions. During this operating period, all major components have been tested and SO_2 removal has consistently exceeded 90 percent.

In the five month period from May 13, 1992, to September 10, 1992, the plant produced approximately 140,000 tons of cement. The scrubber captured 70 tons of sulfur dioxide and treated 6,000 tons of kiln dust that were returned to the kiln as raw feed.

The process uses waste kiln dust as the scrubbing reagent solving two pollution problems at the same time (waste dust to landfill and SO_2 emissions). The high potassium waste dust and water are slurried in a reaction tank and the kiln flue gas is bubbled through the slurry. The SO_2 in the flue gas reacts with potassium compounds in the slurry to form potassium sulfate. Because the potassium sulfate is more soluble than the calcium compounds in the slurry, the calcium compounds settle from the solution and can be recycled as kiln feed.

Two marketable by-products, potassium sulfate for fertilizer and distilled water, are being produced at the plant site by an evaporation process. Both can be sold to help offset operating costs. The Recovery Scrubber produces no waste products, and in fact, uses waste dust, not only avoiding the need for a landfill but removing an existing one.

Operating tests under the Clean Coal Technology Program will continue through December 1992 when the scrubber will become a permanent part of the Dragon facility.



Aerial view of Passamaquoddy Tribe's completed flue gas scrubber facility, which removes SO2 from 250,000 SCFM of cement kiln flue gas at the Dragon Products plant located at Thomaston, ME.

***Briefs**...continued from pg. 1*

About 50 people came to discuss a planned 70 MWe demonstration of pressurized circulating fluidized bed technology. Both the Pleasant Hill mayor and a representative of the Chamber of Commerce spoke on behalf of the project. The project will be sponsored by a partnership involving **Midwest Power Systems, Inc.** (formerly Iowa Power).

To cover the large service area that would be affected by **Sierra Pacific's** proposed 80 MWe coal gasification combined cycle plant, the department held three meetings in the **Reno, Nevada** area on July 21-23. A total of about 75 people took part in the meetings, where DOE heard both support for the project and some concerns, especially with the impact on water supplies . . . **Fort Meade, FL,** was the host of a public meeting for **Tampa Electric's** proposed 260 megawatt coal gasification combined cycle plant, part of the Florida utility's 1,150 megawatt power station planned to meet increased demand. About 60 people attended the meeting which covered a range of questions from air quality to safety. Attendees in general expressed strong support for the project.

And attendance was large at the **York, Pennsylvania** meeting for **York County Energy Partners'** (YCEP) proposed 250 megawatt demonstration of circulating fluidized bed combustion—one of the CCT program's more controversial projects. Organized opposition has formed to try to stop the project, and their activities have attracted widespread media coverage. YCEP (a subsidiary of **Air Products & Chemicals, Inc.**) has been very active in communicating with both project proponents and opponents and is committed to working with all community residents to try to address their concerns.

In other CCT events . . . congratulations are in order to **Ohio Edison Company** and **Ohio's Office of Coal Devel-**

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Status of Clean Coal Technology Demonstration Projects

EER Corporation. Enhancing the Use of Coals by Gas Reburning and Sorbent Injection. (Hennepin and Springfield, IL)
Long-term load following testing of GR-SI continues at Hennepin achieving more than the project goals of 60 percent NO_x reduction and 50 percent SO_2 reduction. Long-term testing at the Springfield site, temporarily suspended in April after the March start-up, is scheduled to resume in December 1992.

Babcock & Wilcox. LIMB/Coolside Demonstration Project. (Lorain, OH)
The final Coolside Topical Report was approved by DOE for distribution on July 27, 1992. The LIMB Extension Final Report is being completed.

American Electric Power. Tidd PFBC Demonstration Project. (Brilliant, OH)
The plant has now accumulated about 2,600 hours of coal-burning operation with indications of in-bed tube bundle endurance capability. Also, testing has been initiated for use of limestone in lieu of dolomite as the sorbent.

Rosebud Syncoal Partnership. Advanced Coal Conversion Process Demonstration. (Colstrip, MT)
Phase III operations commenced in June. At this time the pilot facility is being operated to evaluate solutions for modifications to overcome operating difficulties experienced to date.

CQ, Inc. Coal Quality Expert. (Homer City, PA)
More than half of the six full scale field tests and pilot and bench scale correlation tests have been completed. Over 100 algorithms based on the data generated from the tests are under development. The Acid Rain Advisor software package has been commercialized.

York County Energy Partners. Circulating Fluidized Bed Cogeneration Project. (York, PA)
A NEPA public scoping meeting was held on August 26, 1992, to obtain public comments for consideration in preparation of the Draft Environmental Impact Statement. YCEP selected an independent consultant to develop a detailed cost estimate for the design and construction of the facility.

Pure Air. Advanced Flue Gas Desulfurization Demonstration Project. (Chesterton, IN)
The FGD scrubber is operating and has demonstrated the capability to reduce SO_2 emissions by greater than 95 percent. Byproduct gypsum is 97 percent pure and is being sold to U.S. Gypsum. Tests with the standard NIPSCO coal (3-3.5 percent S) have been completed.

Southern Co. Services. NO_x Reduction for Tangential-Fired Boilers. (Lynn Haven, FL)
Long-term test data from operating the Low NO_x Concentric Firing System (LNCFS) Level II equipment (one of three basic air/coal feed configurations to be tested) indicated full load NO_x reductions up to 40 percent compared to the baseline emission data. Long-term data for Level III show that NO_x emissions have been reduced by as much as 48 percent compared to baseline values. Preliminary results of Level I long-term testing completed in September 1992, indicate full load NO_x reductions of 35 percent below baseline.

Southern Co. Services. NO_x Reduction for Wall-Fired Boilers. (Coosa, GA)
Long-term testing of Advanced Overfire Air (AOFA) has been completed and indicated, depending upon load, a NO_x reduction of 24 percent. Long-term testing of the Low NO_x burners (LNB) was completed. A 48 percent reduction of NO_x at full load was indicated. The test boiler is now being operated at reduced maximum loads to meet particulate compliance limits. Diagnostic, chemical emissions, and long-term testing for the LNB plus AOFA configuration will be performed following resumption of full load operation.

Passamaquoddy Tribe. Cement Kiln Flue Gas Recovery Scrubber. (Thomaston, ME)
Operation of the kiln gas scrubber plant continues. During this operating period, all major components of the system have been tested successfully and SO_2 removal has consistently exceeded 90 percent.

Babcock & Wilcox Co. Coal Reburning for NO_x Control. (Cassville, WI)
Results of parametric and optimization testing indicate NO_x emissions are reduced by about 55 percent between full load (110 MW) and 70 MW. Long-term testing proceeds in a load following manner.

Bethlehem Steel Corp. Coke Oven Gas Cleaning System. (Sparrows Point, MD)
The coke ovens were placed on "cold idle" on January 24, 1992. The project has been postponed for at least two years to allow for rehabilitation of the coke ovens.

Southern Co. Services. Chiyoda Thoroughbred-121 FGD Process. (Newnan, GA)
Plant construction is complete. Construction at the gypsum stack area is near completion. Tie in to the boiler will be completed in October and operations are expected to commence by early November.

ABB Combustion Engineering. IGCC Repowering Project. (Springfield, IL)
Preliminary design efforts continue on preparation of process flow diagrams and equipment data sheets. Also, studies are underway to substantially reduce the project capital cost estimate.

American Electric Power Service Corp. PFBC Utility Demonstration Project. (New Haven, WV)
Baseline system descriptions for the facility were prepared and are being reviewed by AEP. *See "**Status**" on page 8*

***Status**...continued from pg. 7*

Southern Co. Services. SCR for High-Sulfur Coal Boilers. (Pensacola, FL)
Design work is more than 90 percent complete and construction, which began March 23, 1992, continues. Measurement of baseline flue gas conditions are complete.

Babcock & Wilcox Co. SNRB Flue Gas Clean-Up Project. (Dilles Bottom, OH)
Operations at the demonstration facility continue with NO_x and SO_2 reductions above 90 and 85 percent respectively.

ABB Combustion Engineering. SNOX Flue Gas Cleanup Project. (Niles, OH)
The SNOX plant is operating at full capacity producing 93 percent pure sulfuric acid and achieving SO_2 and NO_x removals of 96 and 94 percent respectively.

Bethlehem Steel Corp. Blast Furnace Granulated Coal Injection. (Burns Harbor, IN)
BFGCI process design and detailed engineering continues.

Bechtel Corp. Confined Zone Dispersion FGD Project. (Indiana County, PA)
Slurry injection tests using dolomitic lime have indicated that the expected level of SO_2 emissions reduction of 50 percent can be reached and possibly exceeded. Parametric testing was completed and the six month continuous demonstration run was initiated in mid-August 1992.

AirPol, Inc. Gas Suspension Absorption Project. (Paducah, KY)
Plant dedication ceremonies are scheduled for October 27, 1992. Operations are expected to commence early in the 4th quarter.

Alaska Industrial Development Authority. Healy Clean Coal Project. (Healy, AK)
The Alaska PUC has approved the power sales agreement between AIDEA and Golden Valley Elec. Assn.

Public Service Co. of CO. Integrated Dry NO_x/SO_2 Control System. (Denver, CO.)
Construction work is about done except for paving and insulation. Start-up has begun and optimization of burner and overfire air systems indicated NO_x removals of more than 60 percent are possible.

Tampa Electric. Air-Blown/Integrated Gasification Combined Cycle Project. (Tampa, FL)
Tampa Electric has received the "Certificate of Completeness" for the Polk Co. Site Certification Application from the State of Florida. A Draft Implementation Plan for the EIS is being prepared by DOE following the August public scoping meeting.

LIFAC N. America. LIFAC Sorbent Injection Desulfurization Demonstration Project. (Richmond, IN)
Construction and baseline testing are complete. Parametric testing is in progress. The bypass damper routing flue gas to the activation reactor will be repaired during a scheduled boiler outage in the next few weeks to enable complete closure.

Air Products and Chemicals, Inc. Liquid Phase Methanol Process. (Daggett, CA)
The Cooperative Agreement was signed on October 16, 1992.

Babcock & Wilcox, Inc. Low-NO_x Cell Burner Retrofit. (Aberdeen, OH)
Every other lower burner and NO_x port were inverted and shallow angled replacement impellers were installed by May 1992, to mitigate high CO concentrations in the lower furnace when operating to acheive high NO_x emissions reductions. Optimization testing was completed in July 1992, and long-term testing is now in progress. NO_x emission reductions continue to be greater than 50 percent.

ENCOAL Corp. Mild Gasification Project. (Gillette, WY)
A seven day continuous run was completed on September 15, 1992. To date, eight test runs have been completed with a cumulative total of about 600 hours of coal feed operation. Specification solid process derived fuel and coal derived liquid have been produced.

MK-Ferguson Co. NOXSO Flue Gas Cleanup System. (Niles, OH)
Preliminary design activities are proceeding.

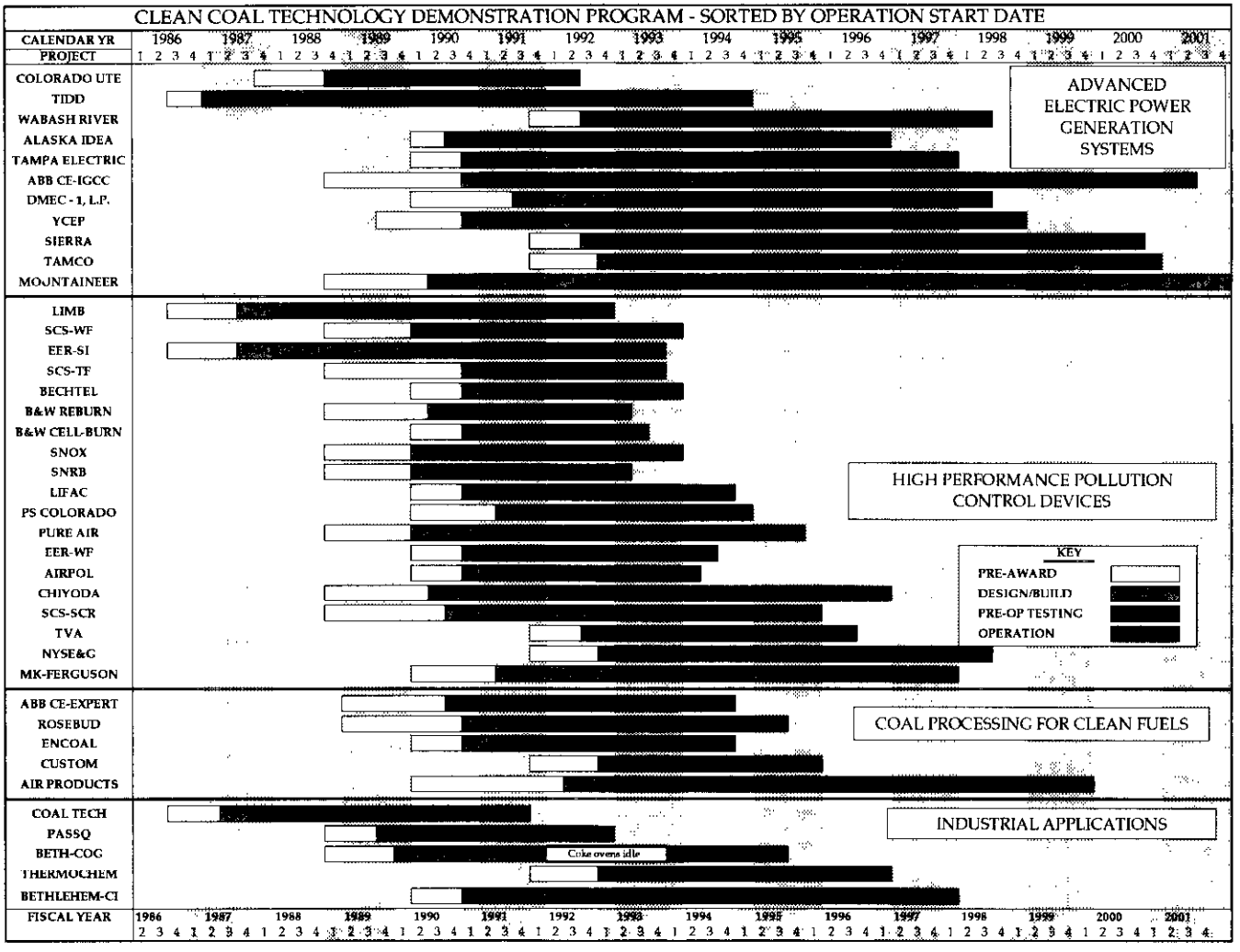
DMEC-1 Ltd. Partnership. Pressurized Circulating Fluidized Bed Demonstration Project. (Pleasant Hill, IA)
Efforts continue on completion of the preliminary design and cost estimate for the project. A NEPA public scoping meeting was held in July.

Energy and Environmental Research Corp. Gas Reburning and Low-NO_x Burners on Wall-Fired Boiler. (Denver, CO)
Optimization testing of gas reburning started in April 1992. Pulverizer fine tuning work was completed in September 1992. Equipment start-up and check-out testing is in progress.

Sierra Pacific Power. Piñon Pine IGCC Project. (Reno, NV)
The Cooperative Agreement was signed by DOE in early August. All comments from the three NEPA public scoping meetings held in July 1992 have been received and collated.

Tennessee Valley Authority. Micronized Coal Reburning for NO_x Control. (Paducah, KY)
The Cooperative Agreement was signed July 28, 1992. The Fuller Company purchased MicroFuel Corporation in September 1992, and will assume MicroFuel's obligations to this project.

*See "**Status**" on page 10*



***Briefs**...continued from pg. 6*

opment, who hosted an extremely well-attended Technology Transfer Open House at the site of **Babcock & Wilcox's** SOxNOxRoxBox Project on August 21 and 24, 1992. Nearly 200 people from across the country attended one of the events, which included detailed briefings on the most recent test results and a tour of the **Dilles Bottom, Ohio** plant. Participants were also pleased with their SOxNOxRoxBox Lunch . . . Later that week, over 300 people gathered in Chesterton, Indiana to formally kick off operations of **Pure Air's** advanced scrubbing system at **Northern Indiana Public Service Company's** Bailly station. Distinguished guests included Assistant Secretary for Fossil Energy James Randolph, and Indiana's Lt. Gov. Frank O'Bannon.

Out west, **ENCOAL** was happy to report the completion of a seven-day continuous run at its mild coal gasification plant on September 15. Some 2,000 barrels of coal-derived liquid fuel were being shipped to TEXPAR Energy in Waukesha, WI. Several thousand tons of solid fuel from the process will be shipped later . . . On September 3, the Alaska Public Utilities Commission gave its approval to the **Healy Clean Coal Project.** The Commission held that the **Alaska Industrial Development and Export Authority**—the project sponsor—should be granted the "certificate of public convenience and necessity" needed for the project to move forward. The Commission also approved a power sales agreement between the state agency and Golden Valley Electric Association, who will operate the clean coal power plant and buy its power.

***Conference**...continued from pg. 4*

The panelists emphasized that the CCT program has already been instrumental in reducing the cost of Clean Air Act compliance. For example, Rush noted that Southern Company's experience with several CCT projects has lowered their estimated cost of meeting anticipated NO_x standards from $300 million a few years ago to $180 million today. The day-to-day operating experience added to knowledge that will allow their company to control NO_x emissions much less expensively than if they had not entered the CCT partnership with the federal government.

The panel concluded by commenting that the CCT program—with government and business working together—is an excellent model that all hope can be adopted by broader research and development programs.

Copies of the technical papers presented at the First Annual Clean Coal Technology Conference can be obtained from the authors. For further information contact the Office of Clean Coal Technology at 703-235-2628.

***Status**...continued from pg. 8*

Wabash Joint Venture. Wabash River Coal Gasification Project. (W. Terra Haute, IN)
The Cooperative Agreement was signed by DOE in early August. A kick-off meeting has been held to review project scope, objectives, schedule, and current status of design work.

ThermoChem, Inc. Demonstration of Pulse Combustion. (Gillette, WY)
The Cooperative Agreement was signed by DOE on October 27, 1992.

Custom Coals International. Self-Scrubbing Coal. (Pittsburgh, PA)
The Cooperative Agreement was signed by DOE on October 28, 1992.

TAMCO Power Partners. Tom's Creek IGCC Demonstration Project. (Coeburn, VA)
The Cooperative Agreement was signed by DOE on October 20, 1992.

New York State Electric & Gas Co. Milliken Clean Coal Project. (Lansing, NY)
The Cooperative Agreement was signed by DOE on October 20, 1992.

CCT Reports Update

The following Clean Coal Technology Program Reports and Comprehensive Reports to Congress have been released since the last issue of Clean Coal Today. Copies of the reports are available from the National Technical Information Service, U.S. Department of Commerce, Springfield, VA 22161.

Sep 92	DOE/FE-0264P	Toms Creek IGCC Demonstration Project (TAMCO Power Partners) - Report to Congress
Sep 92	DOE/FE-0265P	Milliken Clean Coal Technology Demonstration Project (New York State Electric & Gas Corp.) - Report to Congress
Sep 92	DOE/FE-0266P	Self Scrubbing Coal™: An Integrated Approach to Clean Air (Custom Coals International) - Report to Congress
Sep 92	DOE/FE-0267P	Demonstration of Pulse Combustion in an Application for Steam Gasification of Coal (ThermoChem, Inc.) - Report to Congress

The following papers were presented at the *First Annual Clean Coal Technology Conference*, Cleveland, OH, September 1992. Copies are available from the authors. For further information, contact Doug Archer, Office of Clean Coal Technology at 703-235-2628.

"Update and Results of Bechtel's Confined Zone Dispersion (CZD) Demonstration at Pennsylvania Electric Company's Seward Station," Jack Z. Abrams, Principal Engineer, Bechtel Group, Inc. Co-authors: Allen G. Rubin, Project Manager, Bechtel Corporation, and Arthur L. Baldwin, Program Coordinator, NO_x Control Technology, U.S. DOE Pittsburgh Energy Technology Center.

"LIFAC Sorbent Injection for Flue Gas Desulfurization," James Hervol, Project Manager, ICF Kaiser Engineers, Inc. Co-authors: Richard Easler and Judah Rose, ICF Kaiser Engineers, Inc., and Juhani Viiala, Tampella Power Corporation.

"The Clean Coal Technology Program: 10 MWe Demonstration of Gas Suspension Absorption for Flue Gas Desulfurization," Frank E. Hsu, Senior Manager of Special Projects, AirPol, Inc. Co-author: Sharon K. Marchant, U.S. DOE Pittsburgh Energy Technology Center.

"Final Results of the DOE LIMB and Coolside Demonstration Projects," Michael J. DePero, Contract Manager, Babcock & Wilcox. Co-authors: Thomas R. Goots and Paul S. Nolan, Babcock & Wilcox.

"Recovery Scrubber Installation and Operation," Dr. Garrett L. Morrison, President and CEO, Passamaquoddy Technology, L.P.

"Demonstration of the Union Carbide CANSOLV™ System Process at the ALCOA Generating Corporation Warrick Power Plant," Alex B. Barnett, Business Manager, Power Generation, Union Carbide Chemicals and Plastics, Inc. Co-autahor: L.E. Hakka, Union Carbide Chemicals and Plastics Canada, Inc.
*See "**Reports**" on page 11*

***Reports**...continued from pg. 10*

"American Electric Power Pressurized Fluidized Bed Combustion Technology Update." Mario Marrocco, Group Manager, PFBC, American Electric Power Service Corporation. Co-author: D.R. Hafer, American Electric Power Service Corporation.

"Nucla CFB Demonstration CCT Program Summary: Project Origins through Test Completion." Stuart A. Bush, Senior Engineer, Project Coordinator, Tri-State Generation and Transmission Association, Inc. Co-authors: M.A. Friedman, Senior Associate, Combustion Systems, Inc., N.F. Rekos, U.S. DOE Morgantown Energy Technology Center, and T.J. Heller, Tri-State Generation and Transmission Association, Inc.

"Status of the Piñon Pine IGCC Project." John W. Motter, Advanced Generation Projects Manager, Sierra Pacific Power Company.

"DMEC-1 Pressurized Circulating Fluidized Bed Demonstration Project." Gary E. Kruempel, Manager, Generation Engineering, Midwest Power. Co-authors: S.J. Ambrose, Midwest Power, and S.J. Provol, Pyropower Corporation.

"The Wabash River Coal Gasification Repowering Project." David G. Sundstrom, Business Development Manager—Coal Gasification, Destec Energy, Inc.

"Status of Tampa Electric Company IGCC Project." Stephen D. Jenkins, Manager, Advanced Technology, TECO Power Services.

"An Air Cooled Slagging Combustor with Internal Sulfur, Nitrogen and Ash Control for Coal and High Ash Fuels." Dr. Bert Zauderer, President, Coal Tech Corporation. Co-authors: E.S. Fleming and B. Borok, Coal Tech Corporation.

"The Healy Clean Coal Project." Steve M. Rosendahl, Project Manager, Stone & Webster Engineering Corporation, and Dennis V. McCrohan, Alaska Industrial Development and Export Authority.

"Demonstration of Pulse Enhanced™ Steam Reforming in an Application for Gasification of Coal." Richard E. Kazares, Vice President, Sales and Applications Engineering. Co-authors: William G. Steedman, Senior Systems Engineer, ThermoChem, Inc., and Dr. Momtaz N. Mansour, President, MTCI, Inc.

"Coal Quality Expert: Status and Software Specifications." Clark D. Harrison, President, CQ, Inc.

"Self-Scrubbing Coal: An Integrated Approach to Clean Air." Robin L. Godfrey, Executive Vice President, Custom Coals International.

"Fullscale Demonstration of Low NO_x Cell™ Burners at Dayton Power & Light's J.M. Stuart Station Unit No. 4." Roger J. Kleisley, Contract Manager, Babcock & Wilcox, David A. Moore, Engineering Supervisor, Dayton Power & Light. Co-authors: C.E. Latham and T.A. Laursen, Babcock & Wilcox, and C.P. Bellanca and H.V. Duong, Dayton Power & Light.

"Demonstration of Coal Reburning for Cyclone Boiler NO_x Control—A DOE Clean Coal II Project." Anthony S. Yagiela, Cyclone Reburn Project Manager, Babcock & Wilcox. Co-authors: G.J. Maringo, Combustion Systems Development Engineer, Babcock & Wilcox, R.J. Nazwell, Supervisor, Plant Performance, Wisconsin Power & Light, and H. Farzan, Senior Research Engineer, Babcock & Wilcox.

"Gas Reburning—Sorbent Injection Demonstration Results." Leonard C. Angello, Director, Utility Systems, Energy and Environmental Research Corporation. Co-authors: D.A. Englehardt, B.A. Folsom, J.C. Opatrny, T.M. Sommer, Energy and Environmental Research Corporation, H.J. Ritz, U.S. DOE Pittsburgh Energy Technology Center.

Integrating Gas Reburning with Low NO_x Burners." Todd M. Sommer, Vice President, Energy and Environmental Research Corporation. Co-authors: C.C. Hong, A.M. Moser, Environmental Research Corporation, H.J. Ritz, U.S. DOE Pittsburgh Energy Technology Center.

"Micronized Coal Reburning for NO_x Control on a 175 MWe Unit." Dale T. Bradshaw, Manager, Resource Development Department, Tennessee Valley Authority. Co-authors: Thomas F. Butler, Tennessee Valley Authority, William K. Ogilvie, MicroFuel Corporation, Ted Rosiak, Jr., Duke/Fluor Daniel, and Robert E. Sommerlad, Research-Cottrell Companies.

*See "**Reports**" on page 12*

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"Integrated Dry NO_x/SO_2 Emissions Control System Update." Terry Hunt, Professional Engineer, Public Service Company of Colorado. Co-author, John B. Doyle, Babcock & Wilcox.

"Acid Rain Compliance—Advanced Co-Current Wet FGD Design for the Bailly Station." Robert C. Reighard, Director of Operations, Pure Air. Authors: Beth Wrobel, Northern Indiana Public Service Company, and Don C. Vymazal, Pure Air.

"Demonstration of Innovative Applications of Technology for the CT-121 FGD Process." David P. Burford, Project Manager, Southern Company Services, Inc. Co-authors: Harry J. Ritz, DOE Pittsburgh Energy Technology Center, and Oliver W. Hargrove, Radian Corporation.

"NO_x/SO_2 Removal With No Waste—The SNOX Process." Timothy D. Cassell, SNOX Site Leader, ABB Environmental Systems. Co-authors: Sher M. Durrani, Project Manager, Ohio Edison Company, and Robert J. Evans, Project Manager, U.S. DOE Pittsburgh Energy Technology Center.

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"The NOXSO Clean Coal Technology Project: A 115 MW Demonstration Unit." Dr. James B. Black, Sr. Project Engineer, NOXSO Corporation.

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"500 MW Wall-Fired Low NO_x Burner Demonstration." John N. Sorge, Process Engineer, Southern Company Services, Inc. Co-author: Arthur L. Baldwin, Program Coordinator, NO_x Control Technology, U.S. DOE Pittsburgh Energy Technology Center.

"180 MW Tangentially-Fired Low NO_x Burner Demonstration." Robert R. Hardman, Research Engineer, Southern Company Services, Inc. Co-author: Gerard G. Elia, U.S. DOE Pittsburgh Energy Technology Center.

"Demonstration of Selective Catalytic Reduction (SCR) Technology for the Control of Nitrogen Oxide (NO_x) Emissions from High-Sulfur, Coal-Fired Boilers." J. Douglas Maxwell, SCR Project Manager and Principal Research Engineer, Southern Company Services, Inc., and A.L. Baldwin, U.S. DOE Pittsburgh Energy Technology Center.

"Design, Construction, and Start-up of ENCOAL Mild Gasification Project." James P. Frederick, Project Manager, ENCOAL Corporation.

"Rosebud SYNCOAL™ Partnership Advanced Coal Conversion Process Demonstration Project." Ray W. Sheldon, Director of Engineering, Western SynCoal Company. Co-authors: A.J. Viall, Western Energy Company, and J.M. Richards, Scoria, Inc.

"Fuel and Power Coproduction—The Integrated Gasification/Liquid Phase Methanol (LPMEOH®) Demonstration Project." William R. Brown, Manager, Syngas Conversion Systems, Air Products and Chemicals, Inc. Co-author: Frank S. Frenduto, Air Products and Chemicals, Inc.