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Clean Coal Today

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

ENCOAL Project Continues Rapid Pace

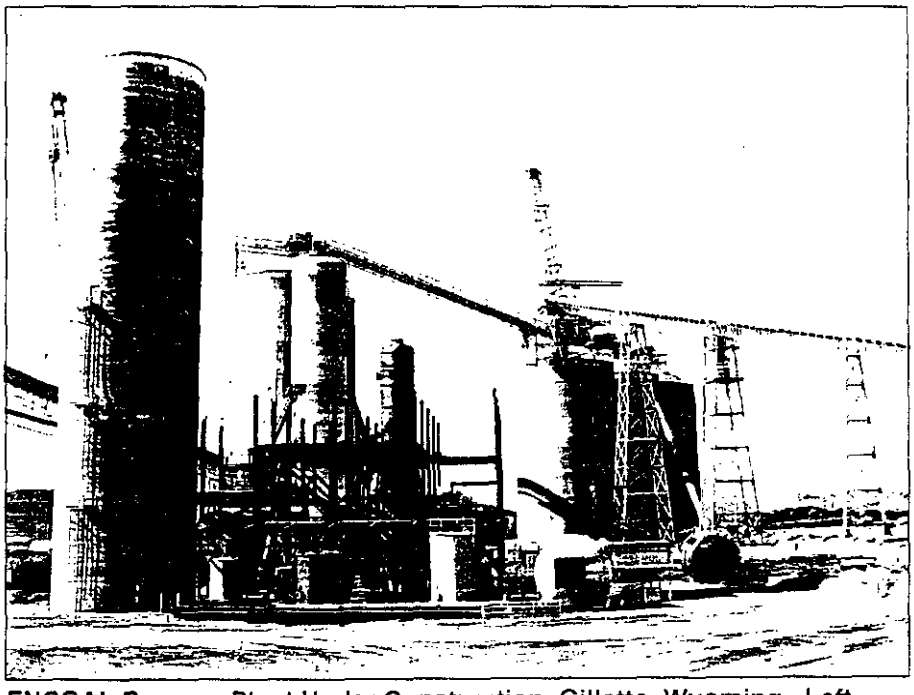
—Spring 1992 Plant Startup Expected—

By April, Wyoming will be the home of a new up-and-running "clean coal" plant that will be making valuable and marketable fuels from the Powder River Basin's generous reserves of subbituminous coal. Designed and built under an aggressive schedule over two winter seasons, the new "mild gasification" plant will take 1,000 tons a day of the region's subbituminous coal and turn it into two new, more valuable fuels—a low sulfur coal-derived liquid fuel, similar in quality to Number 6 fuel oil, and a solid fuel that has the benefits of high rank eastern bituminous coals, but not the high sulfur content.

ENCOAL, a subsidiary of Houston-based Shell Mining Co. and the plant's owner, has already announced its first contracts for the sale of the two low-sulfur fuels to two Wisconsin industrial and utility firms.

The ENCOAL plant—located at Triton Coal Company's Buckskin Mine near Gillette, Wyoming—will demonstrate a process it calls "Liquids from Coal" or LFC (See *Clean Coal Today*, Spring 1991). In this advanced process, coal is dried and heated under carefully controlled temperatures and pressures to drive off the coal's volatile elements. These vapors are cleaned of particulates and then cooled to condense out the liquid fuel. Because the remaining solid fuel is nearly moisture-

See "ENCOAL" on page 2



ENCOAL Process Plant Under Construction, Gillette, Wyoming. Left Foreground is the Solid Product Silo.

Clean Coal Briefs

The beginning of a new year marked several additions to the growing list of projects that have moved through construction and into operations, generating data that will move the technologies to commercial reality. And, through the Clean Coal Technology Outreach Program, that information is being disseminated to a wide range of public and private audience sectors.

In early November, operations began on the **Babcock & Wilcox** retrofit of a 605 megawatt boiler—the largest retrofit in the Clean Coal Technology program—with specially designed low NO_x burners at **Dayton Power & Light's** Stuart Station near Aberdeen, Ohio.

On the other side of the state, **ABB/ Environmental Systems** completed construction and shake-down tests of the **SNOX** demonstration unit. The project went on line in late December, shortly after the project's SO_2 and NO_x catalysts were installed.... A month

See "Briefs" on page 11

In This Issue

ENCOAL...continued from pg. 1

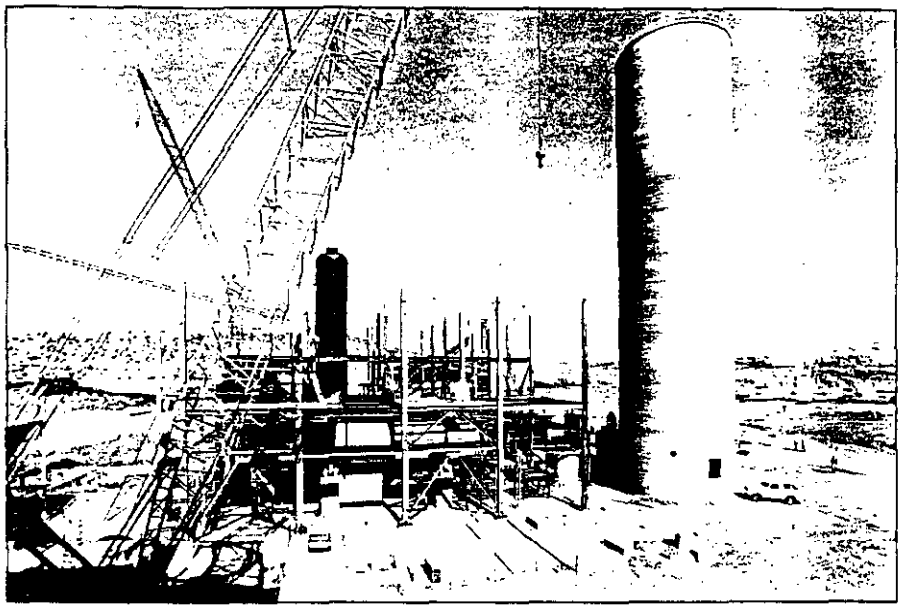
free, it has a much higher heating value than the raw coals.

The Energy Department's agreement with ENCOAL—the first of the CCT third round projects to be signed—was finalized in September 1990. A month later, the first ground was broken, setting in motion a whirlwind of construction activities.

Over the last 17 months—including two winters—construction has proceeded at a rapid pace. The plant's 195 foot high main superstructure has been built, several storage silos have been erected, and most of the more than 25 major pieces of process equipment have been fabricated and installed. These include the 20-foot diameter rotary quench table, a 30-foot diameter coal dryer, and a 25-foot diameter rotary grate pyrolyzer.

Assembly of the solids quench table, that will be used to cool the solid product, was completed in early August. While the fixed base of this 20-ton unit was welded in place at the plant site, its "movable" rotary portion was assembled separately and lifted into its final position, yet meeting bearing tolerances of about 0.002 inch—a significant achievement.

In late October, major components of the pyrolyzer were pre-assembled and lifted 100 feet into their final positions. The vessel was then refractory lined and insulated, followed by placement of the vessel cover.



ENCOAL Process Area. Horizontal Product Solid Cooler and Vertical Liquid Recovery Tower Installed in Structural Steel.

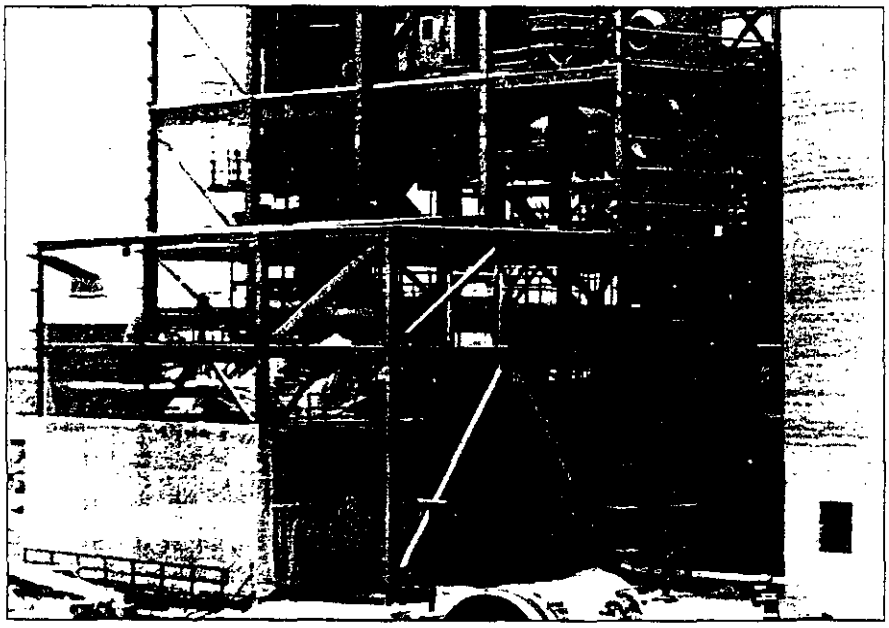
By mid-November, erection of the gas condensation tower was complete, including the installation of its internal trays and packing. The tower, at 12-feet in diameter and 88-feet high, was one of the largest pieces of preassembled equipment delivered to the project site. Weighing in at 44 tons, the tower was fabricated and assembled (without internals) in Denver, CO, then shipped 350 miles to the project site—which required a special permit. The end of November also saw the three new in-series electrostatic precipitators in place.

Over 1,700 tons of structural steel have been erected during the construction phase. Pipes and ductwork range in size from 2 inches to 108 inches in diameter. By the end of construction, about 150,000 labor hours will have been used to complete the plant.

A key component of the ENCOAL plant is a state-of-the-art computerized system to continually control and optimize performance of the plant. Nearly 700 input/output sensing elements will make up the system's instrumentation. The computer system is expected to allow operators to tailor the plant's operations to produce the most economic quality and mix of fuels to consistently meet specific market needs.

Once running, the plant will produce about 500 tons a day of solid fuel and 500 barrels of liquid fuel.

The LFC process was developed by SGI International of La Jolla, CA. TEK-KOL, a partnership between Shell Mining and SGI, is the owner and licensor of the technology. The project's total cost is $72.6 million. ■



View of Process Area Under Construction Showing Pyrolyzer and Associated Large Piping in Structural Steel.

Tidd Plant Resumes Operation

On December 17, 1991, the Tidd Pressurized Fluidized Bed Combustion Demonstration Plant—the Nation's first operating PFBC—resumed operations following a planned 3 month outage.

The down time at the Brilliant, OH plant was used for maintenance, general repairs and the rework of some of the facility's components.

Work included installation of additional in-bed boiler surface, reworking the ash removal circuitry, changing some materials in the fuel paste system, repositioning some of the sorbent lockhopper valves, and installing economizer soot-blowers.

Nine and one-half months of shakedown and preliminary tests preceeded the fall outage. During this time, the plant logged more than 850 hours of coal operation in a total of 50 starts. The longest continuous coal run to date was a 110 hour test in August 1991. The plant's highest heat input has been 75 percent of its design value, resulting in electrical output of up to 53 megawatts.

Additional preliminary tests are continuing to further debug and fine-tune the system. Acceptance tests to verify that performance goals and guarantees can be met are planned during the early part of 1992. Later tests will assess the system's flexibility with different coals and sorbents.

The joint project with American Electric Power is from the Clean Coal Technology Program's first round of competition. Following design and construction, the plant was first operated on coal in late November 1990. DOE is providing $60.2 million of the project's total $193 million cost. Data from this demonstration will be used by American Electric Power to support the design and construction of a 330 megawatt grass-roots PFBC under the Clean Coal Technology Program's second round.■

SNOX Demonstration on Line

The SNOX demonstration project located at Ohio Edison's Niles, Ohio Plant went on stream in late December 1991.

The SNOX Process is an advanced catalytic process that removes greater than 95 percent of the sulfur dioxide and 90 percent of the nitrogen oxides, as well as virtually all particulate from power plant flue gas emissions (See ***Clean Coal Today***, Fall 1991). This promising process demonstrates significant improvements in the areas of greater pollutant removal efficiencies combined with reduced reagent requirements, waste streams, and operating costs.

The SNOX process, consisting of four key areas: (1) particulate collection, (2) nitrogen oxide reduction, (3) sulfur dioxide oxidation, and (4) sulfuric acid formation, operates downstream and independent of the boiler, and can be applied either to new or existing plants of any size or boiler design.

The Ohio demonstration unit will treat a 35 MW slipstream at the Edison Niles Station which burns on the average 3.2 percent sulfur content Ohio coal. Approximately one-third of the flue gas produced by the Niles Plant Boiler No. 2 will be cleaned through the SNOX Demonstration Project. Performance data will be collected and compiled over a 22 month operating period.

The SNOX Process will be licensed in the United States and Canada for use in the electric utility industry through the demonstration's major sponsor ABB Environmental Systems.

Joining the United States Department of Energy and ABB Environmental Systems in funding this $31.4 million demonstration project are the Ohio Coal Development Office, Ohio Edison, and Snamprogetti, USA. Snamprogetti's affiliate Haldor Topsoe of Denmark developed the SNOX technology.■

Round IV Update

DOE is moving ahead with the fact finding portion of negotiations for the nine projects selected under Round IV. Cooperative agreements are expected to be in place by the third quarter of 1992.

The three major combined cycle gasification projects have been assigned to the Morgantown Energy Technology Center for completion of negotiations and day-to-day project management. The other six projects have been assigned to the DOE Pittsburgh ETC.

Negotiations are being conducted under the streamlined process set in place by the Secretary of Energy Directive, SEN-14-89. Key to the process is the establishment of an Executive Board consisting of the heads of the DOE directorates charged with completing the preaward process.

Headquarter's Review Panels composed of senior staff from each of the key directorates report directly to the Executive Board, and work closely with the Technology Centers to complete the negotiations and prepare the required documentation leading to the cooperative agreements.

Since implementing the Directive in December 1989, 27 cooperative agreements have been successfully negotiated.■

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Georgia Power's Plant Hammond Previews Clean Air Act's NOx Challenges

Project Generating Data That Will Help Utilities Face New Law's "Sleeping Giant"

While the debate over the 1990 Clean Air Act Amendments has largely focused on SO_2 control requirements, many see a sleeping giant waiting to be awakened and heard. That giant is NO_x control.

The new Clean Air law calls for reductions in nitrogen oxide emissions (from both utility and transportation sources) by two million tons by the end of the decade. Meeting this overall goal involves two sections of the new law: Title I, which will require reductions in non-attainment areas, and Title IV, with specific acid rain requirements.

While non-attainment standards are yet to be determined, some predict that the cost for utilities in affected areas could reach the billions of dollars, surpassing even SO_2 control costs. The acid rain title is more clearly defined. By 1995, the 110 so-called "Phase One" plants with wall-fired or tangentially-fired boilers will have to reduce NO_x emissions to levels achievable by "low NO_x burner technology."

Remaining power plants—with wet bottom, cyclone, or cell burners—will need to limit NO_x emissions by 2000. This requirement will be based on available pollution control technology that compares to the cost of controlling the Phase One plants.

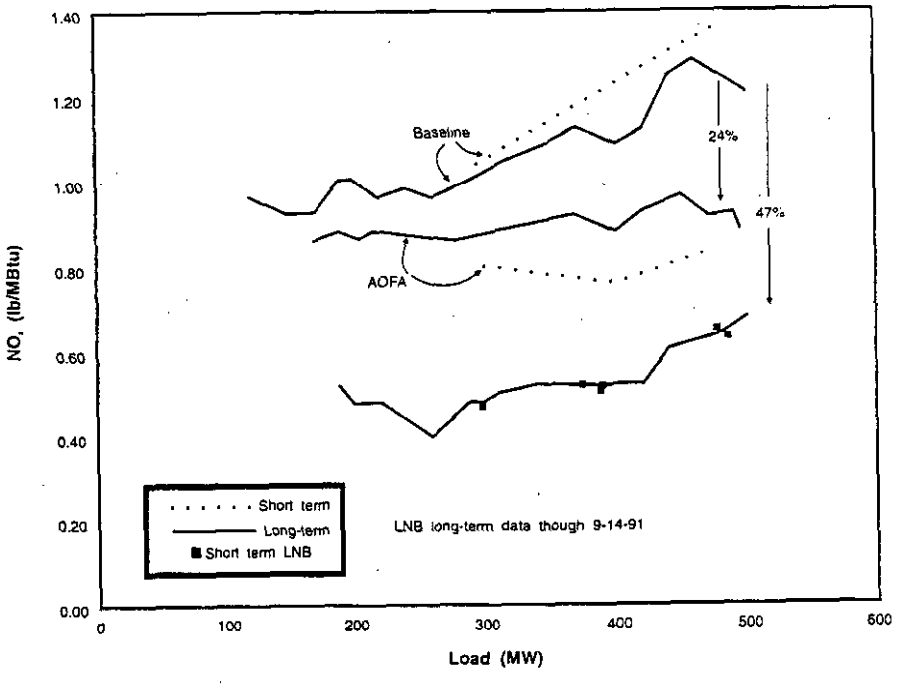
The Clean Coal Technology program is supporting demonstrations of a variety of NO_x control technologies designed for specific boiler types or plant needs. These projects are providing critical operating and economic data needed for the most cost-effective implementation of the new law's standards.

At a wall-fired unit at Georgia Power's Plant Hammond, utilities are already getting a preview of what they will face in implementing the acid rain NO_x provisions of the Clean Air law. This pioneering effort—along with a companion Southern Company project with a tangentially-fired boiler in Panama City, Florida—is expected to help define the capability and the cost of low NO_x combustion technologies.

Future issues of *Clean Coal Today* will look at emerging NO_x reduction techniques for cell-burners, gas and coal reburning, and simultaneous SO_x/NO_x reduction.

Working at Plant Hammond, Southern Company is looking at reducing NO_x from a 500-megawatt wall-fired unit with three techniques: advanced overfire air, low-NO_x burners, and a combination of the two techniques. Before beginning the test program, baseline tests were conducted for comparison. Data is being collected under both short-term controlled conditions and long-term utility dispatch conditions. While results to date are promising, the experience is pointing to some potential difficulties—and proposing some solutions.

NO_x Emissions Short- and Long-Term Comparison



Advanced Overfire Air Results

The advanced air ports provide secondary air from completely separate, aerodynamically-designed ducts that are located above the existing burner wind box. This design increases secondary air penetration velocities over those achieved with conventional overfire air systems and provides an air curtain along the walls to protect them from acid gases.

Preliminary results from the short-term tests indicate that, depending on the load of the unit, NO_x can be reduced by up to 40 percent from the base levels. Not unexpectedly, a statistically reliable data set indicates about a 24 percent NO_x reduction under long term operating conditions.

The most important variables affecting NO_x removal under both operating conditions, were the load of the unit and the level of excess oxygen.

The tests highlighted one area of potential concern with advanced overfire air technologies—namely, an in-

See "NO_x on page 5

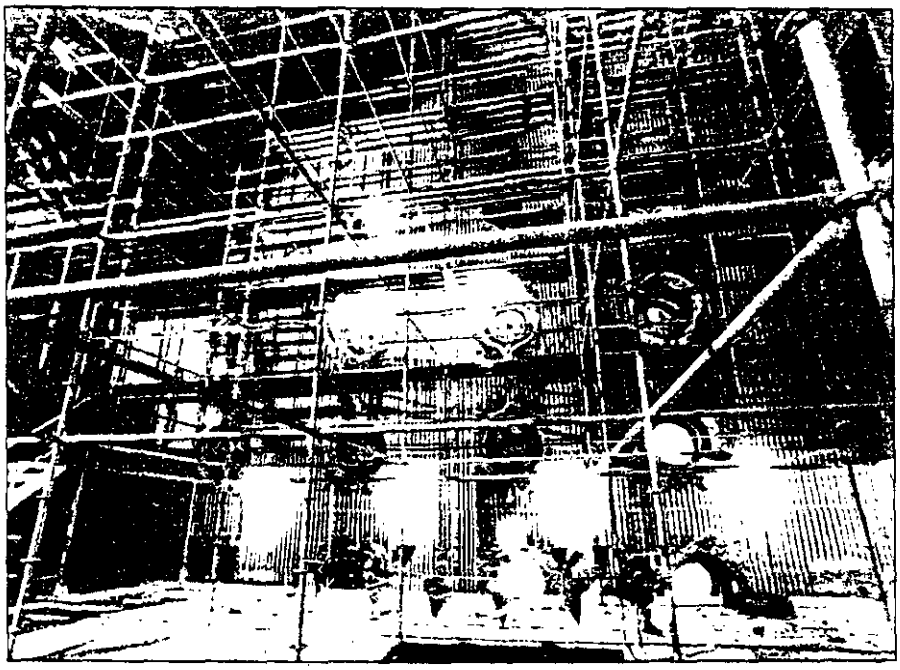
NOx..continued from pg. 4

creased level of unburned carbon that carries with the solids after combustion. In some cases, two-fold increases were observed. Such an increase will change the composition of the fly ash from the plant, making it more difficult to sell or more costly to dispose. The technical staff at the project is looking into steps—such as improving the grinding cabilities of the plant's mills or increasing levels of excess air—that may help reduce levels of unburned carbon in the fly ash.

Low-NO_x Burners Results

Foster Wheeler installed 24 of their modified Controlled Flow-Split Flame Low Nox Burners at Plant Hammond during a 7-week outage in the spring of 1991. These burners control NO_x by regulating the initial fuel/air mixture, velocities, and turbulence, to create a fuel-rich flame core. The addition of the remaining air needed to complete combustion is also controlled to prevent further NO_x formation.

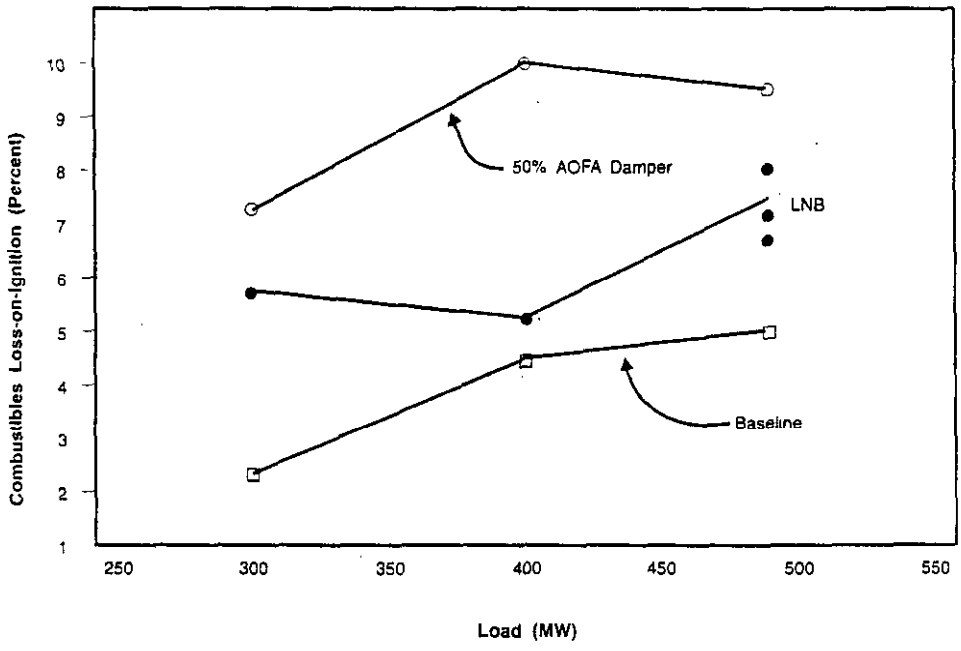
Preliminary findings from the short-term tests—that began in July of 1991—indicate that with a full-load, NO_x emissions can be held to about .65 lb/MBtu, from a baseline of 1.35 lb/MBtu (48% reduction). At the same time, the percent of unburned carbon in the fly ash (loss-on-ignition) increased from 5.2 to 8.0 percent.



View of Boiler Interior during installation of Low NO_x burners. Overfire Air Ports are Directly Above Burners with 12 Burners on Each Side of the Boiler.

Long-term burner tests began in August. A preliminary analysis of the data through mid-November shows that full load NO_x emissions were again held to about .65 lb/MBtu. However, the tests also showed both higher precipitator particulate loading caused by less boiler slagging and more fly ash carryover to the solids collection system and flue gas flow rates caused by the need to increase the amount of excess air to compensate for higher unburned carbon levels. The increased mass loading and flue gas flow rates have adversely affected particulate emissions to the degree that it was necessary to run the unit at reduced loads to meet particulate compliance limits. As a result of injecting approximately 25 ppm of ammonia into the flue gas stream ahead of the precipitator, the units successfully passed a series of particulate compliance tests on December 11, 1991, and is now able to operate at 500 MW.

Flyash Loss-On-Ignition



The final series of tests—combining overfire air with operation of the Low NO_x burners—began in January of 1992.

When the Hammond project is complete, both utilities and their regulators will have an improved, statistically-reliable understanding of both the capabilities and the overall plant costs of low NO_x combustion technologies on wall-fired boilers. ■

Clean Coal Project Will Develop Expert Computer Software Program

Co-funded by DOE and the Electric Power Research Institute (EPRI), this $17.4 million project, led by Combustion Engineering Inc. (CE), Windsor, CT, and CQ Inc., Homer City, PA, is the largest effort ever to tie precombustion, combustion, and postcombustion technologies together to solve emission problems. More than 20 companies from around the country, including software developers, testing laboratories and utilities will participate in the operation.

A computer expert system, termed the "Coal Quality Expert" (CQE), will be demonstrated as a reliable approach to predict the economic, operational, and environmental benefits of using commercially achievable cleaned coals, enabling utilities to select the best quality coal for their boilers.

The project consists of two activities: (1) testing and data gathering, including optimization of coal quality for combustion in different types of boilers; and (2) development of an expert system, a computer program that can emulate human reasoning in a specified area of knowledge.

Extensive data gathering and analysis will validate the models currently in use and the new models that will constitute the CQE.

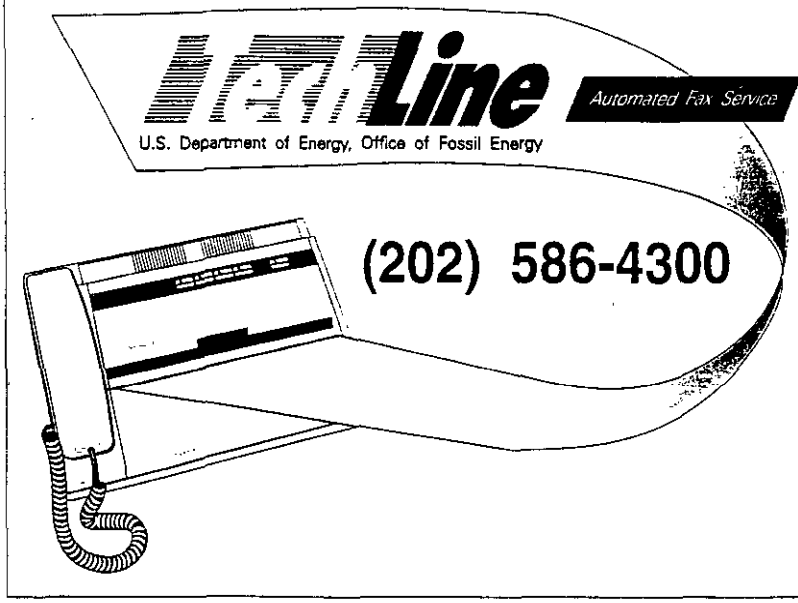
A total of 26 coals collected from mines, commercial cleaning plants, and at the project's six host power plants, will be characterized and cleaned, and tested in laboratory, bench and pilot-scale combustion chambers to determine combustion characteristics. 12 coals—including baseline and improved quality coals—will then be field tested in commercial boilers of all major types at the six power plant sites.

Electric Power Technologies (EPT) of Menlo Park, California, will lead a team of contractors in evaluating power plant performance from these 30 day test burns to determine the impacts of changes in coal quality (by cleaning, switching, or blending) on plant performance and emissions. So far, three and a half out of six field tests have been conducted.

Data generated will be used to develop and validate the Coal Quality Expert models. Specific information that the computer models will evaluate include the potential for coal cleaning, blending, and switching options, pulverizer wear, slagging and fouling potential, precipitator performance, flue gas particulate removal, NO_x formation, flue gas desulfurization performance, new plant construction cost, waste handling, fuel sources, and strategic planning. The Coal Quality Expert will include cost estimating models for new and retrofit coal cleaning processes, power production equipment, and emission control systems.

The foundation of the Coal Quality Expert is EPRI's Coal Quality Impact Model (CQIM). The CQIM features detailed equipment modules for all systems directly affected by coal quality. More than 20 other software models and databases, including a flue gas desulfurization model, a coal cleaning cost model, a transportation model, and a new plant construction model, will be integrated with CQIM to form the Coal Quality Expert.

Specialized computer models will be made available as they are developed. The first of these models, the Acid Rain Advisor, was offered for commercial sale in January 1992. The Acid Rain Advisor provides a means for evaluating compliance options at individual plants or at the overall system level, and allows consideration of trading emissions allowances with other utilities. ■



In January 1992, the Department of Energy's Office of Fossil Energy introduced a new technical information service: the TechLine automated fax system. Techline will be a key tool in communicating up-to-date status reports on the Clean Coal Technology Program. This 24-hour-a-day fax-on-demand system will allow tyou to receive faxed information on all Fossil Energy programs using a touchtone telephone. Call (202) 586-4300 and follow the voice instructions. If you have any questions, contact the Fossil Energy Office of Communications at (202) 586-6503.

Clean Coal Projects Join Integrated Effort to Obtain Toxic Air Pollutant Data

While much is known about how clean coal technologies can help meet acid rain requirements of the new Clean Air legislation, what is not clear is how these technologies can affect another class of emissions addressed in the 1990 Clean Air Act amendments—toxic air pollutants.

The new law establishes a new regulatory program to control air toxic emissions from industrial facilities. One hundred eighty nine hazardous air pollutants—from arsenic to vanadium—are specified and emission standards are to be developed by a set timeframe in the new law. The law requires EPA to report—by 1993—on any health hazards reasonably anticipated to occur from power plant emissions of these pollutants and to recommend control strategies. EPA will then decide whether or not to regulate electric utilities under this Title of the CAAA. If so, then EPA may impose additional controls on coal-fired utility plants for reduction of air toxics.

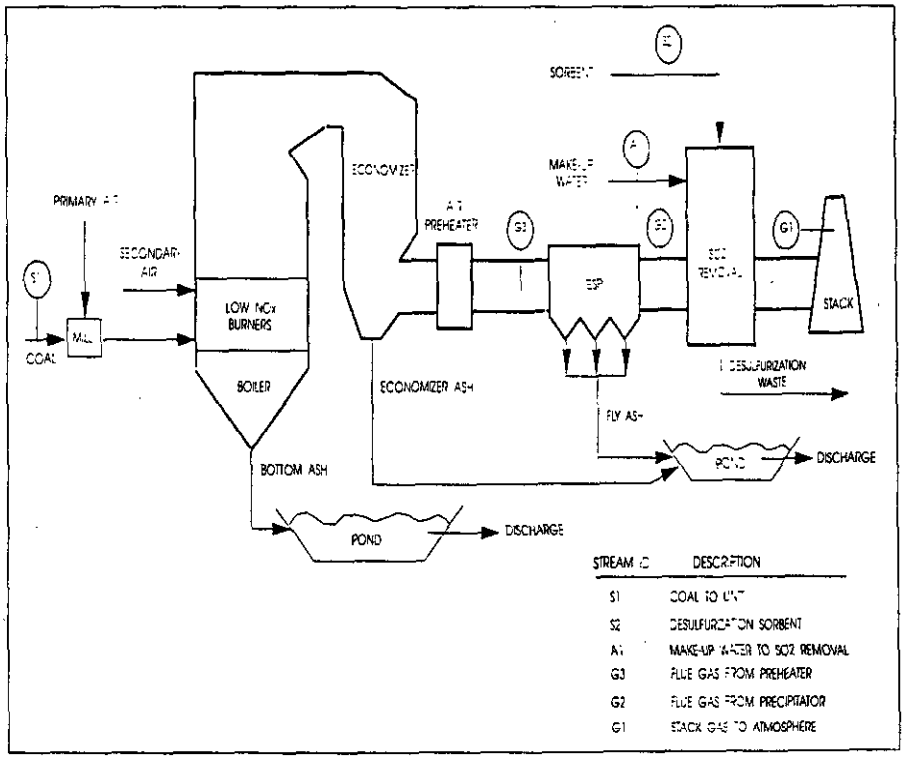
In order for EPA to make knowledgeable decisions on control of toxics from coal burning power plants, they will need to have solid, reliable "real world" data. Unfortunately, little is known about the emissions rates of these hazardous pollutants, their effects on human health, or the efficiency, availability, or cost of control techniques. In addition, the emissions of many of these substances can be changed as a result of installing control technologies that will be used to comply with acid rain requirements.

For example, Southern Company Services' demonstration of low NO_x burners and advanced overfire air retrofits, is showing that operation of the low NO_x combustion systems causes an increase in unburned carbon and a change in the composition of the unit's fly ash (see article, p 4). Sorbent injection and other flue gas desulfurization processes are also expected to change the nature of fly ash and particulate emissions.

The Energy Department has joined EPA and EPRI in an overall program, called PISCES (Power Plant Integrated Systems: Chemical Emissions Study) to characterize toxic air emissions from operating coal-fired utility boilers. Two of the Clean Coal Technology projects—demonstrating advanced NO_x control technologies on a full scale wall-fired boiler in Rome, Georgia and a tangential-fired boiler in Lynn Haven, Florida—are already part of this effort. The Energy Department is also working with other project sponsors to expand the environmental monitoring plans to include monitoring efforts at their sites to gather as much data as possible on hazardous emissions from plants equipped with advanced clean coal technologies.

The goal of supplemental monitoring under the Environmental Monitoring Plan for each project would be to quantify the mass flow rate of specified hazardous air pollutants emitted to the ambient air-both before and after installation of the clean coal technology. A secondary purpose is to quantify the removal of these pollutants both upstream and downstream of various pollution control subsystems, such as sorbent injection or advanced scrubbers. For baseline tests, data would be obtained from the coal feed, at the flue gas leaving the air preheater, and as the stack gas enters the atmosphere. For a typical clean coal demonstration, additional monitoring would be done of the desulfurization sorbent, the make-up water to SO_2 removal, and the flue gas from the precipitator.

Results from all monitoring at Clean Coal projects will provide valuable input to the EPA study. Data from these efforts will also help utilities assess the value of various clean coal technologies—in terms of their effect on both acid rain-causing emissions and toxic air pollutants. ■



Demonstration Operation Streams to be Monitored.

Status of Clean Coal Technology Demonstration Projects

EER Corporation. Enhancing the Use of Coals by Gas Reburning and Sorbent Injection. (Hennepin and Springfield, IL)
The Hennepin site has achieved 400 total hours of operation with approximately 360 hours at maximum capacity. Average reduction of NO_x has been 65%, with a maximum reduction of 77%. Long term testing at Hennepin is scheduled to begin January 1992. Mechanical construction at the Lakeside site should be completed in January as well, allowing checkout activities to begin.

Babcock & Wilcox. LIMB/Coolside Demonstration Project. (Lorain, OH)
This project is essentially complete. Up to 70% SO_2 removal has been achieved by both LIMB and Coolside processes. Data reduction and Final Report preparation remain.

Colorado-Ute Electric Assn. Nucla CFB Demonstration Project. (Nucla, CO)
The project has completed the scheduled two-year testing program. DOE received the final report in December 1991. Additional technical and economic evaluation reports will be delivered in February 1992.

American Electric Power. Tidd PFBC Demonstration Project. (Brilliant, OH)
More than 900 hours of coal-fired operation have been logged. The plant resumed operations in December following a scheduled 11 week outage for maintenance and sub-system modifications.

Rosebud Syncoal Part. Advanced Coal Conversion Process Demonstration. (Colstrip, MT)
Construction is nearing completion with operations scheduled for late January 1992.

CQ, Inc. Coal Quality Expert. (Homer City, PA)
Utility scale combustion tests in combination with smaller scale tests to determine correlations have been conducted on selected Wyoming, Montana, Oklahoma, Illinois, and Kentucky coals. Acid Rain Advisor BETA testing has been completed with commercial release expected in January 1992.

The City of Tallahassee. Arvah B. Hopkins Circulating Fluidized Bed Repowering Project. (Tallahassee, FL)
An alternative site has been proposed to DOE for consideration and approval.

Pure Air. Advanced Flue Gas Desulfurization Demonstration Project. (Gary, IN)
Design is essentially complete and construction is more than 83% complete. Resin lining of the SO_2 absorber is complete. Recovery is complete from ground subsidence in July following collapse of a Bailly power plant cooling water line.

Southern Co. Services. NO_x Reduction for Tangential-Fired Boilers. (Lynn Haven, FL)
Operating the Low NO_x Concentric Firing System (LNCFS) Level II equipment (one of three basic air/coal feed configurations to be tested) indicated NO_x reductions of up to 35% compared to baseline. This testing ended in September 1991. LNCFS Level III system was installed and performance tests were completed December 20, 1991, with preliminary results indicating NO_x emission reduced up to 48% at full load. Long-term testing is to follow.

Southern Co. Services. NO_x Reduction for Wall-Fired Boilers. (Coosa, GA)
Long-term testing of Advanced Overfire Air (AOFA) at Plant Hammond Unit NO. 4 has been completed with 80 days of data collected. Statistically reliable data indicate, depending upon load, a NO_x reduction of 24%. Long-term testing of the Low NO_x burners continues with 94 days of data collected as of December 18, 1991. A 47% reduction of NO_x at full load was indicated.

Passamaquoddy Tribe. Cement Kiln Flue Gas Recovery Scrubber. (Thomaston, ME)
Demonstration operations resumed in August with the unit achieving 1500 hours of operation prior to the January 1992 winter shutdown. SO_2 emission reductions have averaged 95% with a maximum value of 98% being obtained.

Babcock & Wilcox Co. Coal Reburning for NO_x Control. (Cassville, WI)
Installation of the coal reburn system equipment was completed during a scheduled boiler outage in September and October 1991. Check out and shakedown of the new system began in November 1991. Coal was fed to the reburn system and coal flames established on December 4, 1991. Start-up activities are in progress and testing will continue through 1992.

Bethlehem Steel Corp. Coke Oven Gas Cleaning System. (Sparrows Point, MD)
Construction was completed on December 6, 1991. Hot commissioning will be postponed for at least two years to allow for rehabilitation of the coke ovens.

Southern Co. Services. Chiyoda Thoroughbred-121 FGD Process. (Newnan, GA)
Construction activitiy continues. Internals have been installed in the jet-bubbling reactor (JBR) and the agitator has been mounted. Complete hydrostatic/acoustical test report for the JBR and slurry tanks will be available in January 1992.

ABB Combustion Engineering. IGCC Repowering Project. (Springfield, IL)
Interim reports have been submitted summarizing the 1/2 scale gasifier cold flow model tests and dense phase coal transport studies. The project has proceeded into the preliminary design activities phase.

American Electric Power Service Corp. PFBC Utility Demonstration Project. (New Haven, WV)
A revised project implementation plan has been approved. The project will proceed with a four year value engineering and preliminary design study for a greenfield plant. The site will shift from the Sporn Plant to the adjoining Mountaineer Plant.

Southern Co. Services. SCR for High-Sulfur Coal Boilers. (Pensacola, FL)
Final design work continues on the control room, ductwork, reactors, and electrical and control items. Evaluation of vendor bids hs been completed for the gas sampling system, testing services, and other equipment. Evaluation continues on ammonia storage and injection systems and reactor sootblowers. Seven suppliers of nine catalysts have been selected. The process has begun to replace one of the catalyst suppliers that dropped out of the project.

Babcock & Wilcox Co. SNRB Flue Gas Clean-Up Project. (Dilles Bottom, OH)
Design work has been completed. Construction nears completion. Startup is planned for February 1992.

ABB Combustion Engineering. SNO_x Flue Gas Cleanup Project. (Niles, OH)
Construction has been completed. Initial start-up of the various components and systems began in February1992.

Bethlehem Steel Corp. Blast Furnace Granulated Coal Injection. (Burns Harbor, IN)
Process design and detailed engineering are continuing including work on the coal injection facilities and blast furnace injectors. Bethlehem Steel is continuing negotiations with British Steel Consultants, Ltd. to establish a formal license agreement for the BFGCI technology.

Bechtel Corp. Confined Zone Dispersion FGD Project. (Indiana County, PA)
Construction has been completed. The lime slurry injection tests were completed in November 1991, using Type S dolomitic lime resulting in SO_2 reductions of up to 40%.

AirPol, Inc. Gas Suspension Absorption Project. (Paducah, KY)
Design related activities are continuing. A new operations date of October 1992 has been established due to a one year delay in the availability of the TVA test site.

Alaska Industrial Development Authority. Healy Clean Coal Project. (Healy, AK)
The TRW slagging combustor has been successfully demonstrated at their Cleveland, OH facility. Project design work continues.

Public Service Co. of CO. Integrated Dry NO_x/SO_2 Control System. (Denver, CO.)
Construction began in August 1991 with work on the urea system foundation. Engineering work continues on all systems and construction activity will increase as equipment items arrive on site. Construction will continue until late-1992. Baseline boiler testing was completed.

Clean Power Cogeneration, Inc. Air-Blown/Integrated Gasification Combined Cycle Project. (Tampa, FL)
CPC has redefined project baselines to incorporate the 120 MWe IGCC project into Tampa Electric's expansion plan.

LIFAC N. America. LIFAC Sorbent Injection Desulfurization Demonstration Project. (Richmond, IN)
All original design activities are complete. Enhanced design features have been proposed and are under consideration. All plant tie-ins were successfully completed during the scheduled March 1991 outage. The balance of the LIFAC equipment can be installed without impacting plant operations. All long-lead procurement activities are completed. Construction is now in progress with pile driving being completed in December 1991.

Air Products and Chemicals, Inc. Liquid Phase Methanol Process. (Daggett, CA)
Negotiations for a cooperative agreement are nearing completion.

Babcock & Wilcox, Inc. Low-NO_x Cell Burner Retrofit. (Aberdeen. OH)
All 24 sets of low-NO_x cell burners and NO_x ports have been installed at Dayton Power & Light, Aberdeen, OH. The outage for this work was completed in November 1991. Preliminiary testing completed in December demonstrated NO_x reductions up to 45%.

ENCOAL Corp. Mild Gasification Project. (Gillette. WY)
Construction is proceeding ahead of the baseline schedule with all feedstock, handling and product silos completed, and erection of the main process derived fuel building at the 18th floor.

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)
Preliminary design and process definition activities are continuing.

Energy and Environmental Research Corp. Gas Reburning and Low-NO_x Burners on Wall-Fired Boiler. (Denver. CO)
Necessary retrofit work was completed during the scheduled Cherokee Station outage that ended in October 1991. Construction activities continue.

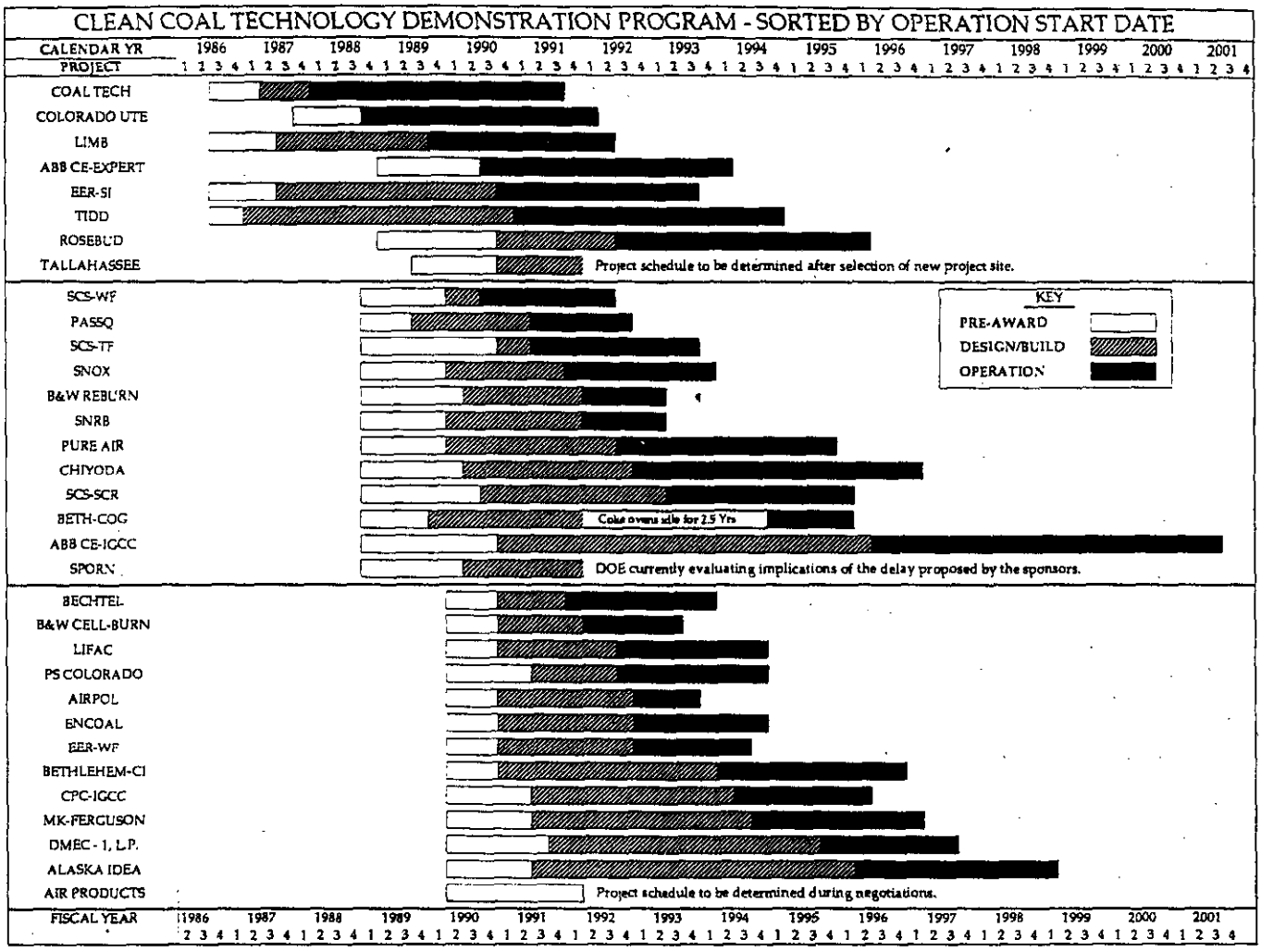
Upcoming Events

Date	Event	Contact
February 24-27, 1992	International Conference on the Clean & Efficient Use of Coal: The New Era for Low-Rank Coal, Budapest, Hungary	USA TMS 301-353-0102
April 28- May 1, 1992	17th International Conference on Coal Utilization & Slurry Technologies, Sheraton Sand Key, Clearwater, FL	L.A. Ruth 412-892-4461
July 26-31, 1992	Coal Preparation, Utilization, and Environmental Control Conference, Westin William Penn, Pittsburgh, PA	R.E. Hucko 412-892-6133
September 15-17,1992	Twelth Annual Gasification and Gas Stream Cleanup Systems Contractors Review Meeting, Morgantown Energy Technology Center, Morgantown, WV	METC Conf. Svcs. 304-291-4108
September 22-24, 1992	Liquefaction Contractor's Review, Westin William Penn, Pittsburgh, PA	G.V. McGurl 412-892-4462

Clean Coal Technology Conference

The U.S. Department of Energy's Clean Coal Technology (CCT) Program is considering holding a "Clean Coal Technology Conference." The objective of this event would be for the Department of Energy and the industry sponsors in the CCT Program to present and disseminate status information and project data for the 42 active projects in the CCT Program. At the present time, 3 of these projects have completed operation and another 10 are operating. The intended audience would be technology users, utility representatives and vendors, equipment manufacturers, state and federal legislative and regulatory bodies, environmental organizations, etc.

At this time, the CCT program is soliciting informal remarks on interest in this type of event. If you would be interested in attending this event, please check "yes" on the address verification postcard enclosed with this newsletter. If you would like to discuss the event further, please contact Ms. Denise H. Calore, U.S. Department of Energy, FE-22, 1000 Independence Avenue, SW, Washington, DC 20585 (703-235-2623).



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

before, nearly 100 government and industry officials from the U.S. and Europe gathered at the plant site to dedicate the new 35 megawatt slipstream facility.

In December, **ENCOAL Corporation** announced that it had its first contracts in place for the sale of two of the new clean fuels that will be produced at its plant near the Triton Mine in Gillette, Wyoming. **Wisconsin Power & Light** wants 30,000 tons of the solid "process derived fuel" while **TEXPAR Energy, Inc.** of Waukesha, Wisconsin has agreed to buy up to 135,000 barrels a year of the new, low-sulfur coal-derived liquid fuel for use in both utility and industrial boilers.

Also in December, **Babcock & Wilcox** began initial operational checks of the new coal reburning system on the 100 megawatt cyclone boiler at Wisconsin Power & Light's plant near Cassville, WI. Look for initial performance results early this year.

Good news continues to be reported from Hennepin, Illinois where **EER, Inc.** is testing its gas reburning/sorbent injection system. Early results from the long-term tests show that NO_x emissions can be cut by 77 percent—better than expected—while SO_2 emissions are 57 percent lower than before the tests began. . . .

During November, a year long series of tests began at the **NOXSO** 5 MW test facility located at Ohio Edison's Toronto Station. These design verification tests support the full scale demonstration of the NOXSO process at Ohio Edison's Niles Station under the Clean Coal Technology program.

DOE's 20 foot main **Clean Coal Technology Exhibit** was featured at the ICCR Conference in October and the following month at the Power Supply USA Exhibition, both in Washington, DC. The exhibit then travelled to Tampa, Florida where it was part of Power Gen '91. . . . A smaller exhibit focusing on specific projects and technologies went to the Pittsburgh Coal Conference, the Virginia Coal Council in Norfolk, and the Lignite Council in Bismarck, North Dakota. all in October; the November Clean Coal Public Meeting in Louisville. and, in December, the SO_2 Symposium in Washington, DC and the Council of State Governments which met in Newport, Rhode Island...DOE's Education Exhibit, "Dinosaurs and Power Plants."—accompanied with school curriculum material—travelled to National Science Teachers Association meetings in Vancouver, BC, Reno, NV, and New Orleans, LA. If you are aware of a meeting that could benefit from one of the three DOE Clean Coal exhibits, please contact Denise Calore at (703) 235-2623. ■

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.

Dec 91 DOE/FE-0242P Proposals received in Response to the Clean Coal Technology IV Program Opportunity Notice

Jan 92 DOE/FE-0243P Commercial Scale Demonstration of the Liquid Phase Methanol (LPMEOH™) Process

The following papers, authored by DOE employees or CCT participants, have been delivered at recent conferences. Copies are available from the authors. For further information, contact the Office of Clean Coal Technology at 703-235-2623.

"Combustion Engineering IGCC Repowering Project." Herbert E. Andrus, Jr.; *Eleventh Annual Gasification and Gas Stream Cleanup Systems Contrtactors Review Meeting, Morgantown, WV,* August 1991.

"Overview of Advanced Coal Combustion and Conversion Clean Coal Technology Demonstration Program." William T. Langan and Gary R. Friggens, Morgantown Energy Technology Center; *ASME International Joint Power Generation Conference, San Diego, CA,* October 1991.

"Update on the Nucla CFB Clean Coal Demonstration Project." M.A. Friedman, Combustion Systems, Inc., et al.; *ASME International Joint Power Generation Conference, San Diego, CA,* October 1991.

"Des Moines Energy Center PCFB Repowering Project." Steve Ambrose and Gary Kruempel, Iowa Power, and Neil Kennebeck, Dairyland Power; *ASME International Joint Power Generation Conference, San Diego, CA,* October 1991.

"Current Status of Design and Construction of ENCOAL Mild Gasification Plant." James P. Frederick, ENCOAL Corp.; *ASME International Joint Power Generation Conference, San Diego, CA.* October 1991.

"Integrating a CFB Boiler into an Existing Central Station." William T. Caudle, Bechtel Corp.; J. Mark Hobday, U.S. Department of Energy; and Gary S. Brinkworth, City of Tallahassee (Florida); *ASME International Joint Power Generation Conference, San Diego, CA.* October 1991.

"Integrated Gasification Combined Cycle Projects in the Clean Coal Technology Program." Dale K. Schmidt and Luke H. Rogers, Morgantown Energy Technology Center; *ASME International Joint Power Generation Conference, San Diego, CA,* October 1991.

"Coal Gasification for Power Generation." M. Rao Gogineni, H.E. Andrus, Jr., and P.R. Thibeault, Combustion Engineering, Inc.; and L.A. Frasco, City of Springfield (Illinois); *Pittsburgh Coal Conference, Pittsburgh PA,* October 1991.

"Initial Operation of the Tidd PFBC Demonstration Plant." J.E. Hollback and D.A. Bauer, American Electric Power Service Corporation; *Pittsburgh Coal Conference, Pittsburgh PA,* October 1991.

"Coal Gasification for Power Generation." M. Rao Gogineni, H.E. Andrus, Jr., and P.R. Thibeault, Combustion Engineering, Inc.; and L.A. Frasco, City of Springfield (Illinois); *Tenth EPRI Annual Conference on Gasification Power Plants, San Francisco , CA.* October 1991.

"The Wabash River Coal Gasification Repowering Project." D.G. Sundstrom, Destec Energy, Inc.; and J.U. Bott, PSI Energy, Inc.; *Tenth EPRI Annual Conference on Gasification Power Plants, San Francisco , CA.* October 1991.