

Clean Coal Today

An Update of the U.S. Clean Coal Technology Demonstration Program

Office of Fossil Energy, U.S. Department of Energy

Nine New Clean Coal Technology Projects Selected In Fourth Round of Competition

Clean Coal Briefs

Highlights of this past quarter of the Clean Coal Technology Demonstration Program include the addition of nine new projects selected for funding under the fourth round of competition, a new \$203 million cooperative agreement for a pressurized circulating fluidized bed combustion plant in Des Moines, Iowa, and the kick-off of next year's planned fifth round with the announcement of public meetings (see separate stories for details).

The 42 government-industry projects now in the Clean Coal Program family—with a total value exceeding \$4.6 billion—continue to progress, attracting wide attention from elected officials, the international community, and the news media, while preparing to help the nation comply with the new Clean Air Act requirements as effectively and efficiently as possible.

AEP's Tidd Plant continued to pave the way for commercial development

See "Briefs" on page 11

In This Issue

New Projects	1
Round V Update	3
Syncoal Project	4
Iowa Project	5
WSA-SNOx Project	6
Project Status	8
Upcoming Events	12
Reports	12

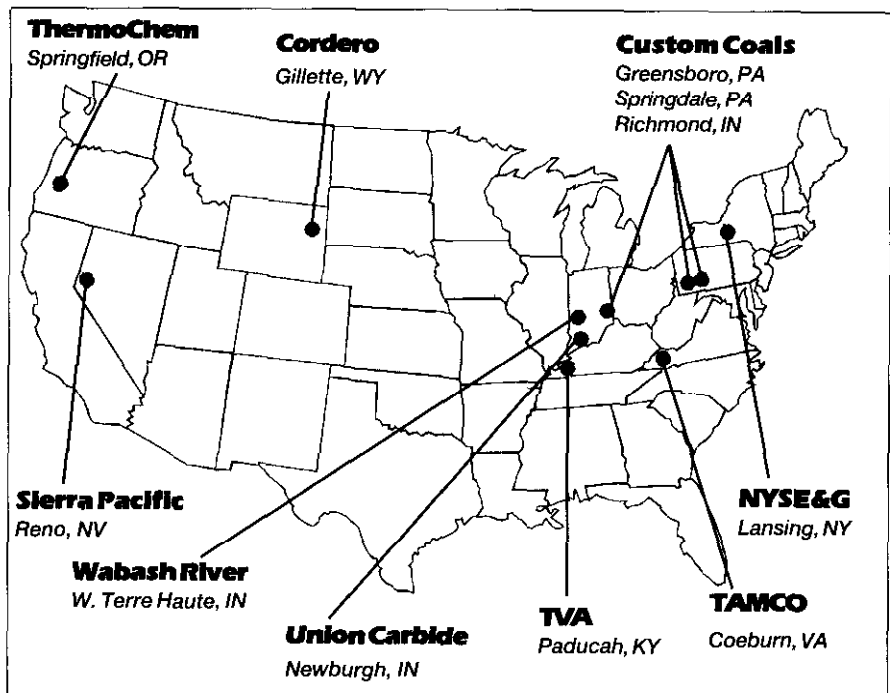
The U.S. Department of Energy has named nine new projects as its top choices in the fourth round of the multi-billion dollar Clean Coal Technology Program.

Acting Assistant Secretary for Fossil Energy Linda G. Stuntz announced the selections September 12, calling the choices "key additions to a program that is preeminent among the coal initiatives of the President's *National Energy Strategy*."

The selected projects have a combined value of nearly \$1.5 billion. Together with 33 other active ventures selected in earlier competitions, they bring the total government-industry investment in clean coal technology demonstrations to \$4.6 billion, 60 percent of which is funded by private companies and states.

"Today's action moves us closer to our goal of having in place a full complement of 'showcase' demonstration plants that I believe represent the future new look of the nation's coal-fired power industry," said Energy Secretary James D. Watkins. "Many of the technologies virtually eliminate the major pollutants commonly associated with acid rain, and several offer the dual benefits of superior environmental performance coupled with more efficient, lower cost power generation. These are the technologies that can brighten our nation's energy future without compromising our commitment to a cleaner, healthier environment."

See "Projects" on page 2



New CCT-IV Proposed Project Sites

Projects...continued from pg. 1

Included in the selection are three large-scale, high-efficiency electricity generating projects that DOE expects will help form the basis for a new generation of 21st century power plants. The integrated coal gasification combined cycle technologies to be used in these projects are expected to produce as much as 25 percent more electricity from a given amount of coal than today's conventional coal-burning methods. In addition, they remove almost all of the pollutants known to cause acid rain.

The three account for nearly 75 percent of the approximately \$568 million in federal funds to be shared by the nine selected projects, pending successful negotiations.

DOE had announced last January in issuing its call for proposals that it would give extra consideration to projects that increase the efficiency of coal-based energy systems. Boosting efficiency can not only reduce energy costs to consumers but is one of the principal ways for reducing gases that might contribute to global climate change.

"A common feature of virtually every new technology supported by the *National Energy Strategy* is its potential to more efficiently transform energy raw materials into the energy services we need. These clean coal technology projects reflect that commitment to greater energy efficiency in the generation of electricity," Watkins said.

Also included are four projects that will demonstrate high-performance pollution control devices that can be added to existing or new power stations. Each of these advanced devices will be capable of meeting the nation's more stringent sulfur and nitrogen pollutant controls required by the *Clean Air Act Amendments of 1990*.

Two other projects will demonstrate techniques to change coal into new, cleaner burning fuel forms that can be used in a variety of power generating, industrial or other energy applications.

DOE received 33 clean coal technology proposals last May. Since then, a team of nearly 100 federal officials,

headed by an eight-member "source evaluation board," reviewed the proposals. The board scored such factors as technical readiness, environmental performance, improved efficiency and the proposer's commitment and capability to jointly finance the venture.

After reviewing the board's evaluation report, DOE's Deputy Assistant Secretary for Coal Technology, Jack S. Siegel, made the final selections.

"The projects we have selected are the best of perhaps our strongest slate yet of clean coal proposals," Stuntz said.

The new projects are located in eight states. In all, the Clean Coal Technology Program is sponsoring 42 ventures in 22 states.

"The projects we have selected are the best of perhaps our strongest slate yet of clean coal proposals"

*Linda G. Stuntz,
Acting Assistant Secretary for
Fossil Energy*

The total federal assistance sought by the nine winning proposers exceeds the \$568 million DOE has allotted for the competition. The department, however, expects to negotiate changes in certain projects, such as excluding certain ancillary hardware and reducing the length of operating times for certain projects, to bring costs down to the available level.

While definitive agreements for the newly-selected projects are being negotiated—DOE has allotted a year to complete the talks—preparations are underway for the fifth and final round of the Clean Coal Technology Program.

The nine new projects are briefly described below. Both DOE proposed cost share and project costs are "as proposed" and subject to negotiation.

High Efficiency Power Generating Projects

Wabash River Coal Gasification Repowering Project, West Terre Haute, IN, \$591.9 million, 41% DOE share, joint venture of Destec Energy, Inc., Houston, TX and PSI Energy Inc., Plainfield, IN. The project will repower one of six units at PSI Energy, Inc.'s Wabash River Generating Station, using a single train, oxygen blown Destec gasification plant, and the existing steam turbine, in a new integrated gasification combined cycle (IGCC) configuration to produce 265 MWe net of electricity from 2500 tons/day of high sulfur eastern bituminous coal.

Toms Creek IGCC Demonstration Project, Coeburn, VA, \$219.1 million, 49.7% DOE share, partnership of Tampella Power Corp., Williamsport, PA, and Coastal Power Production Co., Roanoke, VA. The project will be a new 107 MWe (55 MWe net coal based) IGCC power plant facility located at an existing coal mine. A single air blown, U-Gas fluidized bed gasifier—430 tons/day local bituminous coal—with hot gas cleanup (regenerative zinc titanate fluid beds and gasifier limestone injection for sulfur removal, high temperature candle filters for particulate removal) will be demonstrated. Power will be generated with two gas turbines, (one coal gas fired, the other natural gas fired), and one steam turbine.

Piñon Pine IGCC Power Project, near Reno, NV, \$340.7 million, 50% DOE share, Sierra Pacific Power Co., Reno, NV will own the facility. The project will be a new 80 MWe IGCC plant located at an existing Sierra Pacific facility. A single air blown, KRW fluidized bed gasifier—800 tons/day western bituminous coal—with hot gas cleanup (gasifier limestone injection with zinc ferrite fixed bed reactors for sulfur removal, high temperature candle filters for particulate removal) will be demonstrated. Power will be generated with dedicated combustion and steam turbines.

See "Projects" on page 3

High Performance Pollution Control Technologies

Demonstration of the Union Carbide CANSOLV Process at the ALCOA Corporation Warrick Power Plant, Newburgh, IN, \$32.7 million, 50% DOE share, Union Carbide Chemicals and Plastics Inc., Danbury, CT is the proposer. The CANSOLV process is a regenerable system that removes SO_2 from a flue gas stream by contact of the gas with an aqueous amine absorbent. The absorbent is regenerated thermally and the SO_3 is recovered as a marketable liquid. The retrofit scrubber will be installed in a flue gas duct (75 MWe capacity) at the ALCOA power plant.

Custom Coals International - Self Scrubbing Coal, various sites, \$76.1 million, 50% DOE share, Custom Coals International is a joint venture of Duquesne Ventures (subsidiary of Duquesne Light), Pittsburgh, PA and Genesis Research Corp., Carefree, AZ. The Self-Scrubbing Coal technology involves the integration of advanced physical coal cleaning with coal sorbent reconstitution techniques to produce a coal based fuel to meet an emission limit of 1.2 lbs SO_2 /MMBtu. This is termed a "Carefree Coal." The coal will be produced at Duquesne Light's Greensboro, PA coal cleaning plant, and test-burns of the product will be conducted at Duquesne Light and Rich-

mond Power & Light electric generating facilities.

Milliken Clean Coal Technology Demonstration Project, Lansing, NY, \$158.6 million, 40.7% DOE share, New York State Electric & Gas Corporation is the proposer. The project will demonstrate a combination of cost effective emission reduction and efficiency improvement technologies (formic acid enhanced wet limestone scrubbing, Stebbins tile-lined split module absorber, NO_xOUT urea injection system for NO_x removal, and a heat pipe air heater system).

Micronized Coal Reburning Demonstration for NO_x Control on a 175 MWe Wall-fired Unit, Paducah, KY, \$7.3 million, 48% DOE share, Tennessee Valley Authority, Knoxville, TN is the proposer. The project will demonstrate the reduction of NO_x emissions by the retrofit of coal reburning on an existing wall-fired boiler at the TVA Shawnee Fossil Plant. A low sulfur eastern bituminous coal, micronized (80% less than 325 mesh), will be fired in the boiler up to 30% of total fuel feed. NO_x emissions are expected to be reduced by 50-60%.

New Fuel Forms of Coal

Demonstration of Pulse Combustion in an Application for Steam Gasification of Coal, Springfield, OR, \$37.3 million, 50% DOE share, ThermoChem, Inc., Columbia, MD is the proposer. The project will demonstrate a pulse combustor from Manufacturing and Technology Conversion International Inc. (MCTI), Columbia, MD in an application for steam gasification of coal at Weyerhaeuser Paper Company's Containerboard Division mill, to produce fuel gas and steam to replace existing hog fuel boilers. The MCTI process incorporates an innovative indirect heating process provided by multiple resonance tube pulse combustors immersed in a fluidized bed of coal. Approximately 429 tons/day of Wyodak western sub-bituminous coal will be processed.

Cordero Coal Upgrading Demonstration Project, Gillette, WY, \$34.3 million, 50% DOE share, Cordero Mining Co., Gillette, WY is the proposer. The project will demonstrate the Carbontech Syncoal Process to upgrade high moisture, low rank coals. The technology consists of a two-stage drying process. In the first stage, hot fuel oils drive moisture from the coal. Hot flue gas in the second stage completes the drying of the oil coated coal to produce a high heating value, moisture repellent, attrition and dusting resistant and spontaneous combustion resistant solid fuel. About 1,200 tons of Wyodak seam western sub-bituminous coal will be processed. ■

Round V Update

The fifth round of the Clean Coal Technology Program will be held in 1992.

The Office of Clean Coal Technology is planning two public meetings to obtain the views and recommendations of the public on the proposed goals of the CCT-V program. The CCT-V program will generally be directed at significantly advancing the efficiency and environmental performance of coal technologies and advance the commercial acceptance of coal as a source of clean energy after the turn of the century.

The first public meeting will be in Cheyenne, Wyoming, at Little America (800-445-6945), at 8:30 a.m., on Wednesday, October 30, 1991; the second public meeting will be in Louisville, Kentucky, at the Galt House Hotel (800-843-4258), at 8:30 a.m., on Tuesday, November 12, 1991. For additional details contact J. Lerch at 301-353-3965. ■

Clean Coal Today

Published quarterly by
The Office of Clean Coal Technology
U.S. Department of Energy
Washington, D.C. 20585

Editor: Arvid Strom
Assoc. Editor: Mary Jo Zacchero
Assoc. Editor: Phoebe Hamill

Comments are welcome.
Please submit these to the
Editor (FE-22) or
Mary Jo Zacchero
(202) 586-6503

Montana Plant to Open New Markets for Plentiful Low-Rank Coals

Rosebud Syncoal Plant Well Ahead of Schedule

Being built within one of the nation's largest coal mines is a clean coal technology project—called the Rosebud Syncoal Demonstration plant—that will produce a versatile fuel alternative for many utilities as they face even the strictest requirements of the 1990 Clean Air Amendments. Now known as "syncoal," the process is designed to enhance the value of vast supplies of Powder River Basin and other low-rank coals by reducing moisture, ash, and sulfur content while boosting heating value and avoiding moisture reabsorption.

The Rosebud Syncoal Partnership

Western Energy Co. developed the technology and originally signed a cooperative agreement with DOE to build the \$69 million demonstration plant under the first round of the Clean Coal Technology program. Subsequently, Western Energy joined with the NRG Group (a subsidiary of Northern States Power Company), to form the Rosebud Syncoal Partnership. This partnership

now owns the technology and will manage the demonstration project and future commercialization activities.

Not only did the new partnership provide additional financial strength to the demonstration effort, but it allowed it to offer the full range of technical support encompassing all aspects of coal mining, transportation and utilization. Western Energy (a subsidiary of Montana Power Co.) remains responsible for building and operating the demonstration facility.

Strong corporate financial backing has also helped increase the pace for building the demonstration plant, now a full 9 months ahead of schedule.

Product to be Test-Burned at Utility Sites

When operating continuously, the demonstration plant will produce 1,000 tons per day (up to 300,000 tons per year) of syncoal product. The plant will be adjacent to and fully integrated with a unit train facility and an active stockpile that can hold up to 90,000 tons of coal, allowing easy shipment.

During a planned 3-year test period, the product will be sold and shipped to

utilities for test burning. Six test burns have already been scheduled with mid-west utilities.

When complete, the Colstrip, MT demonstration plant (which includes some commercial-scale equipment) will be about one-tenth the size of a commercial plant which could produce up to 3 million tons of product per year. A full sized plant will consist of multiple process trains.

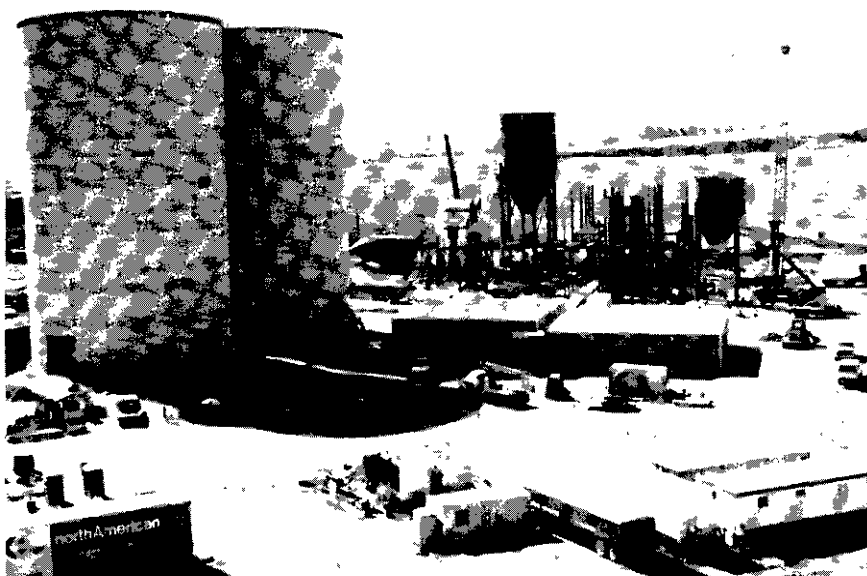
Earlier pilot plant tests (sized at 200 lbs per hour) confirmed the potential of syncoal. In these tests, Syncoal from Rosebud seam sub-bituminous coal was tested for storage, handling, transportation and combustion characteristics. Results have shown a high BTU product that is not only low in sulfur, but also devoid of characteristics that have impaired the marketability of low rank coals—moisture, ash slagging potential, and coal abrasiveness. Syncoal is a stable product with less than 5 percent moisture, sulfur content as low as .5 percent, ash content of about 9 percent, and a heating value up to 11,800 BTUs per pound.

The Three Step Process

There are three major steps to the syncoal process: 1) thermal treatment of the coal in an inert atmosphere, 2) inert gas cooling of the hot coal, and 3) removal of ash minerals.

During the thermal treatment process, raw coal from the stockpile is screened and fed into a two-stage thermal processing system. In the first vibratory fluidized bed reactor, surface water is removed from the coal by heating it with hot combustion gas. When coal exits this reactor, its temperature is slightly higher than that required to evaporate water. Coal is further heated in a second reactor, removing pore water and promoting decarboxylation. Here, particle shrinkage causes fracturing, destroys moisture reaction sites

See "Syncoal" on page 5



Overview of syncoal facility under construction at the Rosebud Mine, Colstrip, MT. Left: Syncoal product silos, each 6,000 tons capacity.

Des Moines, Iowa Greets New Clean Coal Plant

and separates out the coal ash minerals.

The coal then enters the coal cooler, where it is cooled to less than 150 degrees Fahrenheit by contact with an inert gas (carbon dioxide and nitrogen at 100 degrees Fahrenheit) in a vibratory fluidized bed cooler.

In the last stage, the coal cleaning system, cooled coal is fed to deep bed stratifiers where air velocity and vibration separate mineral matter from the coal with rough gravity separation. The light fractions are sent to a conveyor while heavier fractions go to fluidized bed separators for additional ash removal. Fines from various parts of the cleaning process are collected in baghouses and cyclones, made into briquettes, and sent to storage silos as part of the final product.

Following groundbreaking last March, construction has moved quickly and is now 80 percent complete. Two 6,000 ton product storage silos, the main coal processing facility, and auxiliary buildings including a main administration building with the control room, have been erected.

Start-up tests of the new plant are expected to begin by the end of the calendar year. Normal operations will follow in early 1992, with the overall project scheduled for completion by 1996. ■

The latest addition to the Clean Coal Technology program will be an important link between first and second generation high-efficiency systems that are just over the horizon.

On August 1, DOE signed a \$203 million cooperative agreement with the DMEC-1 Limited Partnership, a partnership between Dairyland Power Cooperative and Iowa Power, Inc. The agreement calls for relocating the project from its originally planned site in Alma, Wisconsin over to Iowa Power's Des Moines Energy Center in Pleasant Hill, Iowa. There, an idle boiler will be repowered with the new PCFB system, making the Des Moines site a worldwide showcase for one of the most advanced, cleanest, and efficient coal-burning systems.

PCFB technology—marketed by Pyropower Corp. of San Diego,—combines the best features of two fluidized bed combustion systems that are already being demonstrated in the Clean Coal Program. Like the 70 megawatt pressurized combustion system now operating at Ohio Power's Tidd station, the PCFB system combines steam and gas turbines in a combined-cycle configuration that enhances overall plant efficiency. And, like the 110 megawatt

circulating unit in Nucla, Colorado, PCFB uses a circulating bed of solids rather than a bubbling bed.

In another significant advance, the system will feature an optional oil or gas fired topping cycle that can further improve the system's operating efficiencies.

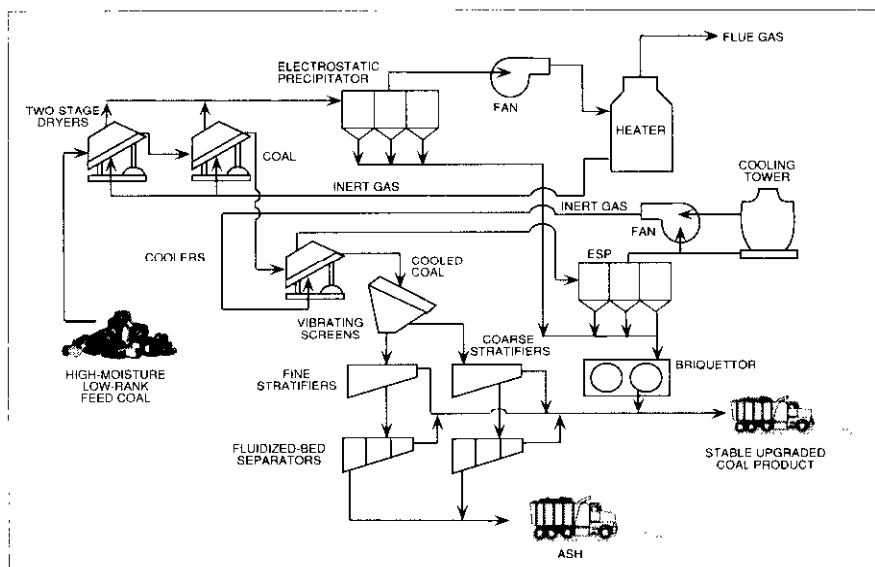
When complete, the 70 megawatt DMEC unit will be the world's largest—and first utility scale—demonstration of Pyropower's PCFB technology.

Crushed coal is combined with water to make a coal-water paste that is fed into the combustor along with a limestone or dolomite sorbent to control SO₂ emissions. Steam generated within the pressure vessel is used to produce most of the plant's electrical output. Particulates in the hot gases leaving the combustor are captured in a high-temperature cyclone separator and a ceramic filter and recycled back into the boiler.

Use of an advanced hot gas cleaning unit, another PCFB first, is expected to remove 99.9 percent of the particulates upstream of the gas turbine. The cleaned gases are sent to the gas turbine, producing the rest of the system's power output (about 25%). The optional topping cycle upstream of the gas turbine can be used to raise the gas temperature before it enters the gas turbine. Higher inlet temperatures mean more power produced in the gas turbine. Such systems could eventually attain overall efficiencies of nearly 45 percent.

In addition to economic and efficiency advantages, the plant will be extremely clean-burning. Emissions of both SO_x and NO_x will be significantly below the limits required under current law.

The PCFB is expected to be attractive in both repowering and greenfield markets. At an estimated cost of about 10 percent less than a conventional pulverized coal plant with a scrubber, the system also offers inherently higher efficiencies. ■



Syncoal Process Schematic

WSA-SNO_x Offers Multiple Pollutant Capture, Efficiency, Salable Byproducts

Construction of First U.S. Demonstration Nears Completion

A single process that captures high levels of both sulfur dioxide and nitrogen oxide pollutants from coal combustion gases, turns potential solid wastes into a valuable chemical byproduct that can be sold to offset costs, and places little or no drain on power plant's efficiency—all that may sound too good to be true. But at Ohio Edison's Niles Station in Trumbull County, Ohio, construction workers are in the last stages of building a clean coal technology project that can do just that.

Called WSA-SNO_x, the technology will receive its first U.S. trials in a \$31.4 million project being conducted by Asea Brown Boveri (ABB) and Snamprogetti, USA under the second round of the Clean Coal Technology Program. The Ohio demonstration will treat a 35 megawatt slipstream of flue gas—a size that would be typical of a single commercial module—from Unit 2 of the Niles station which burns an average 3.2 percent sulfur coal. The WSA-SNO_x unit is expected to capture 95% of the SO₂ and over 90% of the NO_x. Its byproducts are commercial grade sulfuric acid and us-

able heat. The process creates no need for solid waste treatment or disposal.

The WSA technology is the culmination of more than 25 years of research and development in Europe. Haldor Topsoe A/S, an affiliate of Snamprogetti, developed the technology and licensed it to ABB for use in North America. While several commercial systems are under construction or in early operation on power plants and industrial plants in Europe, U.S. utilities are anxiously awaiting its first trials with U.S. coals.

WSA SNO_x Combines Three Distinct Processes

The WSA SNO_x advanced technology is actually a combination of three distinct steps. First, an initial catalytic reaction changes NO_x to harmless atmospheric nitrogen and water vapor. In a second catalytic reaction sulfur dioxide is converted into sulfur trioxide vapor (SO₃), and—in the heart of the process—a “WSA” tower that condenses that vapor into commercially useable sulfuric acid.

In the WSA-SNO_x process, flue gas containing NO_x and SO₂ is first processed through particulate removal equipment, such as a high efficiency

fabric filter baghouse. This minimizes the need to clean downstream catalytic equipment. After the gas is heated to reaction temperature, a small quantity of ammonia is injected into the flue gas. This mixture passes through a NO_x reactor, and nitrogen oxides are converted to nitrogen and water vapor.

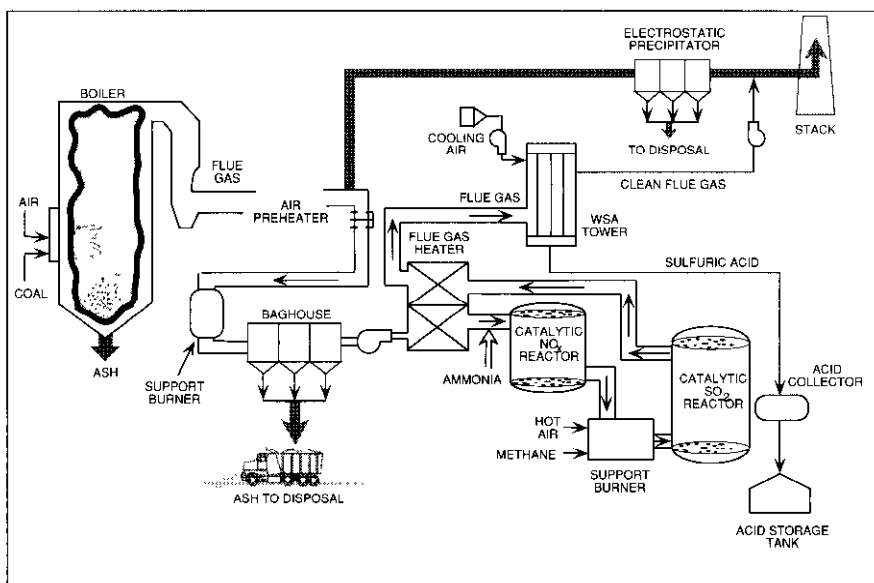
The NO_x-free gas is again heated and processed through a second reactor where SO₂ is converted to SO₃, then cooled by the gases coming to the NO_x reactor and passes through the novel, glass-tube condenser called the “WSA tower” where marketable, high-concentration sulfuric acid is formed.

No wastes form as a result of capturing pollutants with this process. Unconverted ammonia, carbon monoxide and hydrocarbons are oxidized in the SO₂ reactor. Essentially all remaining particulates are retained in the reactor's catalyst bed.

Unique WSA-Tower the Heart of the Process

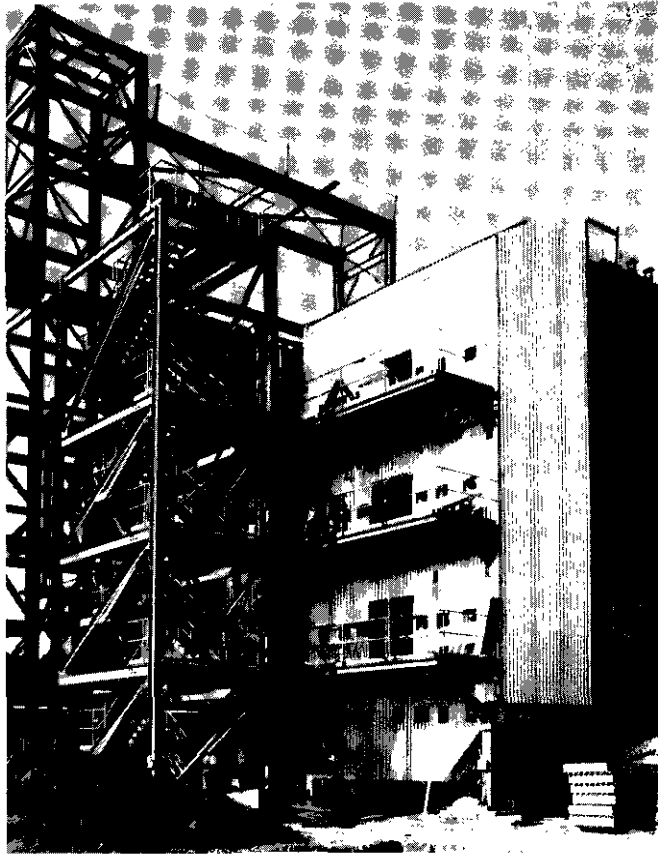
Key to the success of the WSA-SNO_x technology is the unique, WSA-tower where the acid mist is condensed into sulfuric acid. Commercial sale of the valuable byproduct and the elimination of solid wastes for disposal can help offset operating costs and will be key to the technology's commercial viability.

The proprietary WSA condenser was developed by Haldor Topsoc, the owner of the technology. It is an air-cooled falling film condenser, made up of a series of tubes held within shells. Ambient air—which leaves the condenser at about 400 degrees F—is used for cooling on the shell side. As the hot flue gases flow up through the tubes, the acid film moves downward in counterflow, and becomes concentrated to more than 93 percent by weight sulfuric acid, essentially without formation of acid mist. The air used for



WSA-SNO_x Process Schematic

See "WSA" on page 7



Catalytic reduction reactor will destroy NO_x.

WSA...continued from pg. 6

cooling can then be used as combustion air.

WSA SNO_x Process Promotes Efficiency

Another key advantage of the WSA-SNO_x process is its high efficiency compared to other emission control techniques.

Heat—from the two reactor vessels, the oxidation of NO_x and SO₂, and condensation in the WSA tower— can be recovered for reuse in the combustion process, enhancing the plant's overall efficiency.

Because the process operates in modules independent of the boiler, it can be applied to either new or existing plants of any size or boiler design.

All design and procurement for the Niles demonstration is complete. Overall construction at the site is more than three-fourths complete.

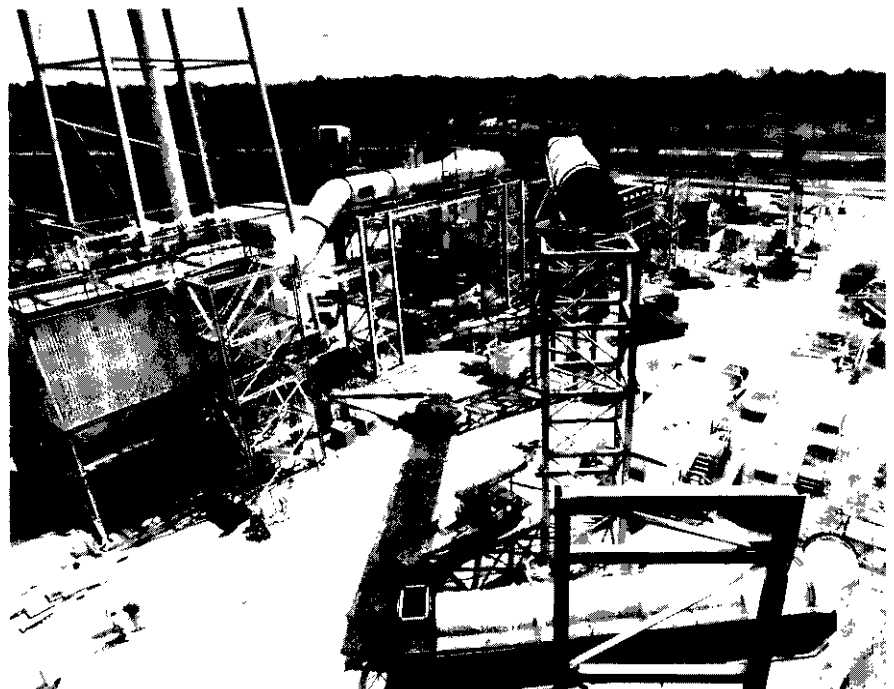
Operation of the unit is expected to begin late this fall, and tests and data



Large section of new flue gas bypass duct being lifted into place by tower crane onto existing FGD duct.

collection will run through late 1993. Joining ABB Environmental Systems and DOE in funding the project are

the State of Ohio Coal Development Office, Snamprogetti, U.S.A., and the Ohio Edison Company. ■



Duct work connecting baghouse with process units.

Status of Clean Coal Technology Demonstration Projects

CCT-I Projects

Status

Advanced Cyclone Combustor with Integral Sulfur, Nitrogen, and Ash Control. Coal Tech Corp., Williamsport, PA.

Project work has been completed. DOE received the final report in September.

Enhancing the Use of Coals by Gas Reburning and Sorbent Injection. Energy and Environmental Research Corporation, Hennepin and Springfield, IL.

Results of 32 basic gas reburning tests completed in March at the Hennepin site (tangentially fired boiler) show NO_x reductions of greater than 70%. Combined operational testing of Gas Reburning - Sorbent Injection began in August with good results. At the Springfield site (cyclone-fired boiler), all civil construction work has been completed and mechanical - electrical construction activities continue. Baseline testing is scheduled for completion in October.

LIMB Demonstration Project Extension. The Babcock & Wilcox Co., Lorain, OH.

Duct injection tests (1,729 operating hours) have been successfully completed with up to 70% SO_2 removal. Combinations of four sorbents and three coals were tested in the LIMB demonstration completed in August. This LIMB Extension testing, started in April 1990, indicates that up to 70% SO_2 removal can also be achieved with this process.

Nucla CFB Demonstration Project. Colorado-Ute Electric Association, Inc., Nucla, CO.

The project has completed the scheduled two-year testing program (15,707 hours) demonstrating New Source Performance Standards reductions for sulfur and nitrogen oxides emissions. Final Technical and Economic Evaluation reports are scheduled for December 1991.

Tidd PFBC Demonstration Project. American Electric Power Service Corp. on behalf of Ohio Power Co., Brilliant, OH.

Over 850 hours of coal-fired operation have been logged including the first continuous run of more than 110 hours. Preliminary performance testing achieved SO_x and NO_x emissions of 0.30 and 0.26 lbs/MMBtu respectively. Power generation rates exceeded 50 MW.

Advanced Coal Conversion Process Demonstration. Rosebud Syncoal Partnership, Colstrip, MT.

All equipment has been ordered. Construction is expected to be complete the last quarter of 1991.

Development of the Coal Quality Expert. Combustion Engineering, Inc. & CQ, Inc., Homer City, PA.

The BETA release 2.0 version of the Acid Rain Advisor is being tested by participating utilities. This software allows strategic planning at the system level for Clean Air Act compliance and includes emission credits trading. Field tests at Public Service of Oklahoma and Mississippi Power Co. have been completed.

Arvah B. Hopkins Circulating Fluidized Bed Repowering Project. The City of Tallahassee, Tallahassee, FL.

The City informed DOE that they have elected not to proceed with the project at the Arvah B. Hopkins site. The City is assisting in efforts to relocate the project.

CCT-II Projects

Status

Advanced Flue Gas Desulfurization Demonstration Project. Pure Air, a Joint Venture, Co., Gary, IN.

Ground subsidence located above an underground water line will cause a construction delay of approximately one month. Construction (about 50 percent complete) is proceeding in areas unaffected by the ground subsidence.

180 MWe Demonstration of Advanced Tangentially-Fired Combustion Techniques for the Reduction of NO_x Emissions for Coal-Fired Boilers. Southern Company Services, Inc., Lynn Haven, FL.

Short and long-term baseline performance testing was completed. Preliminary results of 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 and the LNCFS Level III system will be installed during the scheduled boiler outage.

CCT-II Projects (cont.)

Status

Demonstration of Advanced Combustion Techniques for a Wall-Fired Boiler. Southern Company Services, Inc., 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 25%. Testing of the Low NO_x burners continues with 50% NO_x reduction at full load indicated.

Cement Kiln Flue Gas Recovery Scrubber. Passamaquoddy Tribe, Thomaston, ME.

Demonstration operations resumed in August and will continue through November when the plant will be shut down for an indefinite period due to poor economic conditions. About 95 percent reduction in SO₂ emissions has consistently been achieved.

Demonstration of Coal Reburning for Cyclone Boiler NO_x Control. The Babcock & Wilcox Co., Cassville, WI.

Installation of the reburn system has begun and will be completed during the 7-week boiler outage that began mid-September.

Innovative Coke Oven Gas Cleaning System for Retrofit Applications. Bethlehem Steel Corp., Sparrows Point, MD.

Bethlehem Steel has announced that coke production at the Sparrows Point facility will be suspended for at least two years for rehabilitation of the coke ovens. DOE is discussing impact on the project with Bethlehem officials.

Demonstration of Innovative Applications of Technology for the CT-121 FGD Process. Southern Company Services, Inc., Newnan, GA.

Construction activity continues. The limestone silo and conveyor system has been installed. Jet bubbling reactor SO₂ absorber module (JBR) internals are being installed.

Combustion Engineering IGCC Repowering Project. Combustion Engineering, Inc., Springfield, IL.

Work continues toward establishing design, cost and schedule baselines for repowering the City Water Light and Power Lakeside Station. Cold flow modeling of gasifier internals continues.

Low NO_x/SO_x Burner Retrofit for Utility Cyclone Boilers. TransAlta Resources Investment Corp., Marion, IL.

TransAlta has withdrawn from the project due to cost growth.

PFBC Utility Demonstration Project. American Electric Power Service Corp., as agent for The Appalachian Power Co. and the Ohio Power Co., New Haven, WV.

AEP will submit a revised project implementation plan for DOE consideration in early October. This reflects a changing load growth picture and their overall strategy for Clean Air Act compliance.

Demonstration of Selective Catalytic Reduction Technology for the Control of NO_x Emissions from High-Sulfur Coal-Fired Boilers. Southern Company Services, Inc., Pensacola, FL.

Final design work continues on the large and small reactors, control room, ammonia storage and injection system, and the gas sampling system. Catalyst selection has been completed with seven suppliers of nine catalysts selected.

SOX-NOX-ROX Box Flue Gas Clean-Up Demonstration Project. The Babcock & Wilcox Co., Dilles Bottom, OH.

Design review at 90% has been completed. Construction is 70% complete.

WSA-SNO_x Flue Gas Cleaning Demonstration Project. Combustion Engineering, Inc., Niles, OH.

Construction is close to completion and operations are expected to commence in November. A facility dedication ceremony is planned for October 17.

CCT-III Projects

Status

Blast Furnace Granulated Coal Injection System Demonstration Project. Bethlehem Steel Corp., Burns Harbor, IN.

Process design and detailed engineering are continuing.

Confined Zone Dispersion Flue Gas Desulfurization Demonstration. Bechtel Corp., Indiana County, PA.

Detailed design and construction has been completed. The parametric test program with water testing of atomizing nozzles outside the duct started in July followed by in-duct testing in August. The lime slurry injection parametric test program is scheduled to begin in October.

10 MW Demonstration of Gas Suspension Absorption. AirPol, Inc., 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.

Healy Clean Coal Project. Alaska Industrial Development and Export Authority, Healy, AK.

The TRW slagging combustor has been successfully demonstrated at their Cleveland, OH facility. Project design work has been initiated and applications for environmental permits are being prepared.

Integrated Dry NO_x/SO₂ Emission Control System. Public Service Company of Colorado, Denver, CO.

Construction began in August with work on the urea system foundation. Engineering work continues on all systems and construction activity will increase as equipment items arrive on site.

Air-Blown/Integrated Gasification Combined Cycle Project. Clean Power Cogeneration, Inc., Tampa, FL.

DOE has approved a site change request to move the project to a Tampa Electric Power site in Polk County, near Lakeland, FL.

LIFAC Sorbent Injection Desulfurization Demonstration Project. LIFAC North America, Richmond, IN.

Construction activities were completed for the LIFAC tie-in to the Richmond Power & Light's Whitewater Valley Unit No. 2. Fabrication of the activation reactor and limestone storage silo was started.

Liquid Phase Methanol Process. Air Products and Chemicals, Inc., Dakota Gasification Co., Beulah, ND.

Negotiation schedule has been extended to Fall 1991 to allow full evaluation of an alternative site.

Full-Scale Demonstration of Low-NO_x Cell Burner Retrofit. The Babcock & Wilcox Co., Aberdeen, OH.

All 24 sets of low-NO_x cell burners and NO_x ports have been fabricated and shipped to Dayton Power & Light, Aberdeen, OH for installation during a scheduled September outage.

ENCOAL Mild Coal Gasification Project. ENCOAL Corp., Gillette, WY.

Project construction activities (about 20% complete) remain ahead of schedule. All major equipment items have been delivered. The pyrolyzer and quench table are in place, and all required permits except the operating permit have been obtained.

Commercial Demonstration of NO_xSO₂/NO_x Removal Flue Gas Cleanup System. MK-Ferguson Co., Niles, OH.

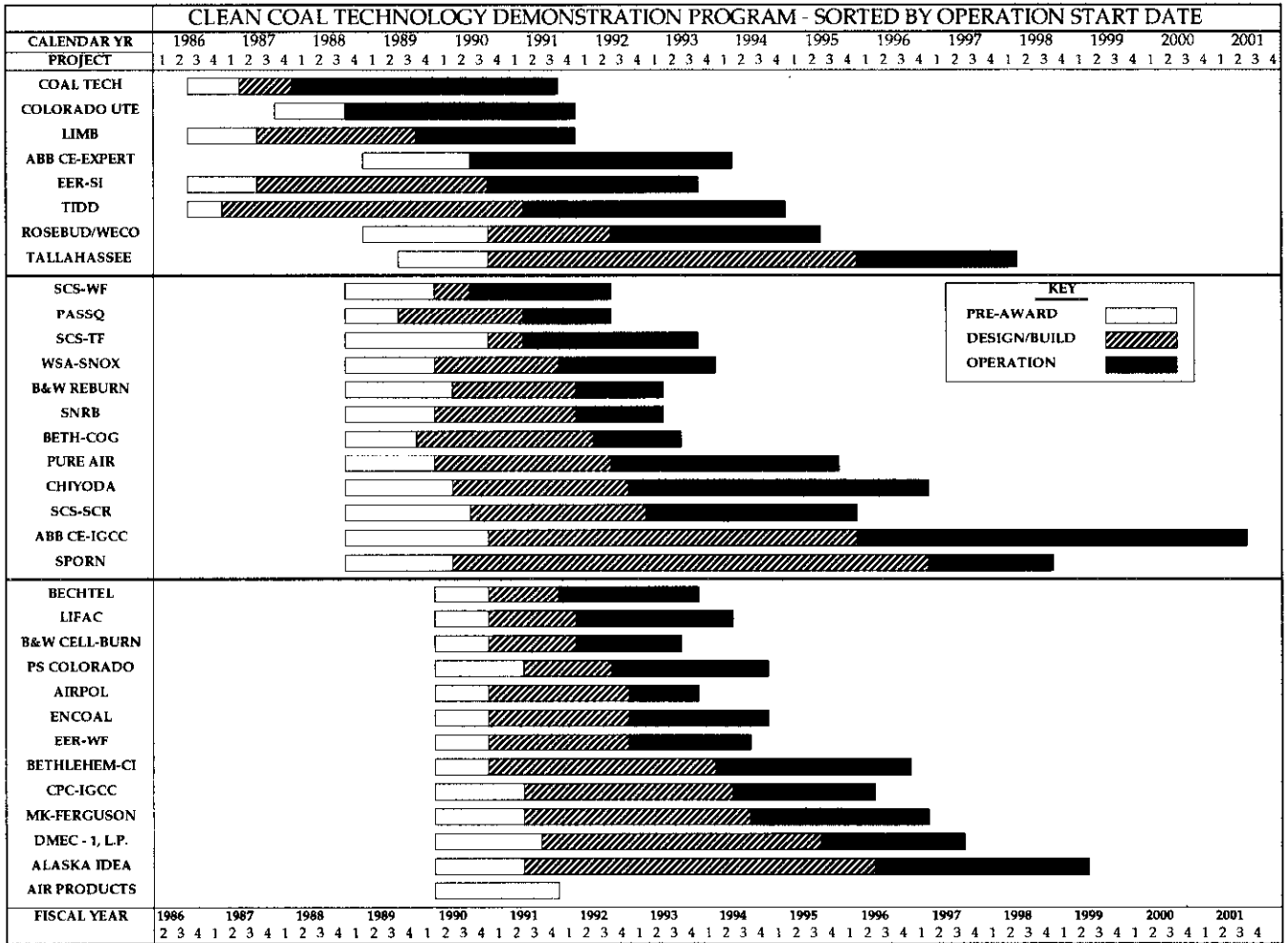
Preliminary design activities are proceeding.

Pressurized Circulating Fluidized Bed Demonstration Project. DMEC-1 Limited Partnership (Dairyland Power Cooperative & Iowa Power Co.), Pleasant Hill, IA.

The Cooperative Agreement was signed August 1, 1991. The host site is Iowa Power's Des Moines Energy Center, Pleasant Hill, IA, near Des Moines.

Evaluation of Gas Reburning and Low-NO_x Burners on a Wall-Fired Boiler. Energy and Environmental Research Corp., Denver, CO.

Retrofit work is underway during the current scheduled Cherokee Station outage which began in August. A report on the analysis of baseline test data collected this summer is being prepared. A public ceremony was held on September 25 in Denver, CO, to commemorate the project.



Briefs...continued from pg. 1

of advanced PFBC technology. A 110 hour test run completed on August 14 brought to 850 hours the total operating time. Later that month, an Open House sponsored by the Ohio Coal Development Office attracted more than 250 visitors in two days. And on July 17, the editors of *Power Magazine* visited the plant to officially present Tidd's owners with its "Power Plant of the Year" award.

Over at **Pennsylvania Electric's Seward Station near Johnstown, PA**, nearly 150 people attended a dedication of **Bechtel's Confined Zone Dispersion (CZD)** project. Jack C. Abrams, inventor of the technology, oversaw a live demonstration of the innovative spray nozzles, while Pennsylvania's Lieutenant Governor Mark Singel delivered the event's keynote address. Tests of the in-duct SO₂ control technology began in July.

Construction delays caused by the collapse of water pipes at **NIPSCO's Bailly Station** near Gary, Indiana will be minimal, company officials reported in a July press update. The 528 megawatt scrubber—to be owned and operated by Pure Air—is now set to begin operations in the fall of 1992.....NIPSCO and **Pure Air** hosted a site visit of their innovative scrubber by the Indiana Congressional delegation in July and await another group from the Senate and House Environment and Energy Committees in October.

On September 25, another public ceremony was held in Denver, Colorado to commemorate **Energy and Environmental Research Corporation's** round three project to evaluate a combination of gas reburning and low-NO_x burners on a wall-fired boiler.

Moving down south, two Clean Coal participants have announced that they are moving their projects from their

originally planned sites in Tallahassee, Florida. The **CPC Limited Partnership** said in September that it has found a preferable location for its IGCC project. **TECO Power Services** is now the full owner of CPC, and will move the project to a Tampa Electric Power site in Polk County near Lakeland, FL.

The **City of Tallahassee**, which was planning to repower an oil/gas fired unit with a 250 megawatt circulating fluidized bed combustion system, has suspended its role as site host for the project at its Hopkins plant in the near term. While still intending to utilize coal-based CFB in its future plans, recent economic studies led the city to conclude that it was not feasible to switch fuels at this time. Along with partners **Bechtel** and **Foster Wheeler**, the City still plans to plan an active role in the project once it moves to a new site. Officials indicate there are several possibilities under consideration. ■

Upcoming Events

Date	Event	Contact
October 29-31, 1991	<u>COAL: The World's Security Blanket-Virginia Coal Council</u> , Omni International Hotel, Norfolk, VA	W. Fernald 202-586-7156
October 30, 1991	<u>Round V Public Meeting</u> , Little America, Cheyenne, WY	J. Lerch 301-353-3965
November 4-6, 1991	<u>Power Supply USA</u> , Washington Convention Center, Washington, DC	B. McBride 703-359-8080
November 12, 1991	<u>Round V Public Meeting</u> , Galt House Hotel, Louisville, KY	J. Lerch 301-353-3965
December 4-6, 1991	<u>Power-Gen '91</u> , Tampa Convention Center, Tampa, FL	S. Oldoerp 202-586-7164
December 9-11, 1991	<u>5th International Fluidized Bed Combustion Conference: Fluidized Bed Combustion Technology to Meet the Environmental Challenge</u> , London, United Kingdom	Instit. of Energy, Conf. Dept. 18 Devonshire St., London WIN 2AU

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.

Jun 91	DOE/FE-0221P	Clean Coal Technology Demonstration Program: Program Update (As of June 30, 1991)
Jun 91	DOE/FE-0236P	Pressurized Fluidized Bed Demonstration Project (DMEC-1 Limited Partnership of Dairyland Power Cooperative & Iowa Power, Inc.)

The following papers, authored by DOE employees or CCT participants, have been delivered at conferences over the past several months. Copies are available from the authors. For further information, contact the Office of Clean Coal Technology at 202-586-7148.

"Demonstration of Combined NO_x and SO₂ Emission Control Technologies Involving Gas Reburning." Dr. Blair A. Folsom, Todd M. Sommer, and Dr. Roy Payne, Energy and Environmental Research Corporation. *AFRC-JFRC International Conference - Environmental Control of Combustion Processes, Honolulu, HI, October 1991.*

"Development and Application of a Gas Reburning Process Model for the Design of Boiler NO_x Reductions." K.T. Wu, Roy Payne, and Quang Nguyen, Energy and Environmental Research Corporation, *1991 International Joint Power Generation Conference, San Diego, CA, October 1991.*

"Operating Experience with a Gas Reburning-Sorbent Injection System for Acid Rain Precursor Emission Control For Utility Boilers," J.D. Opatrny, Dr. B. A. Folsom, R. T. Keen, Q. H. Nguyen, Dr. R. Payne, and T. M. Sommer. Energy and Environmental Research Corporation, *ASME International Joint Power Generation Conference, San Diego, CA, October 1991.*