DOE/PC/94063--T1

QUARTERLY TECHNICAL PROGRESS REPORT

AND KEY PERSONNEL STAFFING REPORT

NUMBER 1

**PRODUCTION AND SCREENING OF CARBON PRODUCTS
PRECURSORS FROM COAL**

CARBON PRODUCTS CONSORTIUM

CONTRACT NO. DE-AC22-95PC94063

REPORTING PERIOD:

February 15, 1995 to March 30, 1995

Submitted to:

**AAD Document Control Center
U.S. Department of Energy
Pittsburgh Energy Technology Center
PO Box 10940, MS 921-143
Pittsburgh, PA 15236-0940**

Submitted by:

**West Virginia University Research Corporation
on behalf of West Virginia University
617 N. Spruce Street
Morgantown, WV 26506**

June, 1995

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MASTER

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U. S. DEPARTMENT OF ENERGY
RECOMMENDATIONS FOR THE ANNOUNCEMENT AND DISTRIBUTION
OF DEPARTMENT OF ENERGY (DOE) SCIENTIFIC AND TECHNICAL INFORMATION (STI)
(See instructions on reverse side. Use plain bond paper if additional space is needed for explanations.)

OMB Control No.
1910-1400
OMB Burden
Disclosure
Statement on
reverse side

PART I (DOE, DOE Contractors, Grantees, and Awardees complete)

A. Product/Report Data

1. (Award) Contract No.

DE-AC22-95PC94063

2. Title

The Production and Screening of Carbon Products Precursors from Coal.

3. Product/Report Description

☒ a. Report (Complete all that apply)

(1) ☒ Print ☐ Nonprint (specify)

(2) ☒ Quarterly ☐ Semiannual ☐ Annual ☐ Final

☐ Topical ☐ Phase I ☐ Phase II

☐ Other (specify)

Dates covered 1-1-95 thru 3-31-95

☐ b. Conference/Meeting/Presentation (Complete all that apply)

(1) ☐ Print ☐ Nonprint (specify)

☐ Published proceedings

☐ Other (specify)

(2) Conference Title (no abbreviations)

Location (city/state/country)

Date(s) (m/d/y) / / thru (m/d/y) / /

Sponsor

☐ c. Software—Additional forms are required. Follow instructions on the back of this form.

☐ d. Other (Provide complete description)

B. Patent Information

Yes No

☐ ☒ Is any new equipment, process, or material disclosed?
If yes, identify page numbers

☐ ☒ Has an invention disclosure been submitted?
If yes, identify the disclosure number and to whom it was submitted. Disclosure number
Submitted to

☐ ☒ Are there patent-related objections to the release of this STI product? If so, state the objections.

C. Contact (Person knowledgeable of content)

Name John Zondlo

Phone (304) 293-2111 X409

Position PI

Organization West Virginia University

PART II (DOE/DOE Contractors complete/or as instructed by DOE contracting officer)

A. DOE Identifiers

1. Product/Report Nos.

2. Funding Office(s) (NOTE: Essential data)

B. Copies for Transmittal to AD-21 (OSTI)

(STI must be of sufficient quality for microfilming/copying.)

☐ 1. One for classified processing

☐ 2. (number) for standard classified distribution

☐ 3. Two unclassified for processing

☐ 4. (number) for program unclassified distribution

☐ 5. UC/C Category

☐ 6. Additional instructions/explanations

☐ 2. Classified (Standard Announcement only)

☐ 3. Special Handling (Legal basis must be noted below.)

☐ a. Unclassified Controlled Nuclear Information (UCNI)

☐ b. Export Control/ITAR/EAR

☐ c. Temporary hold pending patent review

☐ d. Translations of copyrighted material

☐ e. Small Business Innovation Research (SBIR)

☐ f. Commercializable information

☐ (1) Proprietary

☐ (2) Protected CRADA information

Release date / /

☐ (3) Other (explain)

☐ 4. Program Directed Special Handling (copy attached)

D. Releasing Official

A. Patent Clearance ("X" one)

☐ Has been submitted for DOE patent clearance

☐ DOE patent clearance has been granted

B. Released by

(Name)

(Signature)

(Phone)

(Date)

C. Recommendation ("X" at least one)

☐ 1. Program/Standard Announcement/Distribution

(Available to U.S. and foreign public)

(Do not identify Sigma categories for Nuclear Weapons Data reports, and do not provide additional instructions that are inconsistent with C below.)

INSTRUCTIONS

Purpose: This form provides the Office of Scientific and Technical Information (OSTI), AD-21, the data elements required to accurately process and/or announce and disseminate the result of work funded by the U.S. Department of Energy (DOE) or performed in DOE facilities.

When to use: Submit this form with each Scientific and Technical Information (STI) product/report title. When submitting electronically, include all relevant data elements, and prior to submission contact AD-21 at 615-576-1261.

1. DOE and DOE Contractors: Complete the entire form and submit with the STI product to AD-21 (OSTI) for processing in accordance with the requirements of DOE 1430.1C and 1430.2B. Reporting that may be required under the terms of the contract but is not appropriate for transmittal to AD-21 includes such things as contract proposals, funding status, routine construction or inventory reports, etc. (Call 615-576-1261 for further clarification.) Submit to:

U.S. Department of Energy
Office of Scientific and Technical Information (AD-21)
175 Oak Ridge Turnpike (for shipments)
P.O. Box 62 (for mail)
Oak Ridge, TN 37831

2. Financial Assistance Recipients: Normally, only Part I is to be completed. When completed, forward the form along with the STI product/report to the DOE Contracting Officer who will complete Part II and submit the package to AD-21. However, the DOE Contracting Officer may require the awardee to complete portions of Part II and also may require that the form and product/report be forwarded directly to AD-21. Check your specific requirements.

PART I

A. Product/Report Data

1. Contract (Award) No. Insert the DOE award or contract number(s) under which the work was funded.

2. Title. Provide the title exactly as on the product itself.

3.a., 3.b. and, 3.d. Self-explanatory.

3.c. Software. STI software must be submitted to the Energy Science and Technology Software Center (ESTSC). To obtain required forms and instructions, contact ESTSC at 615-576-2606.

B. Patent Information. Self-explanatory.

C. Contact. Self-explanatory.

PART II

A. DOE Identifiers

1. Product/Report Number. This is a unique identifier. A complete and accurate number is essential. AD-21 has approved identifiers for use by most DOE offices and Management and Operating (M&O) Contractors (see examples below). For others, use DOE/ and the final seven characters from the applicable contract or grant number. A slash mark must separate the letters from the number. Complete the number with dashes followed by a sequential number for each product/report generated under the contract. For example, the first product/report number generated under contract number DE-AC03-79NE01834 should have the number DOE/NE/01834--1. The following are examples of format for multivolumes, parts, or revisions.

DOE/NE/01834--1-Vol. 1
DOE/NE/01834--1-Pt. 1
DOE/NE/01834--1-Rev. 1

Product/Report numbers are to be structured exactly as specified in these instructions. Any modification must be approved by AD-21. The following are examples of approved identifiers.

Product Producer	Approved Sequential Identifier
Headquarters DOE	DOE/NE--193
Major Field Offices	DOE/OR--759
Major Project Offices	DOE/LLW--198
M&O Contractors	ANL/TM--482

For work performed for other agencies, the funding agency may assign their product/report number. If so, provide their number.

2. Funding Office. This information is essential. Insert the name, symbol, B&R code of the DOE office providing support/funding. For projects funded by more than one office, indicate all sources of DOE funding. For work for others, indicate funding agency.

B. Copies for Transmittal to AD-21 (OSTI)

All STI products must be in a form that can serve as the record copy and be of sufficient quality for successful reproduction (optical scanning, microfiche and other media). For nonprint media, refer questions to AD-21 at 615-576-1268.

1. and 3. For printed products, one copy must be original ribbon or offset and be completely legible according to DOE 1430.2B. A high-contrast photocopy is acceptable as a second reproducible copy.

2. and 4. When submitting print copies for distribution by AD-21, forward the number of copies specified in DOE/OSTI--3679-Rev. 75 or DOE/OSTI--4500.

5. UC/C Category. This code identifies the appropriate distribution of the product/report. Provide the appropriate unclassified code from DOE/OSTI--4500 or classified code from DOE/OSTI--3679-Rev. 75. For copies of these documents contact AD-21 at 615-576-8401.

6. Provide sufficient instructions for AD-21 to accurately process, announce, or distribute the STI product. Include complete project information when requesting services. Use this block to note when mailing labels are included.

C. Recommendation

DOE is obligated to make available the results from federally funded work to the widest extent possible. AD-21 makes distribution of STI products on behalf of DOE strictly in accordance with existing laws, regulations, and/or written DOE Program Office guidance. Recommendations to restrict access to STI products must have a legal basis or be accompanied by written programmatic guidance. Questions concerning current laws and guidance may be referred to AD-21 at 615-576-1268.

1. Program/Standard Announcement/Distribution. The unrestricted unlimited distribution of the product includes abstracting in *Energy Research Abstracts (ERA)*, DOE distribution to appropriate addressees listed in DOE/OSTI--4500, to those Government Printing Office (GPO) Depository Libraries maintaining energy collections, and to the National Technical Information Service (NTIS) for sale to the U.S. and foreign public.

2. Classified. STI products will be announced by AD-21 in accordance with DOE/OSTI--3679-Rev. 75.

3. Special Handling. The specific legal basis for restricting access must be checked. All STI products will be announced/distributed strictly in accordance with existing laws, regulations, or official guidance.

CRADAs—STI products generated under Cooperative Research and Development Agreements (CRADAs) under the National Competitiveness and Technology Transfer Act of 1989. Please include the estimated release date for the STI product in accordance with the terms of the agreement.

4. Program Directed. A copy of the specific guidance (or if the guidance is lengthy, a reference will be acceptable) must be attached.

D. Releasing Official

The appropriate official differs based on the source of STI, the contracting instrument, and the internal organizational responsibilities. Do not forward this form to AD-21 until after appropriate review and release.

OMB BURDEN DISCLOSURE STATEMENT

Public reporting burden for this collection of information is estimated to average 5 minutes per response, including the time for reviewing instructions, searching existing data sources, gathering and maintaining the data required, and completing and reviewing the collection of information. Send comments regarding this burden estimate or any other aspect of this collection of information, including suggestions for reducing this burden, to the Office of Information Resources Management, AD-244-GTN, Paperwork Reduction Project (1910-1400), U.S. Department of Energy, Washington, DC 20585, and to the Office of Management and Budget (OMB), Paperwork Reduction Project (1910-1400), Washington, DC 20503.

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Executive Summary

The Carbon Products Consortium (CPC) is a university, industry, national laboratory cooperative research, development and commercialization partnership focused on the use of coal-derived precursors for a wide range of carbon products. The CPC program has evolved over five years through the combined efforts of academic, congressional, industrial, and government agency participation and support.

The PETC funded WVU portion of the CPC involves both administration and research. During the preceding quarter, the Project Management Plan specified in Task 1 of the Workplan has been initiated and a draft will be submitted to the DOE COR. A CPC Participants Agreement has been approved and signed by the university and industrial participants.

The WVU carbon products group has added three additional technicians to help initiate the project. Several new reactor systems have been obtained for the solvent extraction lab. Due to WVU's experience and background in solvent extraction of coal, the WVU portion of the project will be in operation very soon. Several small samples (one ounce or less) of coal extracts will be provided to UCAR for initial screening.

Task 1.0 Project Planning and Administration

The purpose of Task 1.0 is to prepare and submit to the DoE, a Project Management Plan for the WVU portion of the Carbon Products Consortium (CPC).

1.2 Accomplishments, Results, Discussion Preparation of the Management Plan was initiated during the current reporting period.

Task 2.0 Consortium Administration and Reporting

The purpose of Task 2.0 is to establish a Carbon Products Consortium Participants Agreement, to facilitate communications between the CPC members and the DOE COR, and to secure, maintain and manage CPC funds obtained under this contract.

2.1 Accomplishments, Results, Discussion A CPC Participants Agreement has been signed by all five industrial participants and by WVU. The Participants Agreement is under consideration at Oak Ridge National Laboratory, the national

laboratory participant. Funding for the WVU portion of the CPC program is being managed by the WVU College of Engineering. Funding for work done by the industrial participants is being administrated through the Lockheed Martin contract officers at the Oak Ridge National Laboratory. As of March 15, 1995 only two of the five industrial subcontracts are in place.

Task 3.0 Coal Extraction

Task 3.0 is the principal technical task for WVU. A variety of types and sizes of samples of coal extracts will be provided to the industrial and national laboratory participants.

Task 3.1 Supplying Coal Extracts for Testing

Under this subtask, WVU will provide approximately 50 screening samples of up to one ounce of various types of coal extracts. In addition, several one to two pound samples of the most suitable coal extract types will be produced at WVU and provided to other participants. This subtask is mainly conducted during the first 12 months of the contract.

3.1.1 Accomplishments, Results and Discussion

3.1.1.1 Personnel

The effort during this quarter has been focused on getting the project started and coordinating efforts between West Virginia University and the industrial members of the Consortium. A job description for technician positions has been drawn up, approved by the University, and posted with our Department of Human Resources.

We have selected three qualified technicians. One technician, who will work full-time for the entire year, will begin work on April 1, 1995. Two additional technicians who will work for a period of six months each have a planned starting date of May 15, 1995. With the hiring of these key technical positions, our work force is now up to the full complement.

3.1.1.2 Autoclave Reactors

A variety of autoclave reactors used for the hydrogenation of coal have been cleaned and brought into service. These reactors consist of a single one-liter vessel

useful for screening studies, as well as three larger one-gallon capacity reactors. Since these reactors have been used on previous projects, a variety of component parts were in need of repair and replacement. These orders have been placed and should be received within the next two months.

In addition to the autoclave reactors, several smaller microreactors (50 cc volume) have been built and tested. These reactors will be used early in the project to produce smaller quantities of materials over a wide range of hydrogenation conditions. Thus a broad spectrum of experimental parameters can be quickly and efficiently studied. These microreactors are currently ready for use.

3.1.1.3 Batch-Scale Reactor

In order to process significant quantities (around 2 lbs.) of extract material, a large-scale batch apparatus has been designed. This system is totally self-contained and consists of a large heated extraction vessel capable of holding five gallons of materials, a coarse and fine filter system, two fifteen gallon holding vessels, and a solvent distillation system. At the present time the design for the apparatus is complete and we are in the process of ordering piping, valves, and the various system components. We expect the apparatus to be constructed and tested for the next quarter.

3.1.1.4 Experimental Plan

In close consultation with our industrial collaborators, a detailed experimental plan has been devised and laid-out. Initially, small quantities (25 grams) of hydrogenated material will be produced over a wide range of conditions of temperature, pressure catalyst and time. These preliminary screening studies will allow rapid exploration of the experimental space and determine directions for future work. It is planned to deliver these samples to UCAR for complete characterization and testing. Upon completion of this phase of the work we will meet with representatives from UCAR to discuss in detail the properties and characteristics of these materials. This information will then be distributed to the other Consortium members and specific samples will be selected for further study and scale-up.

It should be noted however that at this time three of the industrial Consortium members are still not under contract. The delay in these subcontracts could have serious impact on the progress and execution of this contract.

3.1.1.5 Acquisition of Supplies

Large quantities of supplies, chemicals, and solvents have been ordered and are beginning to arrive. In addition, approximately 30 pounds of Powellton Coal have been acquired from the mine face and have been prepared by appropriate grinding, sieving, and storage. Arrangements have been made to acquire additional coal samples from the Beckley seam which may also be used in subsequent studies.

KEY PERSONNEL STAFFING REPORT

January - March, 1995

Key personnel for the reporting period are:

West Virginia University

John Zondlo
Afred Stiller
Peter Stansberry
Gene Cilento
Carl Irwin
Alan Martin

UCAR Carbon Company, Inc.

John Chang
Irwin Lewis

Koppers Industries

Ron McHenry

Aluminum Company of America

David Belitskus

Amoco Performance Products, Inc.

Mike Michno
Girish Despande

Fiber Materials, Inc.

Cliff Baker