DOE/PC/93051--79

MAINTENANCE OF THE COAL SAMPLE BANK AND DATABASE

Quarterly Technical Progress Report

Contract Number DE-AC22-93PC93051

**The Pennsylvania State University
Coal and Organic Petrology Laboratories**

Reporting Period: 7/01/95 - 9/30/95

Report Date: 2/13/96

Contract Date: 9/28/93

Anticipated Completion Date: 9/28/98

Government Award: \$173,843. for current contract year

Principal Investigators: Alan Davis
David C. Glick

Program Manager: Gilbert V. McGurl

Contracting Officer's Representative: Udaya Rao

RECEIVED
DOE/PETC
35 FEB 14 AM 10:51
LABORATORY & ASSOCIATE DIV.

US/DOE Patent Clearance is not required prior to the publication of this document.

DISTRIBUTION OF THIS DOCUMENT IS UNLIMITED

MASTER

DISCLAIMER

Portions of this document may be illegible in electronic image products. Images are produced from the best available original document.

Quarterly Technical Progress Report: 7/01/95 - 9/30/95

Objectives:

This five year project is intended to ensure the availability of well-characterized, high-quality coal samples for public and private coal research. It continues support of the DOE Coal Sample Bank and Database at The Pennsylvania State University. Thirty coal samples will be collected, processed, packaged, and analyzed, and a resulting database will be maintained. These samples and data, as well as 26 samples collected under previous contracts, will be distributed to DOE contractors and others performing coal research.

Samples will be chosen to maintain a sample bank of 56 coals representing the major U.S. coal fields and a variety of coal ranks and compositions. In addition to standard analyses, liquefaction tests and organic geochemical analyses will be performed. The samples will be stored to minimize deterioration, and will be monitored annually by proximate, sulfur forms, and gaseous oxygen analysis to evaluate their condition. These samples will be used for additional research on the influence of changes in surface chemistry on surface properties, the influence of sample deterioration on liquefaction properties, and the mechanisms of coal oxidation.

A revised work statement has been submitted to DOE, setting out a reduction in effort following a cut in the level of funding of the project.

Summary of Technical Progress

Task 1B. Storage and Inventory of Samples

All samples supported by the contract are stored in containers purged with argon before sealing; container locations are tracked by a computer inventory program. PSOC-series samples are stored in drums or buckets at the Coal Sample Bank building, or in cans in the Coal and Organic Petrology Laboratories. All DECS-series samples are stored under refrigeration in foil laminate bags.

During the quarter, samples were distributed and inventory records were updated. The newly collected sample was added to the inventory records. Storage and inventory of sample containers is expected to continue routinely through the next quarter.

Task 1C. Monitoring of Sample Quality

It was planned that one 300 g (2/3 lb) bag of each DECS sample would be analyzed annually to monitor sample condition. This Task has been reduced in scope, to 10 samples per year, because of reduction in funding.

The related study of liquefaction behavior over time has also been reduced, and is discussed under Task 1F.

Task 1D. Collection and Processing of Replacement Samples

One sample was collected from the main bituminous field of the Appalachian region during the quarter, following discussion and approval by DOE. DECS-33 is a

whole-seam channel sample of the Ohio #4A seam collected from an underground mine in Meigs County, Ohio, on July 25, 1995. The coal had been exposed less than two days prior to collection. Initial processing of this sample was accomplished on July 27.

Task 1E. Basic Characterization of Coal Samples

Characterization of samples DECS-29 through -32 (collected just prior to the beginning of this quarter) and DECS-33 was accomplished during the quarter.

Task 1F. Liquefaction Testing

In this Task, appropriate samples will be subjected to a standardized liquefaction test using tetralin and subsequent product workup.

Product workup on the liquefaction components of DECS-29, -31 and -32 was performed. The new sample (DECS-33) was processed promptly, and liquefaction testing was performed. Table 1 shows liquefaction product breakdown for 6 samples.

Table 1. Conversion of DECS samples in a standardized liquefaction test using tetralin, with detailed gas composition (average of two runs, except gas components based on one run; see Task 1F).

sample	conversion, percent of dry ash-free coal											
	total	asph.	pre-asph.	oil	gas							
					total	c1	c2	c3	c4	c5	c1-c5	other
DECS-11	29.5	7.7	4.9	7.8	9.1	2.4	1.1	0.4			3.9	5.2
DECS-17	54.6	11.4	9.4	15.0	18.8	3.6	1.8	1.1			6.5	12.3
DECS-18	31.9	4.6	16.2	7.3	3.8	0.2	0.1	0.1			0.4	3.4
DECS-20	29.0	5.9	11.9	6.2	5.0	0.9	0.5	0.2			1.6	3.4
DECS-31	36.4	15.7	3.2	7.4	10.1	0.5	0.1				0.6	9.5
DECS-32	29.8	4.6	16.3	6.6	2.3	0.3	0.1	0.1			0.5	1.8

Task 1G. Investigation of Changes in Surface Chemistry During Storage

The general objective of this task is to measure the changes in functional group concentration as a function of duration and type of storage method using reflectance-mode FT-i.r. and direct oxygen determination using electron optical techniques. Also, microscopic measurements of fluorescence alteration and intensity will be employed to determine the extent of surface alteration during coal storage.

Further work on this Task has been suspended pending decisions on funding.

Task 1H. Organic Geochemistry

Nuclear Magnetic Resonance (NMR) Spectroscopy

Analysis of the five recently collected samples was performed during the quarter.

Pyrolysis - Gas Chromatography - Mass Spectrometry

Analysis of the recently collected samples was performed during the quarter.

Task 1I. Distribution of Coal Samples to Users

During the period 7/01/95 - 9/30/95 a total of 21 samples (20 DOE Sample Bank samples and 1 other Penn State sample) of various sizes in 47 containers were distributed. See Task 2C for a list of sample and data recipients. This task will continue in the same manner through the next quarter.

Task 2A. Programming

No significant programming was undertaken during the quarter.

Task 2B. Data Entry

Available data for the five recently collected samples were entered in the Database.

Task 2C. Distribution of Data to Users

During the quarter a total of 41 data printouts were distributed. In addition, 3 special data requests were filled by database searches and printed output or creation of a data disk, resulting in distribution of limited information on 790 samples. Preliminary requests for Sample Bank and Database information have also been filled. This task will continue in the same manner through the next quarter.

Organizations supplied with coal samples and/or data include:

Babcock and Wilcox, Alliance Research Center
 Buckeye Industrial Mining Company
 Marshall University, Chemistry Department
 Northeastern University, Mechanical Engineering Department
 Pennsylvania State University, Polymer Science Department (2)
 Pennsylvania State University, Mineral Processing Department
 Pennsylvania State University, Fuel Science Department (3)
 Pickands-Mather Coal Company
 Universidade do Porto (Portugal)
 University of Mississippi, Chemical Engineering Department (3)
 University of Cincinnati, Engineering Research Department
 Virginia Division of Mineral Resources (2)
 West Virginia University, Physics Department
 West Virginia University, Geology Department (2)

The numbers in parentheses represent multiple requests which were separately processed.

DISCLAIMER

This report was prepared as an account of work sponsored by an agency of the United States Government. Neither the United States Government nor any agency thereof, nor any of their employees, makes any warranty, express or implied, or assumes any legal liability or responsibility for the accuracy, completeness, or usefulness of any information, apparatus, product, or process disclosed, or represents that its use would not infringe privately owned rights. Reference herein to any specific commercial product, process, or service by trade name, trademark, manufacturer, or otherwise does not necessarily constitute or imply its endorsement, recommendation, or favoring by the United States Government or any agency thereof. The views and opinions of authors expressed herein do not necessarily state or reflect those of the United States Government or any agency thereof.