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Methane Recovery from Coalbeds Project

Monthly Progress Report

Contract Number DE-AC21-78MC08089

AUGUST 1979

**PREPARED FOR
UNITED STATES DEPARTMENT OF ENERGY
MORGANTOWN ENERGY TECHNOLOGY CENTER
MORGANTOWN, WEST VIRGINIA**

BY

TRW
ENERGY SYSTEMS PLANNING DIVISION

METHANE RECOVERY FROM COALBEDS
MONTHLY PROGRESS REPORT

August 1979

Contract No. DE-AC21-78MC08089

TRW

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1. SUMMARY OF PROGRESS - AUGUST 1979

This section of the report highlights the progress made by TRW Energy Systems Group on the Methane Recovery from **Coalbeds** Project (MRCP) under DOE Morgantown Energy Technology Center Contract No. DE-AC21-78MC08089 through August 1979. A discussion of the progress is contained in Section 3.

1.1 PROGRESS DURING THE MONTH

Engineering Support

- Continued effort to incorporate the additional methane drainage activity being assigned to METC into the PPD and Semi-Annual Report.
- Completed and transmitted original manuscript for the UGR Semi-Annual Report covering the period October 1, 1978 through March 31, 1979.
- Provided inputs to the Gas Resources RD&D Management Plan.
- Continued to review progress of the MRCP exhibit being developed for the International Petroleum Exposition.
- Submitted the Phase II Test Plan for testing the METC 5 3/8 inch turbodrill at **Gearhart** Owen for approval.

Resource Engineering

- Completed field operations at Fuelco well in Piceance Basin.
- Completed field operations in Confidential Wells No. 4 and 5 in Colorado.
- Production testing continuing following artificial stimulation of Confidential Well in Green River Basin.
- Completed field operations in conjunction with USGS corehole in the Powder River Basin near **Broadus**, Montana.
- Meet with Southern Union-University of New Mexico to establish schedule for drilling, coring, testing, and monitoring two wells in Central San Juan Basin.
- Draft Illinois Basin Report reviewed and approved by METC. Final draft copies ready to go to press.

Technology Test Projects

- Consent to subcontract with Occidental Research Corporation was received. Signing is **imminent**.
- Started environmental assessment effort including sampling at the Waynesburg College site.
- Forwarded PER1 subcontract package to METC for review and approval.
- Met with PER1 to discuss the CY 1980 activities, and to provide guidance and samples for preparation of the Environmental Assessment.

1.2 PROGRESS TO DATE

The following is a summary of the significant progress made by TRW Energy Systems Group under this contract since its inception.

ENGINEERING SUPPORT

Planning and Analysis

- Assisted in the preparation and publication of the FY 1979 and FY 1980 MRCP Project Plan Documents (PPD)
- Assisted in the preparation of the MRCP Technical Implementation Plan (TIP)
- Provided inputs and assistance for preparation and publication of Unconventional Gas Recovery Semi annual Report for the period ending September 1978
- Provided MRCP inputs to be used in preparation of exhibits for the International Petroleum Exposition
- Provided inputs for preparation and publication of the Unconventional Gas Recovery Semi annual report for the period ending March 1979
- Provided drafts of a newspaper article on METC's role in Unconventional Gas Recovery.
- Provided inputs to the Gas Resources RD&D Management Plan.

Technical Review of Proposals

- Supplied formal review and evaluation of four R&D proposals, three Technology Test Project proposals, and nine Resource Engineering proposals.

Technology Transfer and Information Management

- Assisted in planning and conducting the 1978 and 1979 Methane Recovery from Coalbeds Symposia and in compilation of the Symposia Proceedings
- Prepared drafts of the MRCP Technology Transfer Plan and the Information Management Plan
- Authored or co-authored the following papers on Methane Recovery from Coalbeds
 1. A. A. Lee, "The Delineation of Methane Resources in Unminable and Minable Coalbeds," presented at the Methane Recovery from Coalbeds Symposium, April 18 - 20, 1979 in Pittsburgh, Pennsylvania

Technology Transfer and Information Management (Continued)

2. H. H. Rieke, C. R. Skillern, C. T. Rightmire, and W. Overbey, "A Systems Approach to Large Scale Exploratory Drilling Ventures," presented at the Society of Professional Log Analysts' 20th Annual Logging Symposium June 3 - 6, 1979, in Tulsa, Oklahoma.
3. H. D. Shoemaker, A. Gillies, and C. L. Sturgil?, "Generation of Mine Power from Methane Drainage," presented at the Coal Gasification Conference, July 31 - August 3, 1979 in Pittsburgh, Pennsylvania.
4. R. L. Wise and C. T. Rightmire, "Methane Recovery and Utilization from Coalbeds," to be presented at the 1979 Society of Petroleum Engineers Annual Technical Conference and Symposium, September 23 - 26 in Las Vegas, Nevada.
5. H. H. Rieke, C. T. Rightmire, and W. H. Fertl, "Evaluation of Gas-Bearing Coal **Seams**," to be presented at the 1979 Society of Petroleum Engineers Annual Technical Conference and Symposium, September 23 - 26, 1979, Las Vegas, Nevada.

R&D Surveillance

- Planning, directing, and evaluating performance and reliability testing of the Maurer turbodrill.

RESOURCE ENGINEERING

Planning and Analysis

- Assisted in the preparation and publication of the following:
 - a. Unminable Coal Drilling Project Plan
 - b. Resource Delineation Plan
 - Ⓝ Draft Illinois Basin Report
 - d. Draft Powder River Basin Report.
- Participated in coordination meetings as follows:
 - a. Unmined Coal Project Organization
 - b. Resource Delineation
 - Ⓝ Desorption Methods and Standards

Planning and Analysis (Continued)

- Developed contractual agreements with well service companies, with possible cooperative participation in 15 wells of the 24 planned for this year's program.

<u>Basin</u>	<u>Completed (to date)</u>	<u>Projected (7 9)</u>	<u>Anticipated Total</u>
Arkoma	3	2	
Green River	1	4	5
Illinois	2	3	5
Northern Appalachian	1	0	1
Piceance/Uinta	8	0	8
Powder River	1	2	3
San Juan	1	4	5
Warrior	1	0	1

University Subcontracts

- Negotiated and signed subcontracts with Pennsylvania State University, Virginia Polytechnic Institute, and the Colorado School of Mines to support the resource delineation effort.
- VPI and SU actively involved in basin analysis of coal-bearing regions of Southeastern United States.
- Colorado School of Mines Department of Geology has completed field work on a detailed geologic site investigation in the northern part of the San Juan Basin in the vicinity of Durango, Colorado.

Field Activities

- Reservoir assessment efforts have been directed to the following target areas:

San Juan County, New Mexico
Rio Blanco County, Colorado
Pittsburg County, Oklahoma
Haskell County, Oklahoma
LeFlore County, Oklahoma
Clay County, Illinois
Marion County, Illinois
Greene County, Pennsylvania
Sublette County, Wyoming
Fayette County, Alabama
Powder River County, Montana

TECHNOLOGY TEST PROJECTS

Management and Analysis

- Completed conceptual system designs for three candidate sites:

<u>Company</u>	<u>Types of Systems</u>	
	<u>Recovery</u>	<u>Utilization</u>
Ranger Fuels	Vertical wells	Pipeline injection
Eastern Associated	Gob gas	Mine shaft heating
Bethlehem Mines	Vertical wells	Pipeline injection

- Prepared and published the Technology Test Project Evaluation Report
- Completed negotiations and signed a subcontract with Waynesburg College to develop and demonstrate a system for the recovery of methane from bituminous coal and utilizing the gas by injection into a private pipeline
- Completed negotiations with Occidental Research Corporation (ORC) in cooperation with Island Creek Coal Company to develop a technique for recovery of methane from long horizontal holes drilled from within the mine and using the gas to produce LNG.
- Completed negotiations with Pennsylvania Energy Resources, Inc. (PERI) to develop and demonstrate a system for the recovery of methane from anthracite coal using stimulated multiple completion wells and utilizing the gas by injection into a local pipeline.

2. INTRODUCTION

2.1 BACKGROUND

During the natural process of coal formation, methane, the principal constituent of natural gas, is generated and trapped in the coal seam as well as in the adjacent rock area. All coal deposits contain methane. The concentration of methane varies from seam to seam, and within the seam. Recent estimates of the methane reserves in coalbeds are reported to approximate 700 trillion cubic feet. Given current and conservatively projected economic and technological factors, the recovery of an estimated 300 trillion cubic feet of the resource appears feasible. Based on present consumption rate, this is equal to a 10- to 12-year supply of the commodity.

Because of its volatility, methane has been considered a menace and hazardous to mining operations. The U. S. Bureau of Mines and many mining companies, in the interest of safety, have developed techniques for draining methane from the coalbeds prior to the start of underground coal mining, and for diluting the methane with fresh air during underground coal mining operations to reduce the concentration of coal dust and methane in the mines, and thereby reduce the probability of mine explosions and fires. Presently, all drainage techniques conclude by venting the coal gas into the atmosphere. Approximately 250 million cubic feet of methane are vented daily in U. S. mining operations. The content of the methane in gas vented from virgin coal is comparable to the quality of natural gas recovered from gas reservoirs. The content of methane in gas vented from gob (working mine) areas varies from 25 to 90 percent, depending on the venting techniques used.

In order to curb the waste of methane contained in coalbeds, and to provide for its recovery and utilization, the Department of Energy has initiated the Methane Recovery from Coal Project (MRCP) and assigned lead responsibility to the Morgantown Energy Technology Center. Major project objectives include:

- Location and characterization of methane resources
- Development of improved, cost-effective methane recovery and utilization technology

- Development of methane conservation techniques and systems
- Development of methane recovery prediction and projection techniques (models for well productivity)
- Development of field tests for pilot systems
- Investigation of legal and institutional constraints
- Transfer of applicable technologies to private industry.

On March 24, 1978, TRW was awarded Contract No. DE-AC21-78MC08089 to implement the engineering and integration necessary to achieve these objectives.

2.2 SCOPE OF WORK

Objectives and Approaches

The primary objective of the TRW effort is to develop and demonstrate a set of conditions in which recovery and utilization of coalbed methane is clearly to the economic advantage of the relevant private sector interests and which minimizes the necessity for Federal involvement over an extended time period. The TRW approach is established to meet this objective and encompasses:

- Resource characterization to identify target sites with greatest potential
- Identification of R&D to improve recovery and utilization techniques
- Definition, selection, and implementation of systems application projects to verify technical and economic viability under a variety of field conditions
- Technology transfer sufficient to support extensive commercialization of coalbed methane
- Overall program integration to assure a coordinated effort.

Statement of Work

Work under the TRW Methane Recovery from Coalbeds Project (MRCP) is defined by three discrete tasks.

Task 1 - Engineering Assistance to METC

Objective

Provide technical assistance to the Methane from Coalbeds Project.

Subtask Objectives

Subtask 1 - Preparation and updating of Methane from Coalbeds Project planning inputs for Technical Implementation Plans, Project Plan documents, Program and Project Strategies, Resource Delineation, and other project and subproject level planning documents, as directed by METC.

Subtask 2 - Review and analyze technical proposals associated with the Methane from Coalbeds Project which are submitted to DOE/METC for resource delineation, technology development, and Technology Test Projects as directed by METC.

Subtask 3 - Project documentation including preparation of project reports and technology transfer activities.

Subtask 4 - Review and evaluate R&D and related activities associated with the Methane from Coalbeds program as directed by METC.

Task 2 - Resource Delineation

Objective

Provide technical assistance and subcontracting support for the resource delineation **activities**. The objectives of the resource delineation effort are threefold:

- To estimate more reliably the methane resources contained in the nation's coalbeds
- To estimate the recoverable resource
- To determine exploration and production technologies that allow extrapolation from test sites to larger resource areas.

Subtask Objectives

Subtask 1 - Provide overall resource delineation planning, field support, evaluation and analysis, and administration/monitoring support.

Subtask 2 - Provide subcontracting and administration/monitoring of selected university activities.

Subtask 3 - Provide subcontracting and administration/monitoring data derived from field activities involving geological investigations, drilling, well testing, logging, fracturing, laboratory analysis, and evaluation of data.

Task 3 - Technology Test Projects

Task Objective

Provide design/development analyses, implementation, and evaluations of technology test projects.

Subtask Objectives

Subtask 1 - Technical assistance and support for selected Technology Test Projects. .

Subtask 2 - Implementation of a test to demonstrate the recovery of methane from multiple horizontal wells in an active mine and the utilization of the gas for the production of LNG or other purposes.

Subtask 3 - Deleted.

Subtask 4 - Implementation of a test to demonstrate the feasibility of recovering methane from multiple production zones in a single well and utilizing the gas in a local distribution system pipeline.

Subtask 5 - Implementation of a test to demonstrate the feasibility of recovering methane from multiple, vertically drilled wells with multiple production zones in unminable anthracite coal and utilizing the gas by pipeline injection.

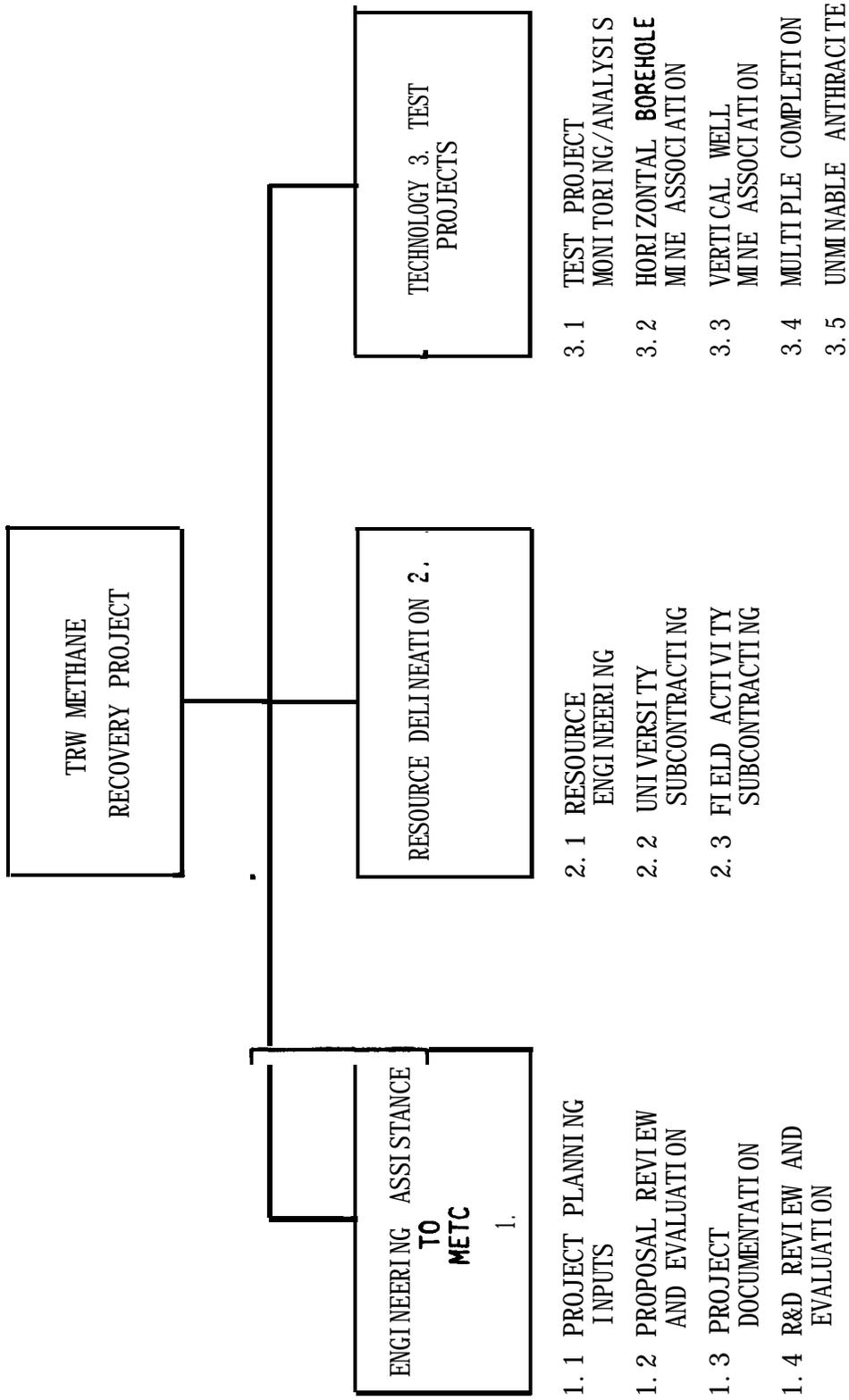


Figure 2-1. TRW MRCP Work Breakdown Structure (Revised 6/30/79)

3. DISCUSSION OF PROGRESS DURING AUGUST 1979

3.1 ENGINEERING SUPPORT

- Continued effort to incorporate review **comments** and format editing into the MRCP input for the Unconventional Gas Resources Semi-Annual Report.
- Provided inputs to the Gas Resources RD&D Management Plan.
- Prepared additional information on the methane **activity** being transferred to METC for incorporation into the draft FY 1980 MRCP PPD
- Provided management preparation guidelines for the semi-annual report.
- Provided inputs to advanced drilling technology planning.
- Continued to review progress of the MRCP exhibit being developed for the International Petroleum Exposition in Tulsa, Oklahoma.
- Continued preparation of the MRCP Symposium Proceedings.
- The Phase II Test Plan for testing the METC 5-3/8 inch turbodrill at Gearhart-Owen has been submitted for review and approval to Maurer Engineering and Gearhart-Owen. Other preparations are in progress to conduct the test.

3.2 RESOURCE ENGINEERING

- Coring and desorption operations were conducted on coal and interburden samples from the Mesaverde Formation in two confidential wells in Colorado. Very low gas contents were observed.
- Production testing of the stimulated zone (4863 to 4873 feet) in a confidential well in the Green River Basin is continuing. Recovery to date suggests poor recovery of either **frac** or formation fluid.
- Coring and desorption of a Fuelco well in the Piceance Basin was completed. Approximately, 23 feet of coal was encountered in the well, 18 feet of which was cored. Preliminary indications suggest low gas content.

- Coal samples from two thick **coalbeds** were collected near **Broadus**, Montana in the northern Powder River Basin from a USGS corehole. The Anderson and Dietz (Canyon A&B) beds were encountered at depths of 247.5 and 377.6 feet with a total thickness of 77.1 feet of coal.
- Internal review of the Powder River Basin Report has been completed and the document is being prepared for DOE review.
- Approval to release the Illinois Basin Report has been received from DOE/METC.

A field check of the area mapped by Colorado School of Mines as a part of the Detailed Geologic Site Investigation in the northern San Juan Basin was conducted August 8-9, 1979.

- A meeting with Mustang Production Company and Christensen Diamond Products was held August 15, 1979 in Oklahoma City, Oklahoma to discuss equipment and procedural changes which might improve core recovery in the geologically complex portions of the Arkoma Basin.
- A meeting was held with Southern Union Exploration and the University of New Mexico in Albuquerque, New Mexico to delineate a cooperative program for drilling, coring, and testing two wells in the southern San Juan Basin in New Mexico. This program offers the monitoring of flow from the Fruitland coals in two wells and the possibility of Type III tests in both.

3.3 TECHNOLOGY TEST PROJECTS

- The subcontract with Occidental Research Corporation for the in-mine drilling of long degasification holes has been signed by TRW following prior consent from METC. The signing by ORC should be in September following a final in-house review. A variation from the standard patents clause requested by ORC is under consideration by **Oakridge** Operations.
- The Environmental Assessment for the Waynesburg College project is underway. The team is gathering data necessary for inclusion into the report. The collection and analysis of air and water samples has been initiated. The drilling plan summary for the report is under preparation and should be completed in early September.
- Various techniques for dewatering the Waynesburg College we?? are under study.
- Submitted the subcontract package for the Pennsylvania Energy Resources, Inc. (PERI) technology test project to METC for DOE review and approval.

- Provided guidelines and sample documents to PERI, and provided guidance for the preparation of the Environmental Assessment.
- Visited the PER1 field site. No changes from last visit.

4. ACTIVE FIELD PROJECTS

Each of the projects in the Engineering Support, Resource Engineering, and Technology Test areas having substantial field activities, planning for field activities, or analysis activities immediately following field activities are summarized in this section.

Project. summary sheets are included for the following projects:

Engineering Support

Active R&D Projects

Maurer Turbodrill Testing

Resource Engineering

Active Projects

Kinloch Development - Northern Appalachian Basin
Western Coal Company - San Juan Basin
Fuelco - Piceance Basin
Twin Arrow Drilling Company #1-13 - Piceance Basin
Arkla Exploration Company - Arkoma Basin
Hagen Oil Company - Illinois Basin
Confidential #1 - Green River Basin
Twin Arrow Drilling Company #4-14 - Piceance Basin
Belco Petroleum Corporation - Green River Basin
GeoWest Inc. - Illinois Basin
Confidential #2 - Colorado
Confidential #3 - Colorado
Grace Petroleum - Warrior Basin
Mustang Production - Arkoma Basin (Pittsburg County, Oklahoma)
Mustang Production - Arkoma Basin (Haskell County, Oklahoma)
Confidential #1 - Green River Basin (Type III operations)
Fuelco - Piceance Basin
Confidential #4 - Colorado
Confidential #5 - Colorado
U. S. Geological Survey - Powder River County, Montana

Firm Planning

Fuelco - San Juan Basin (2 wells)
Indiana Geological Survey - Illinois Basin (2 wells)
Montana Bureau of Mines and Geology - Powder River Basin (2 wells)
Mustang Production - Latimer County, Oklahoma (2 wells)

ENGINEERING SUPPORT

Active R&D Projects

TURBODRILL TESTING PROJECT
HOUSTON AND FORT WORTH, TEXAS

STATUS

PHASE II PERFORMANCE TESTS

August 1979

CO-OPERATING COMPANY

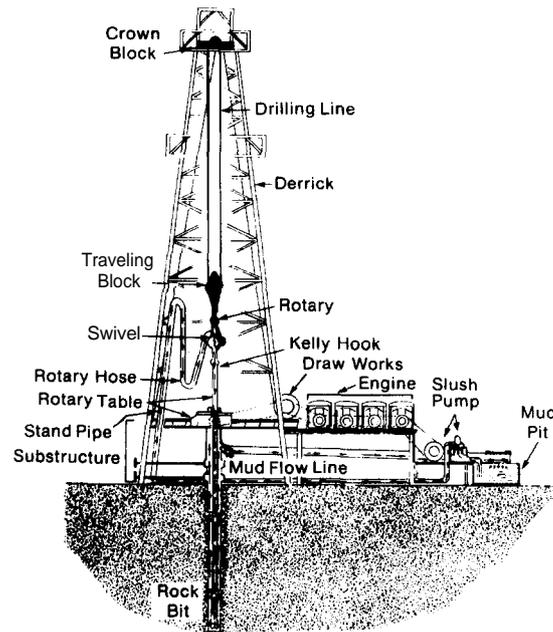
- Maurer Engineering Inc
Houston, Texas
- TRW Mission Manufacturing
Houston, Texas
- Gearhart-Owen Indus., Inc.
Fort Worth, Texas

CONTRACT(S)

Basic:
DE-AC21-78MC08089

FIELD TEST PERIOD(S)

Performance, Phase I - Feb 79
Field Tests, Phase II - Oct 79
Directional Drilling
Test, Phase III - not scheduled



OBJECTIVE

Determine performance and wear characteristics and operational procedures required to apply the turbodrill to placing methane drainage boreholes in horizontal and/or steeply-dipping coal seams.

FIELD ACTIVITY PROGRESS

- Maurer Engineering completed informal developmental testing at its Kor-King Facility in Houston, Texas on December 28, 1978. The tests utilized water as the working fluid. Design mods were made to the bearing pack based on the results of the **teardown** inspection following each test.
- Formal Phase I testing was begun February 20, 1979. The test was prematurely terminated due to lower thrust bearing failure. A modification was made and testing resumed on March 15.
- Performance testing was completed at TerraTek's Drilling Research Laboratory in Salt Lake City, Utah on April 10 and 11, 1979. Sustained penetration rates in the range of 30 to 50 ft/hr were achieved.
- Drillability testing using the 7-3/4 inch motor has been carried out at the Los Alamos Fenton Hill site. Average penetration rates of 20 ft/hr and above have been observed.

OTHER TESTING

Preparations for subsequent Phase II testing at Gearhart-Owen are in progress. The tachometer performed satisfactorily at Fenton Hill and transmitted signals to the surface from 8800 feet downhole.

ANALYSIS STATUS

Phase I - Part I data analysis is complete. TerraTek test data analysis is complete.

Maurer Turbodrill Testing

FIELD ACTIVITIES

Maurer Engineering has performed five short-duration shakedown tests of the Turbodrill. Baseline performance data were obtained. Teardown and inspection of the drill motor has revealed design problems. Maurer Engineering instituted design modifications to the floating piston seal assembly in preparation for subsequent formal Phase I testing at TRW Mission Manufacturing. DOE/METC has exercised the option to proceed into a modified testing project using the flow-through version of the bearing pack. The flow-through bearing pack will be used in Phase I and Phase II. When an adequate pressure seal is obtained, an abbreviated Phase I test may be run. At that point, the project will proceed directly into Phase III testing in a rugged field environment using the sealed bearing pack version.

Some potential drill motor operational difficulties were observed during the TerraTek tests. Refinements in operational procedure were determined by Los Alamos personnel at the field trials of the larger 7-3/4 inch turbodrill at Fenton Hill, New Mexico. These procedures will be used at the Gearhart Owen during startup on bottom. The prototype tachometer was also tested in the larger drill motor by Los Alamos.

ANALYSIS ACTIVITIES

Preliminary baseline performance curves (at zero imposed bit-end pressure drops), have been determined from the shakedown tests and limited Phase I testing.

Preliminary indications of drilling rates to be expected at Gearhart-Owen were determined from the TerraTek data to aid in planning activities for Phase II testing.

RESULTS

- The tachometer unit run at Fenton Hill operated satisfactorily by transmitting pressure pulses from 8800 feet downhole.
 - Redesign of the floating-piston assembly on the oil reservoir of the sealed bearing pack model.
 - Elimination of the pressure seal assembly and use of the seal leak-sleeve in the flow-through version of the bearing pack.
 - Analyses of the preliminary shakedown test data and available Phase I data show characteristic torque, power, efficiency, and rotary speed relationships as expected. However, pressure drops through the drill appear to be considerably higher than expected.
 - Penetration rates achieved in relatively hard rock at TerraTek are encouraging in meeting the projected test schedule at Gearhart-Owen.
-

RESOURCE ENGINEERING

Projects - Active

STATUS Complete

July 1979

CO-OPERATING COMPANY

Kinloch Development
Company

Location: #1 Murdoch Well; Whiteley Township, Greene County,
Pennsylvania ~1 mi. North of Fordyce along
Frosty Run.

CONTRACT(S)

FIELD TEST PERIOD(S)

April 3 - June 23, 1978

OBJECTIVE To test the effect of stimulation on the producibility of methane from
Pennsylvanian coalbeds.

FIELD ACTIVITY PROGRESS

- Drilling completed.
- Borehole geophysical logging - Neutron, compensated, density, induction - Completed.
- Sidewall coring - Completed.
- Perforation and pre-frac flow testing - Completed.
- Stimulation - Kiel process hydraulic fracturing - Completed.
- Post-frac injection testing - Completed.
- Gas and water production testing - Recommended but not carried out.

OTHER TESTING

- Desorption of sidewall core samples - Completed.

ANALYSIS STATUS

- All testing and analysis of tests completed.

Kinloch Development Company

FIELD ACTIVITIES

- April 3-7 - Drill to TD 1608 feet.
- April 8 - Log and sidewall core well.
- May 5 - Cement in 5-1/2 inch casing to TD.
- May 25 - Perforate 4 selected coalbeds.
- May 25-26 - Run casing-collar log and perforating record and cement band logs.
- June 7 - Complete pre-frac injection tests.
- June 7 - Stimulate well - Kiel frac process.
- June 23 - Final injection test.

ANALYSIS ACTIVITIES

- Desorption of sidewall core samples show that gas in content of coal seams ranges from 33.3 to 425.6 ft³/ton with the higher values from samples of the lower perforated coals.
- Pre-frac water injection test through acidized perms indicated permeabilities of 0.5 to 1.0 md depending on tested zone.
- Three stage frac at 3800 - 3900 psi (well above design) introduced 1533 bbl containing 18,480 lb 80-100 mesh and 15,750 lb 20-40 mesh sand.

RESULTS

- After frac, well flowed ~80 bbl water per day with show of gas.
- Sucker rod pump installed and produced water and gas. No water or gas monitoring equipment was installed so no quantitative measure of fluid production could be made.

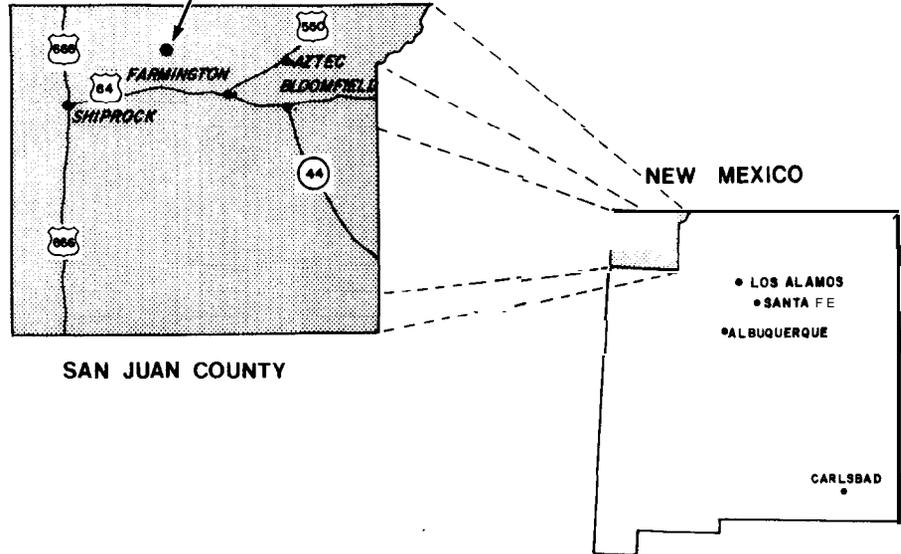
SAN JUAN BASIN - SITE
SAN JUAN COUNTY, NEW MEXICO

Western Coal Company

STATUS Testing and Analysis Complete
No Further Activity

CO-OPERATING COMPANY
Western Coal Company
Albuquerque, New Mexico
(505) 842-1023

Location SE 1/4, Sec. 22, T30N, R15W
PROJECT LOCATION



CONTRACT(S)

FIELD TEST PERIOD(S)
16-17 June 1978

OBJECTIVE To determine the methane content and reservoir properties of coal seams within the Fruitland Formation in the San Juan Basin as part of an effort to delineate the potential for production from this resource area.

FIELD ACTIVITY PROGRESS

- Testing on this well was done during original coring at 393.5 feet

Tests Performed

Results/Comments

Conventional coring

- 43.5 ft. of core cut between 370 and 413.5 ft. encountering cumulative coal thickness of 12.2 feet.

OTHER TESTING

Coal core desorption
Proximate/ultimate analysis

ANALYSIS STATUS

Desorption and analyses completed.

Western Coal Company - SE 1/4, Sec. 22, T30N, R15W

FIELD ACTIVITIES

16-17 June - Participate in coring activities, core description, sample collection, and initial desorption

Coal Cored

<u>Core No.</u>	<u>Coal Interval</u>	<u>Seam Thickness (Ft)</u>
3	387.3-387.8	0.5
4&5	395.5-403.7	8.2
5	404.0-407.5	3.5

ANALYSIS ACTIVITIES

- Desorption of two coal samples completed.
- Laboratory analyses (proximate/ultimate, heating value, sulfur forms) completed.

RESULTS

- Desorption Data and Lab Data (as received)

<u>Depth (ft)</u>	<u>Gas Content (Total), cc/gm</u>	<u>Ft³/ton</u>	<u>Coal Rank</u>	<u>Heating Value (Btu/lb)</u>	<u>Moisture Content (%)</u>	<u>Volatile Matter (%)</u>	<u>Fixed C(%)</u>	<u>Ash (%)</u>
398.2-398.8	2.3	73.0	Hvaa	12293	4.7	38.2	49.3	7.7
398.8-399.4	.51	16.3	Hvab	12543	4.2	37.1	52.6	6.1

PICEANCE BASIN, SITE AA
RIO BLANCO COUNTY, COLORADO

Fuel co

STATUS

Testing Complete/Analysis in Progress

July 1979

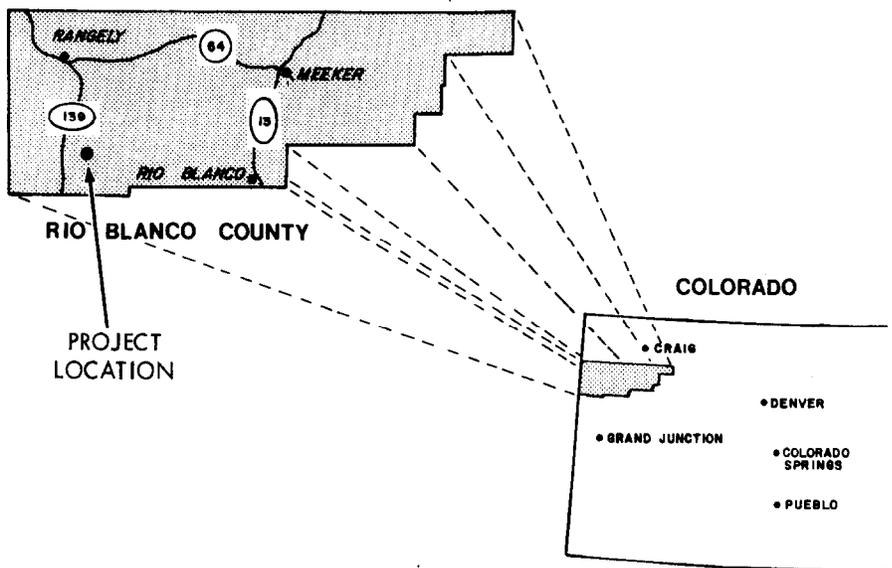
CO-OPERATING COMPANY
Fuel Resources Development
Company
Denver, Colorado

Location: Cathedral 0-28-3-101-S - Sec. 28, T3S, R101W

CONTRACT(S)

FIELD TEST PERIOD(S)

September 9-10, 1978



OBJECTIVE To determine the methane content and reservoir properties of coal seams within the Lower Mesaverde Formation sediments in the Piceance Basin as part of an effort to delineate the potential for production from this resource area.

FIELD ACTIVITY PROGRESS

- Testing was performed during the original drilling at 7894 feet.

Tests Performed

Results/Comments

Conventional coring

- 142 feet of core, coal samples taken at 1584-1586 and 1603-1604 feet.

Logging

- Compensated neutron-formation density, dual induction-laterolog.

OTHER TESTING

Coal core desorption
Proximate/ultimate analysis

ANALYSIS STATUS

Desorption of cores completed.

Fuel co - Cathedral 0-28-3-101-S, Sec. 28, T3S, R101W

FIELD ACTIVITIES

- September 7 Spudded in bedrock
- September 9 ● Began coring, cored 90 feet
- September 10 ● Cored 52 feet
- September 11 ● Began logging by Schlumberger
- September 12 ● Rigged down Schlumberger and rigged up casing crew
- September 13 ● Released rig

ANALYSIS ACTIVITIES

- Desorption of two coal samples complete.
- Laboratory analysis (proximate/ultimate, heating value, sulfur forms) completed

RESULTS

- Desorption data from conventional cores;

<u>Sample Depth (Ft)</u>	<u>Total Gas (CC)</u>	<u>Sample Wt. (gm)</u>	<u>Total Gas Per Unit</u>	
			<u>(cc/gm)</u>	<u>(Ft³/Ton)</u>
1585	898	1584	.56	17.9
1603	364	144	2.5	80.9

STATUS Testing Complete
 No Further Activity

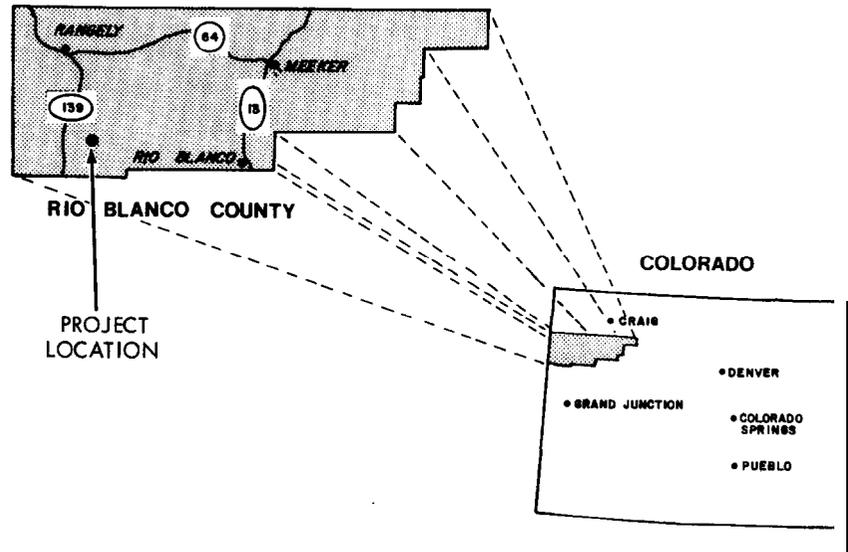
July 1979

CO-OPERATING COMPANY
 Twin Arrow Drilling Co.
 Rangely, Colorado

Locations C&K Well #1-13, Elevation 6910 feet.
 Section 13, Township 3S, Range 101W

CONTRACT(S)
 DE-AC21-78MC08089

FIELD TEST PERIOD(S)
 3 October to
 7 October 1978



OBJECTIVE To determine the gas permeability, flow rate and producibility of several coal seams of the Mesaverde Formation in the Piceance Basin as part of an effort to delineate the potential for production from this resource area.

FIELD ACTIVITY PROGRESS

- Well in process of being abandoned by Twin Arrow. Plug set at about 1050 feet to isolate coal seams prior to initial testing.
- Zones tested. 573-581, 627-665, 726-736, 801-810.
- Testing Sequence, all zones Results/Comments

Pressure and flow tests	No pressure, no flow
Squeeze cemented	1050 to 320 feet
Cement Bond Log	100 - 883 feet
Perforated	1 shot per foot
Acid treated	7.5% HF
Swabbed	Dry
Pressure and flow tests	No pressure, no flow
Fracture and flow test	Not performed due to no gas shows.

OTHER TESTING

Logs available from original drilling effort.
 Induction, electric compensated density.

ANALYSIS STATUS

No further site specific analysis activity.

FIELD ACTIVITIES

- October 3. Swabbing attempted while awaiting bridge plug, unable to swab dry. Shut in.
- October 4. Bridge plug set at 1050 feet and hole swabbed dry. Hole continues to make water at 2.5 bbl/hr. Pressure and flow are negligible.
- October 5. Hole cemented from top of existing cement (-1050 feet) to 320 feet.
- October 6. Cement Bond log run. Perforated 5 zones at 1 shot/ft.
- October 7. Treated all zones with 7.5% MF. Total acid - 500 gal. Swabbed dry and pressure tested. Shut-in pressure zero. No flow observed through 1/8 inch orifice. Operations terminated.
- Service Contractors - Haleburton - Bridge plug, cementing, acidizing
Schlumberger - Bond log, perforating
Wellex - Original logs

ANALYSIS ACTIVITIES

In this area the Mesaverde is divided into upper and lower. Upper is brown and yellowish gray massive sandstone and gray shale with principal **coalbeds** near base. Lower is light gray and brown massive sandstone, gray shale and some coal. Based on Twin Arrow logs coal is present at 573-581, 627-633, 661-665, 726-736, 801-810. Other coal in thinner, deeper seams and in washed out hole areas at 1278-1282, 1494-1496, 1864-1870, 2116-2119, and 2148-2154. These zones to be tested in another well.

While no shows are now evident, original well tool pusher recalls show at 320 feet. It is possible that a bridge sealed off small sand from perforations.

RESULTS

No gas show in coals. Drilling site is on mesa with valley floor lower than intervals tested. It is possible any original gas in place was lost to the atmosphere.

See site AC in same locale.

STATUS

Testing Complete - Analysis in Progress

CO-OPERATING COMPANY

Arkla Exploration Co.
 Shreveport, Louisiana

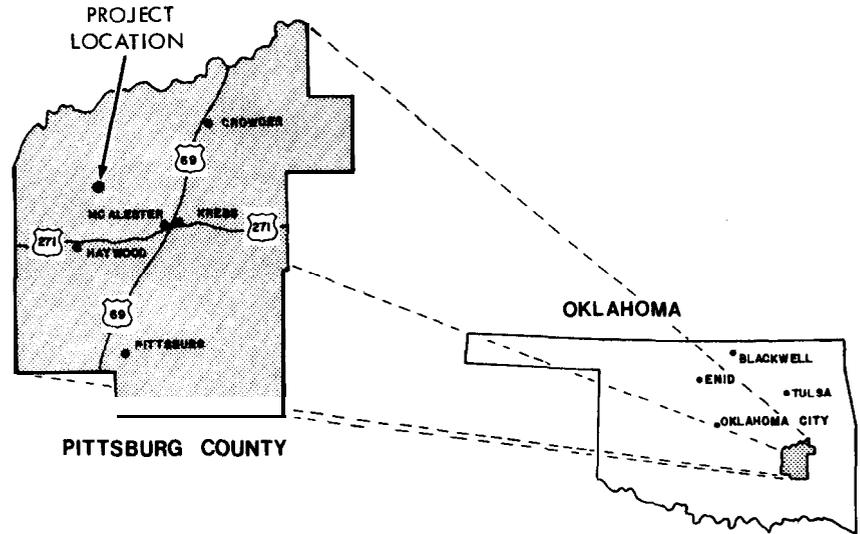
Locations Brown Well #1-2, Elevation 755 feet
 Section 2, Township 6N, Range 13E

CONTRACT(S)

DE-AC21-78MC08089

FIELD TEST PERIOD(S)

9 October to
 11 October 1978



OBJECTIVE To determine the methane content and reservoir properties of the Lower Hartshorne Seam in the Arkoma Basin as part of the effort to delineate the potential for production from this resource area.

FIELD ACTIVITY PROGRESS

- Testing on this well was done during original drilling to 3150 feet.
- Tests Performed
 - Sidewall coring ● 36 cores obtained from 48 shots, 1820.0 to 2715.5 feet.
 - Drill stem tests ● Tested interval 2700 to 2740 feet. Pressure 716 psig, final flow 9.6 bbls/day.
 - Test interval 2127-2130 cancelled to eliminate risk of sticking pipe.

OTHER TESTING

Desorption of core samples by Geochem.
 Logging by Arkla (Induction Later log, neutron density, and sonic).

ANALYSIS STATUS

Desorption completed.
 DST indicates permeability of 4.5 md average, no formation damage.
 Radius of investigation, 206 feet.

Arkla Exploration Company - Brown Well #1-2, Sec. 2, T6N, R13E

FIELD ACTIVITIES **October 8** - Drilling reached 3150 feet, logging completed.
October 9 - Sidewall cores taken.

<u>Interval</u>	<u>Shots</u>	<u>Cores Recovered</u>
1833.0 - 1834.0	2	2
1903.0 - 1906.0	4	3
2124.0 - 2131.0	20	17
2703.0 - 2732.0	22	18

October 10 - Circulated preparatory to drill stem tests at 2700 to 2740 feet. After reaching bottom with DST tools, pipe tally showed improper test depth.

October 11 - DST tools repositioned and test conducted.

October 12 - Preparing for DST at 2127 to 2130 feet.

October 13 - DST cancelled by Arkla due to risk of sticking pipe below packer to bottom of the hole.
Testing completed.

Service

Contractors - Geochem - Sidewall cores, desorption

Johnston - DST

Schlumberger - Arkla logs

ANALYSIS ACTIVITIES

- Coal indicated on logs at depths shown above.

- DST results as calculated by Johnston using Horner method.

Flow	9.0 bbl/day, water
Pressure	Initial shut-in 716 psig, Final shut-in 710 psig
Permeability	4.5 md, average
Well Bore Damage	None
Radius of Investigation	- 206 feet

- Desorption in progress.

RESULTS

- Results from Geochem of sidewall cores:

<u>Interval</u>	<u>Lithology</u>	<u>Gas Content</u> in Place (ft ³ /ton)
1903-1905	Coal	130.9
2125-2130	Coal	211.2
2728-2733	Coal	72.6

STATUS

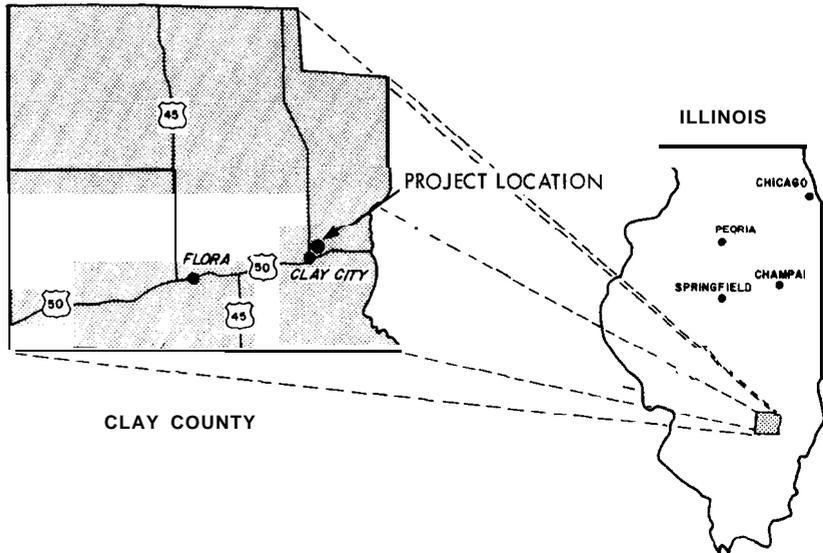
Testing Complete/Analysis in Progress

August 1979

CO-OPERATING COMPANY

Hagen Oil Company
Clay City, Illinois

Locations Henderson #2 Well, Elevation 451 feet,
Section 19, Township 3N Range 8E



CONTRACT(S)

DE-AC21-78MC08089

FIELD TEST PERIOD(S)

25 October to
28 October 1978

OBJECTIVE

To determine the methane content and reservoir properties of numerous coal horizons within the Illinois Basin as part of an effort to delineate the potential for production from this resource area.

FIELD ACTIVITY PROGRESS

- Testing was performed during the original drilling at 990 feet.

Tests Performed

Conventional coring

- 194 feet of core. Coal at 994-997, 1035-1037, 1077-1078, 1089-1091, and 1352-1352.5 feet.

Drill stem tests

- Tests at 1342-1354, 1071-1083, and 1026-1038 feet.

Logging

- Induction-laterolog, porosity, density, sonic, fracture identification.

Sidewall cores

- Very little coal recovered.

OTHER TESTING

Desorption complete.

ANALYSIS STATUS

In progress.

Hagen Oil Company - Henderson #2 Well, Sec. 19, T3N, R8E

FIELD ACTIVITIES

- October 25
 - Coring with 30 foot barrel. Rates of 10 to 30 feet/hour.
 - Intervals 990-1020, 1023-1053, 1053-1067, 1067-1097, 1330-1360, 1400-1430, and 1480-1510 feet (TD).
 - Coal samples collected and placed in desorption canisters.
- October 27
 - Start drill stem tests in Seelyville coal - 1342-1354 feet.
- October 28
 - DST in Briar Hill No. 5A, 1071-1083 feet.
 - DST in Herrin No. 6 - Misrun due to plugged tool.
 - Ran logs (induction, porosity, density, sonic, and fracture identification).
 - Attempts at sidewall coring aborted due to zero return - no charge for attempts.

Service Contractors: Christensen - Conventional coring
Lynes - DST
Schlumberger - Logging sidewall cores

ANALYSIS ACTIVITIES

- Desorption complete.
- DST analysis completed, shut in pressures in Seelyville 479 to 466 pgs; in Briar Hill 239 to 176 psig. No significant flows.
- Sidewall core desorption preliminary data - the gas content of the Danville No. 7 coal was estimated by this technique to be 27.7 cubic feet/ton.
- Proximate/Ultimate Analysis complete.
- Porosity/Permeability of coal analyses complete; porosity is estimated to be between 3 and 7 percent; permeability is less than 0.1 md.

RESULTS

Conventional Core Desorption Results

<u>Depth of Sample</u>	<u>Lithology</u>	<u>Gas Content (Ft³/Ton)</u>
994	Coal	42
995	Coal } Danville No. 7	38
1035	Coal	29
1036	Coal } Herrin No. 6	35
1034	Shale (roof rock)	10
1077	Coal - Briar Hill No. 5A	32
1090	Coal - Harrisburg No. 5	38
1352	Coal - Seelyville	48

STATUS

Testing Complete/Analysis in Progress

August 1979

CO-OPERATING COMPANY

Confidential

CONTRACT(S)

FIELD TEST PERIOD(S)

November, 1978

OBJECTIVE To determine the methane content and reservoir properties of several coal seams within the Mesaverde Formation in the Green River Basin as part of an effort to delineate the potential for production from this resource area.

FIELD ACTIVITY PROGRESS

- Testing was performed during the original drilling at 6540 feet.

Tests Performed

Results/Comments

Conventional coring

- 139 feet of core, coal at 3652-3652.6, 3674.7 to 3676.1, 3923 to 3924.1, 3937 to 3937.2, 3947.9 to 3948.2, 4649 to 4659.8, 4660.8 to 4661, 4704.4 to 4706 feet.

Logging

- Compensated neutron, caliper, natural gamma, bore hole compensated sonic, dual induction

Sidewall coring

a 26 cores obtained

Drill stem tests

- Sample depth 3683-4988 feet

OTHER TESTING

Coal core desorption
Proximate/ultimate analysis

ANALYSIS STATUS

Desorption in progress

Green River Basin - Confidential Well No. 1

FIELD ACTIVITIES

- November 6 ● Spud date
- November 16 ● Began coring at 3642 feet, 30 foot core barrel
- November 17 ● Core #1 removed, 3642-3672, drilling rate 4 ft/hr.
- November 18 ● Core #2 removed, 3672-3702 feet
- November 19 ● Drill stem Test #1, 3700-3800 feet
- November 20 ● Drill stem Test #1 continued
- November 22 ● Core #3 removed, 3923-3953 feet
- November 28 ● Core #4 removed, 4649-4679 feet
- November 29 ● Core #5 removed, 4679-4709
- Drill stem Test #2, 4634-4714 feet
- December 2 ● Ran Schlumberger Logging for sidewall cores

ANALYSIS ACTIVITIES ● Laboratory analysis (Proximate/ultimate, heating value, sulfur forms)

- Conventional core desorption continuing
- Drill stem test results complete
- Sidewall core desorption

<u>Depth</u>	<u>Lithology</u>	<u>Gas in Place (Ft³/ton)</u>
4984	Coal	144.0
4982	Very carbonaceous shale	89.9
4980	Coal w/shale	157.4
4978	Coal	157.7
4976	Coal	142.0
4872	Coal	178.5
4868	Coal	157.4
4864	Coal	209.9
4986	Coal	132.8
4814	Coal	189.6
4720	Coal	136.0
4666	Coal	178.5

RESULTS Preliminary **Summary** - On-going desorption of conventional core samples for Green River Site AA as of January 26, 1979.

- From 13 samples, the gas content ranged from a low of 7 SCF/ton to a high of 340 SCF/ton. Most of the samples had gas content in the range of 220 to 340 SCF/ton.

PICEANCE BASIN, SITE AC,
RIO BLANCO COUNTY, COLORADO

Twin Arrow Drilling Company

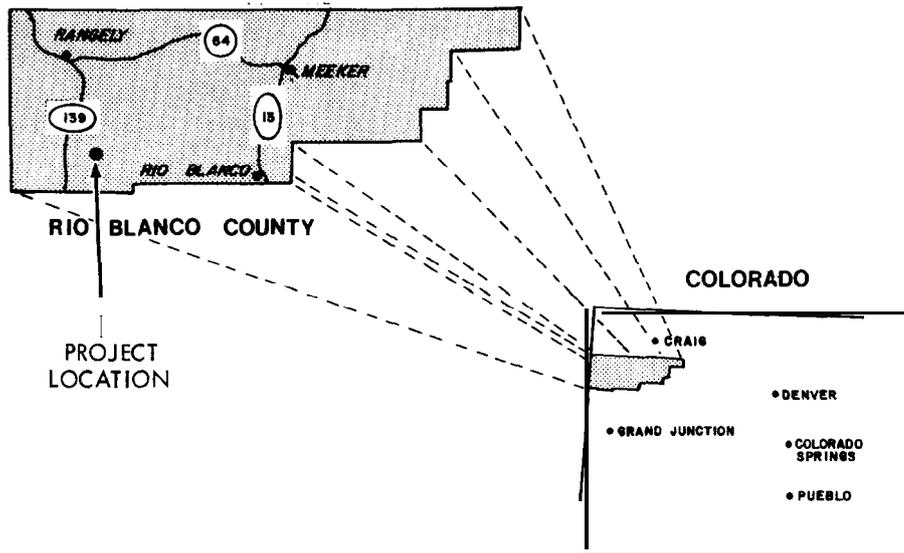
STATUS Testing Complete/Analysis in Progress

August 1979

CO-OPERATING COMPANY

Twin Arrow Drilling Company
Rangley, Colorado

Location: C&K Well #4-14 - Sec. 14, T3S, R101W



CONTRACT(S)

FIELD TEST PERIOD(S)

November - December
1978

OBJECTIVE To determine the content and reservoir properties of multiple coal seams of the Mesaverde Formation in the Piceance Basin as part of an effort to delineate the potential from this resource area.

FIELD ACTIVITY PROGRESS

- Testing was performed during original drilling at 6931 feet.

Tests Performed

Results/Comments

Conventional coring

- 150 feet of core. Coal at 685.2-685.6, 698.1-698.45, 770.9-771.6, 772.5-773.8, 759.2-760.0, 801.9-802.6, 804.4-805.0, 809.4-809.7, 986.5-987.3

OTHER TESTING

Desorption in progress
No logs run due to lost hole; logs run on \$4-14X at same location.

ANALYSIS STATUS

Preliminary desorption data available.

Twin Arrow Drilling Company - C&K Well #4-14, Sec. 14, T3S, R101W

FIELD ACTIVITIES	November 18	• First truck loads of rig equipment moved to site
	November 20-24	• Rigging up
	November 25	• Spud date, shaft pilot bearing froze
	November 26	• Repairs
	November 27	• Repair Kelly bushings, drill surface
	November 30	• Trip in for core #1
	December 1	• Trip in for core #2, core #3, core #4
	December 2	• Trip out for core #4, reaming, drilling
	December 3	• Repairs
	December 4	• Coring for CER
	December 5	• Coring for CER
	December 8	• Fish in hole
	December 11	• Fishing completed
	December 14-28	• Tried to whipstock out of plugged hole. Hole abandoned on December 28, 1979

ANALYSIS ACTIVITIES

- Desorption in progress
- No well testing was performed because the hole was lost

RESULTS

- Preliminary desorption results

<u>Depth of Sample</u>	<u>Lithology</u>	<u>Gas₃ Content (Ft³/Ton)</u>
685.2-685.6	Coal	151.4
698.1-698.45	Carb Shale/Coal	130.3
770.9-771.6	Carb Shale/Coal	33.1
759.2-760.0	Coal	156.2
772.3-773.6	Carb Siltstone	126.1
801.9-802.6	Coal	107.7
804.5-805.0	Carb Shale	136.6
809.3-809.7	Coal	339.2
986.5-987.3	Coal	111.0

STATUS Testing Complete/Analysis in Progress

August 1979

CO-OPERATING COMPANY

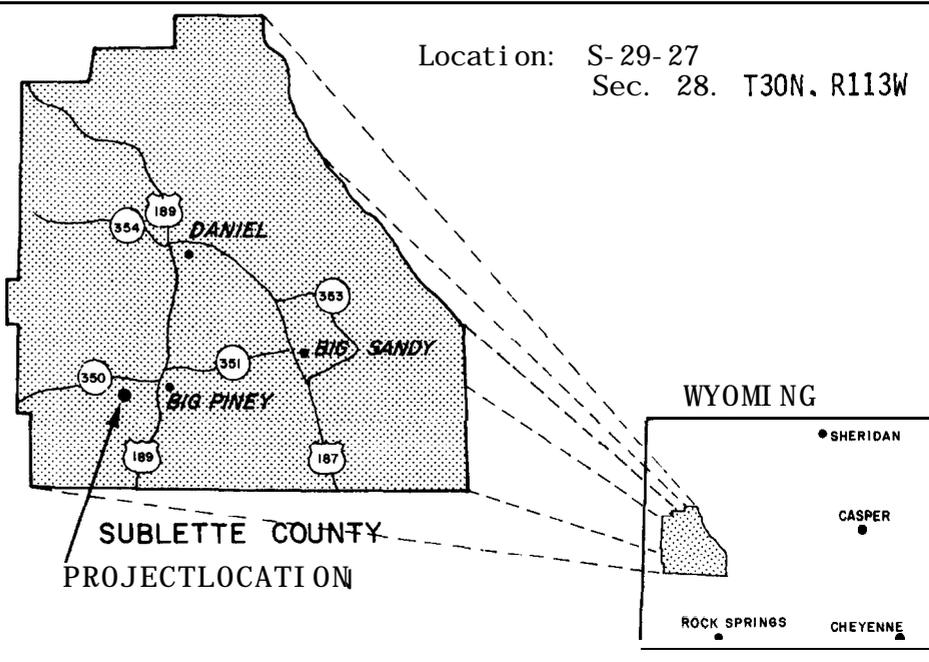
Belco Petroleum Corp.
 Lakewood, Colorado

Location: S-29-27
 Sec. 28. T30N. R113W

CONTRACT(S)

FIELD TEST PERIOD(S)

2 January to
 14 January 1979



OBJECTIVE To determine the methane content and reservoir properties of numerous coal horizons within the Mesaverde Formation in the Green River Basin as part of an effort to delineate the potential for production from this resource area.

FIELD ACTIVITY PROGRESS

- Testing was performed during the original drilling at 7298 feet.

Tests Performed

Results/Comments

Conventional Coring

- 90 feet of core. Coal at 3479.1-3481.4, 3494.8-3496.5, 3526.6-3528.2 feet

Logging

- Borehole compensated sonic/gama ray dual induction - SFL

Sidewall coring

- Compensated neutron/formation density Caliper
- 18 cores obtained
 3498' - 3500'
- Sample depths: 3484' - 3487'
 1438' - 1440'

OTHER TESTING

Coal core desorption
 Proximate/ultimate analysis

ANALYSIS STATUS

- Analysis by gaschromatograph complete
- Desorption in progress

- FIELD ACTIVITIES **January 2**
- Spud date
- January 11
- Started coring at 3450 feet, 30 foot core barrel
 - Intervals 3450-3540.9, 3480.6-3510.9
 - Coal samples collected and placed in desorption canisters
- January 12
- Cored interval 3510.9-3540.9
 - Coal samples collected and placed in desorption canisters
- January 13
- Sidewall cores taken
 - Ran logs
 - Drill stem testing canceled at the request of Belco due to inclement weather and potential hole problems
 - Completion of testing
- Service
Contractors: Geochem - Desorption
Christensen - Conventional coring
Schlumberger - Logging and sidewall cores

- ANALYSIS ACTIVITIES
- Laboratory analysis (proximate/ultimate, heating value, sulfur forms)
 - Desorption in progress for conventional cores
 - Sidewall core desorption complete

RESULTS

- Conventional core desorption data through May 11, 1979

<u>Sample Depth Range (ft)</u>	<u>Lithology</u>	<u>Range of Total Gas (ft³/ton)</u>
3479.1 - 3495.7	Coal (5 spls)	384 - 480
3506.0 - 3519.3	Carb. Shale (2 spls)	28 - 172
3525.1 - 3526.7	Coal (2 spls)	407 - 443

- Sidewall core desorption data by Geochem - March 11, 1979

<u>Sample Depth Range (ft)</u>	<u>Lithology</u>	<u>Range of Total Gas (ft³/ton)</u>
3438.5	Coal (1 spl)	214
3440.0 - 3485.5	Carb Shale (3 spls)	98 - 212
3498.0 - 3499.5	Coal (3 spls)	215 - 350

STATUS

Field Operations Completed

August 1979

CO-OPERATING COMPANY

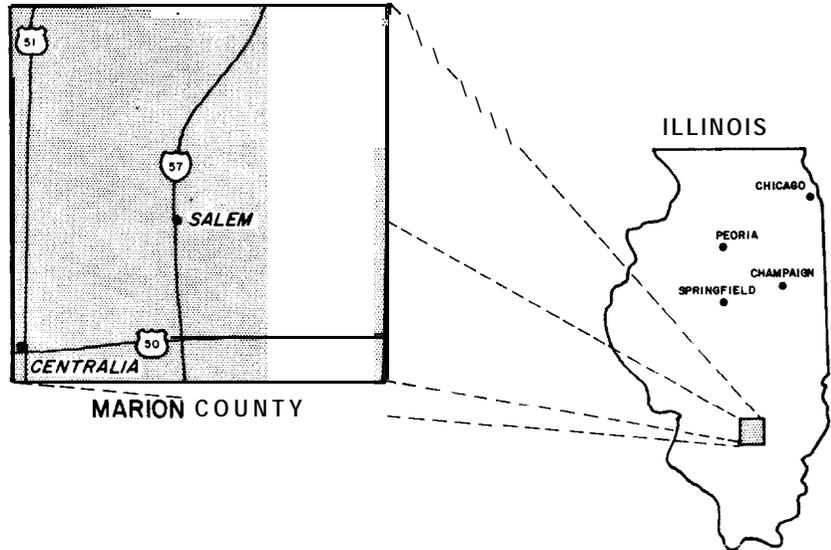
GeoWest Inc.
Billings, Montana
(406) 252-0070

Location: Confidential - Marion County, Illinois

CONTRACT(S)

FIELD TEST PERIOD(S)

May 12-17, 1979



OBJECTIVE

To determine coal thickness and gas content and some reservoir characteristics of these coals.

FIELD ACTIVITY PROGRESS

- Drilling and coring completed
- Borehole geophysical logging - electric, gamma-ray, gamma-gamma density, and caliper - completed.
- Drill stem test aborted because of hole sloughing.

OTHER TESTING

Desorption of coal samples
Laboratory analyses of coal samples

ANALYSIS STATUS

Desorption complete - remaining gas determination in progress.

FIELD ACTIVITIES

12 May - Location selection

13 May - Site preparation

14-16 May - Drill and core coal seams encountered:

<u>Seam</u>	<u>Depth (feet)</u>	<u>Thickness (feet)</u>
Illinois No. 7	663.7	2.8
No. 6	698.0	5.1 (Upper part of seam drilled through)
No. 4	727.0	0.9
No. 5	732.4	4.0

16 May - Borehole geophysical logs run - Electric, gamma-ray, gamma-gamma density, and caliper.

17 May - Plug hole.

ANALYSIS ACTIVITIES

- Coal desorption complete; remaining gas determination in process.
- Porosity/Permeability and bulk density determination of roof and floor rock samples complete.
- Proximate/Ulimate analyses in progress.

RESULTS

- Desorption of core

<u>Depth of Sample</u>	<u>Unit</u>	<u>Gas Content (Ft³/ton)*</u>
664.8	Danville No. 7 coal	● 22
698.0	Herrin No. 6 coal	29
727.0	Briar Hill No. 5A coal	13
		29
732.4	Harrisburg No. 5 coal	29
732.4	Harrisburg No. 5 coal	16

*Excluding remaining gas

Colorado

STATUS

Field Operation completed

August 1979

CO-OPERATING COMPANY

Confidential

Confidential Colorado - Well No. 2

CONTRACT(S)

FIELD TEST PERIOD(S)

June 11-20, 1979

OBJECTIVE

To determine the quantity and quality of the coal, the methane content of the coal, and some reservoir properties of three coal seams. This effort will help determine the potential productivity of **coalbed methane** from this resource area.

FIELD ACTIVITY PROGRESS

- Testing was performed during the original drilling at 5463 feet.

Tests Performed

Results/Comments

Conventional Coring

- 43 feet of core. Coal at 1324.7 - 1325.9, 1325.9 - 1327.1, 1330.65 - 1338.8, 1351.2 - 1352.1

Logging

- **Borehole** geophysical logs run - electric, gamma-ray, gamma-gamma density, and caliper.

OTHER TESTING

- Desorption of coal samples
- Laboratory analysis of coal samples to be completed.

ANALYSIS STATUS

- Desorption in work - initial indications of low gas content

Colorado - Confidential Well #2

FIELD ACTIVITIES

- 16 June - Pilot hole logged
- 17 June - Spud date for core hole
- 19 June - Core point reached

<u>Seam</u>	<u>Depth (ft)</u>	<u>Thickness (ft)</u>
I _E "	1324.8	1.17
I _D "	1330.6	8.2
I _C "	1351.2	0.9

- 20 June - **Borehole** geophysical logs run - electric, gamma-ray, gamma-gamma density and caliper
- Demobilization

ANALYSIS ACTIVITIES

- Coal core desorption in progress
- Laboratory analysis of coal samples (proximate/ultimate, heating value, sulfur form) to be conducted on completion of desorption.

RESULTS

- Coal desorption results as of 11 July from conventional cores:

<u>Sample Depth (ft)</u>	<u>Total Gas (cc)</u>	<u>Sample WT (gm)</u>	<u>Total Gas Per Unit</u> <u>(cc/gm) (ft³/ton)</u>	
1324.68-1325.85	1259	1558	0.80	25.6
1330.65-1331.65	1608	1599	1.00	32.0
1333.3 -1334.3	1183	1614	0.73	23.4
1335.8 -1336.8	950	1651	0.57	18.2
1351.1 -1352.1	1503	1453	1.03	33.0

STATUS

Field Operations Completed

August 1979

CO-OPERATING COMPANY

Confidential

CONTRACT(S)

Confidential - Colorado
Well No. 3

FIELD TEST PERIOD(S)

June 26 - July 1, 1979

OBJECTIVE To determine the quantity and quality of the coal, the methane content of the coal, and some reservoir properties of six coal seams. This effort will help determine the potential productivity of coalbed methane from this resource area.

FIELD ACTIVITY PROGRESS

- Testing was performed during the original drilling at 5344 feet.

Tests Performed

Conventional Coring

- 79 feet of core. Coal at 741.75-748.18, 758.71-761.01, 764.92-770.0, 770.0-772.5, 794.65-796.8, 797.5-801.5, 805.6-810.97. Eight samples placed in canisters for desorption.
- Borehole geophysical logs run - Electric, Gamma-Gamma Density, and Caliper.

OTHER TESTING

- Desorption of coal samples.
- Laboratory analysis of coal samples to be completed.

ANALYSIS STATUS

- Desorption in progress - Initial indications of low gas content.

Confidential Well #3

FIELD ACTIVITIES

- June 29 - Spud date, surface casing set.
June 30 Core point reached (depth 740.0 feet)
June 30-July 1 - Cored six coal seams.

<u>Seam</u>	<u>Depth (ft)</u>	<u>Thickness (ft)</u>
"F"	741.75-748.18	6.43
"E"	758.71-761.01	2.30
"D"	764.92-770.0	5.08
"C"	794.65-796.8	2.15
"B"	797.5-801.5	4.0
"A"	805.6-810.97	5.37

- July 2 - Borehole geophysical logs run - electric, gamma-ray, gamma-gamma density and caliper.

ANALYSIS ACTIVITIES

- Coal core desorption in progress.
- Laboratory analysis of coal samples (proximate/ultimate, equilibrium moisture) to be conducted following completion of desorption.

RESULTS

- Coal desorption results as of July 11 from conventional cores

<u>Sample Depth (ft)</u>	<u>Total Gas (cc)</u>	<u>Sample Wt (gm)</u>	<u>Total Gas Per Unit</u>	
			<u>(cc/gm)</u>	<u>(ft³/ton)</u>
741.25-742.25	173	1678	0.10	3.2*
744.25-745.25	1627	1820	0.89	28.5
758.72-759.72	1053	1596	0.65	20.8
764.87-765.87	1604	1731	0.93	29.8
771.5 - 772.5	1338	1622	0.77	24.6
795.4 - 796.4	1113	1646	0.68	21.8
797.45-798.45	1081	1620	0.66	21.1
808.6 - 809.3	565	1665	0.34	10.9

*Possible canister leak

Warrior Basin
Fayette County, Alabama

Grace Petroleum Corporation

STATUS

Testing Complete - Analysis in progress

July 1979

CO-OPERATING COMPANY

Grace Petroleum Corp.

Location: Davis Chapel Field, Sec. 34, T14S, R11W

CONTRACT(S)

FIELD TEST PERIOD(S)

July 6-23, 1979

OBJECTIVE To determine the quantity and quality of the coal, the methane content of the coal, and some reservoir properties of several coal seams in the Pottsville Formation. This effort will help determine the potential productivity of coalbed methane from this resource area.

FIELD ACTIVITY PROGRESS

- Testing was performed during the original drilling at 551 feet.

Tests Performed

Conventional Coring

- 80 feet of core. Coal at 593-597, 1100-1102, 1675-1676, 1880-1882.
- Geophysical borehole logs - Dual induction (DISF), Formation density, compensated neutron, microlog and borehole compensated sonic log.

OTHER TESTING

- Desorption of coal samples.
- Laboratory analyses of coal samples.

ANALYSIS STATUS

- Desorption in progress

Grace Petroleum Corporation - Sec. 34, T14S, R11W

FIELD ACTIVITIES

- July 6 - Spud date
- July 9 - Core point reached
- July 11 - Cored Blue Creek seam, logged hole
- July 13 - Cored unnamed "H" seam
- July 15 - Logged hole
- July 16 - Cored Roosa seam
- July 17 - Cored Tidemore "B" seam
- July 23 - Final logging
- July 23 - Cemented production casing.

ANALYSIS ACTIVITIES

- Coal core desorption in progress.

RESULTS

Arkoma Basin
Pittsburg County, Oklahoma

Mustang Production Company, Inc.

STATUS

Field Operations Completed

August 1979

CO-OPERATING COMPANY

Mustang Production Co.
1100 East First National
Center
Oklahoma City, OK

Location: Barringer No. 1-11, Pittsburg County, OK
Sec. 11, T4N, R15E

CONTRACT(S)

FIELD TEST PERIOD(S)

July 4 - July 26, 1979

OBJECTIVE

To determine coal thickness and gas content and some reservoir characteristics of these coals

FIELD ACTIVITY PROGRESS

- Drilling and coring completed
- Borehole geophysical logging - electric, gamma-ray, spectralog, compensated density, and caliper - completed.

OTHER TESTING

Computer analysis of the coal seams for relative rank, thickness, moisture, mineral content, and ash content; Desorption of coal samples; Laboratory analyses of coal samples.

ANALYSIS STATUS

Desorption in progress - initial indications of high gas content.

Mustana Production Company - Sec. 11, T4N, R15E

FIELD ACTIVITIES

- July 11 - Coal horizon - Middle Booch, projected to be within the interval 3650 to 3662 ft.
Core size - 3" core, using PVC plastic liner for the inner barrel.
Interval cored - 3650' to 3662' = 12 feet, "air" coring
Core recovered - 10.45' of core; 11' of which was coal
Core loss - 1.55', attributed to core lifter slippage.
Percent recovery - 87.1 percent.
- July 16 - Coal horizon - Upper Hartshorne, projected within the interval 4435 to 4458 ft.
Core size - 3" core, using PVC plastic liner for the inner barrel
Interval cored - 4435' to 4458' = 23 feet, "air" coring
Core recovered - 0 feet
Core loss - 23.00', attributed to the failure of the core lifter to react.
Percent recovery - 0 percent.
- July 17 - Coal horizon - Lower Hartshorne, projected to be within the interval 4500 to 4593 feet.
Core size - 3" core, using PVC plastic liner for the inner barrel
Interval cored - 4580' to 4593' = 13.0 feet, "air" coring
Core recovered - 5.5' of core; shale w/sandstone partings
Core loss - 7.5' of core attributed to failure of the core lifter.
Percent recovery - 41.3 percent.
-

ANALYSIS ACTIVITIES

RESULTS

Total gas content to date of the Middle Booch coal sample is 163 ft³/ton.

Arkoma Basin
Haskell County, Oklahoma

Mustang Production Company, Inc.

STATUS Field Operations Completed

August 1979

CO-OPERATING COMPANY
Mustang Production Company

Location: Day Well 1-14, Haskell County, Oklahoma
Sec. 14, T7N, R20E

CONTRACT(S)

FIELD TEST PERIOD(S)

July 4-26, 1979

OBJECTIVE To determine coal thickness and gas content and some reservoir characteristics of these coals

FIELD ACTIVITY PROGRESS

- Drilling and coring completed
- Borehole geophysical logging - electric, gamma-ray, spectralog, compensated density and neutron, and caliper - Completed.

OTHER TESTING

- Computer analysis of the coal seams for relative rank, thickness, moisture, mineral content, gas content and ash content.
-

ANALYSIS STATUS

In progress.

FIELD ACTIVITIES

- July 7 ● Coal horizon - Upper **Booch**, projected to be within the interval 1615 to 1643 ft.
Core size - 3 1/2" core, using the standard steel inner barrel liner.
Interval cored - 1615 to 1643 feet - 28 feet, "air-mist"
Core recovered - 25.30" of core
Core loss - 2.70 feet of core caused by slippage of the core lifter
Percent recovery - 90.4 percent, all shale.
- July 21 ● Core horizon - Hartshorne Undivided, projected within the interval 2585 to 2613 ft.
Core size - 3" core, using PVC plastic liner for the inner barrel
Interval cored - 2585 to 2613 feet - 28 feet, "air mist"
Core recovered - 18.45 feet of core, shale with sandstone partings
Core loss - 9.55 feet of core; 6 feet of which is believed to be coal and
3.55 feet of which is believed to be bottom rock. Coal core
loss attributed to air jetting of a soft and friable material.
Loss of bottom rock attributed to core lifter failure.
Percent recovery - 65 percent.

ANALYSIS ACTIVITIES

- Computer analyses of the well logs in progress.

RESULTS

Colorado
Specific project location confidential

Confidential Well No. 1
(New test series)

STATUS

August 1979

CO-OPERATING COMPANY

Confidential

Confidential #1 (Type III operations)

CONTRACT(S)

FIELD TEST PERIOD(S)

June - December 1979

OBJECTIVE

Complete one coal interval, frac if necessary, and conduct long term production test.

FIELD ACTIVITY PROGRESS

Planned activities:

- Complete one zone (4863 to 4873 ft.), to include artificial stimulation (fracturing), if necessary.
- Equip well for long term production test.
- Conduct long term production test including fluid monitoring.

OTHER TESTING

ANALYSIS STATUS

FIELD ACTIVITIES

ANALYSIS ACTIVITIES

RESULTS

Confidential Well #5 - Colorado

STATUS

Field Operation Completed

August 1979

CO-OPERATING COMPANY

Confidential

Confidential Well #5 - Colorado

CONTRACT(S)

FIELD TEST PERIOD(S)

August 23 - 31, 1979

OBJECTIVE

To determine the quantity and quality of the coal, the methane content of the coal, and some reservoir properties of two coal seams. This effort will help determine the potential productivity of coalbed methane from this resource area.

FIELD ACTIVITY PROGRESS

- Testing was performed during the original drilling at 5562.2 feet.

Tests Performed

Conventional Coring

- 28.9 feet of core. Coal at 1187.46 - 1190.96 ft, 1198.35 - 1206.75 ft.

Logging

- Borehole geophysical logs run - electric, gamma ray, gamma-gamma density, and caliper.
-

OTHER TESTING

- Desorption of coal samples
 - Laboratory analysis of coal samples to be completed in future.
-

ANALYSIS STATUS

- Desorption in progress - initial indications of low gas content.
-

Confidential Well #5

FIELD ACTIVITIES

August 25 - Pilot hole logged, twin core hole spudded.

August 29 - Core point reached (depth 1170 feet), began coring two coal seams.

<u>Seam</u>	<u>Depth ()</u>	<u>Thickness (ft)</u>
"E"	1187.46 - 1190.96	3.5
"D"	1198.35 - 1206.75	8.4

August 30 - Completed coring, demobilization.

ANALYSIS ACTIVITIES

- Coal desorption in progress
- Laboratory analysis of coal samples planned.

RESULTS

STATUS

Field operations completed.

August 1979

CO-OPERATING COMPANY

U. S. Geological Survey
Coal Branch
Denver, Colorado

Location: 1400' FSL, 2900' FSL
Sec. 22, T8S, R47E

CONTRACT(S)

FIELD TEST PERIOD(S)

28 - 31 August 1979

OBJECTIVE

To determine the methane content and some reservoir properties of the Anderson and Canyon A&B (Dietz) coalbeds in the Fort Union Formation.

FIELD ACTIVITY PROGRESS

- Drilling and coring completed.
Conventional coring started at 236.5 feet
Anderson seam top at 243.2 feet; seam 52.6 feet thick
Canyon A-B (Dietz) seam top at 377.0 feet; seam 24.5 feet thick.
- Borehole geophysical logs run - gamma ray, density, S.P., and resistivity.

OTHER TESTING

- Desorption of coal samples
- Laboratory analysis of coal samples and roof and floor rock to be completed.

ANALYSIS STATUS

- Desorption in progress.

U. S. Geological Survey - Sec. 22, T8S, R47E

FIELD ACTIVITIES

- August 29 - Drill to core point, 236.5 feet, and core Anderson seam from 243.5 to 305.1 feet
- August 30 - Waiting on repairs to water truck
- August 31 - Drill to second core point, ~367 feet, and core the Dietz (Canyon A&B) seam from 377.0 to 401.5 feet,
- Log hole.

ANALYSIS ACTIVITIES

- Coal core desorption in progress:

<u>Seam</u>	<u>Depth (ft)</u>
Anderson	247.5
	266.0
	291.0
Dietz	377.6
	385.0
	400.5

- Laboratory analysis of coal samples to be conducted upon completion of desorption (proximate/ultimate, equilibrium, moisture).

RESULTS

PICEANCE BASIN
RIO BLANCO COUNTY, COLORADO

Fuel co

STATUS

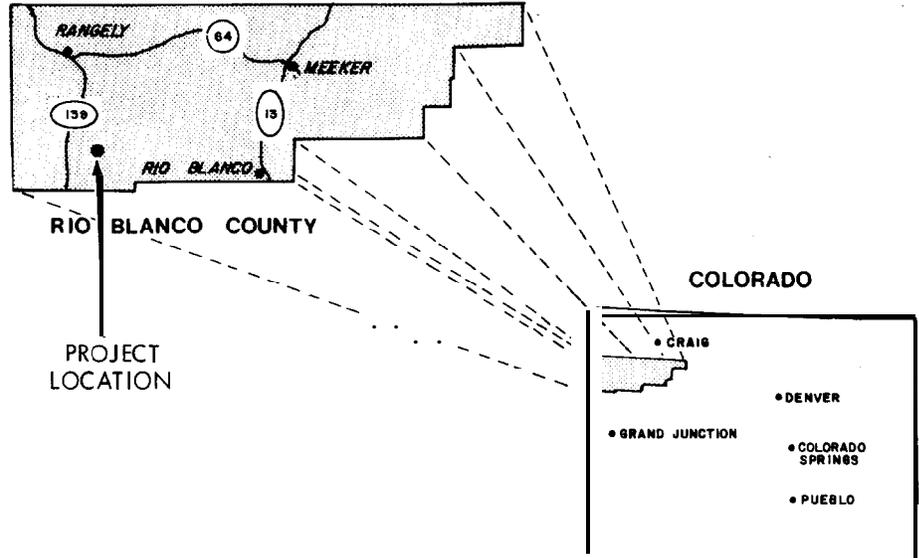
Field operations completed.

August 1979

CO-OPERATING COMPANY
Fuel Resources Development
Co. (Fuel co)
Denver, Colorado
(303) 571-7707

Location: D-26-3-101-5 Section 26, T 35, R 101W

CONTRACT(S)



FIELD TEST PERIOD(S)

12 - 17 August 1979

OBJECTIVE

To determine the quantity and quality of coal and the methane content of that coal in the Mesaverde Formation on the west side of the Piceance Basin.

FIELD ACTIVITY PROGRESS

- Testing was performed during the original drilling at 9287 feet.

Tests Performed

Conventional coring

- 96 feet of core. Coal at 1148.9 - 1151.9, 1154.0 - 1159.0, 1183.2 - 1185.7, 1205.7 - 1206.5, 1209.1 - 1217.8, 1223.0 - 1225.0

Logging

- Borehole geophysical logs run - electric, gamma-ray, compensated density, and caliper.

OTHER TESTING

- Description of coal samples
- Laboratory analyses of coal samples, roof rock and floor rock.

ANALYSIS STATUS

- Desorption in progress - initial indications of low gas content.

FIELD ACTIVITIES

- 13 August - Spud date for core hole
- 14 August - Core point reached, began coring operations

<u>Seam</u>	<u>Depth (ft)</u>	<u>Thickness (ft)</u>
"C"	1148.9 - 1151.9	3.0
"C"	1154.0 - 1159.0	5.0
"B"	1183.2 - 1185.7	2.5
"A"	1205.7 - 1206.5	0.8
"A"	1209.1 - 1225.0	8.7
Unnamed	1223.0 - 1225.0	2.0

- 15 August - Completed coring, demobilization

ANALYSIS ACTIVITIES

- Coal desorption in progress
- Laboratory analysis of coal (proximate/ultimate, heating value, sulfur form) in progress
- Laboratory analysis of roof rock (Triaxial Compressive Strength w/elastic properties, Permeability, Porosity and Natural bulk density) in progress
- Laboratory analysis of floor rock (Uniaxial Compressive Strength, Permeability, Porosity and Natural bulk density) in progress.

RESULTS

- Coal desorption results as of August 4 from conventional cores:

<u>Sample Depth (ft)</u>	<u>Total Gas (cc)</u>	<u>Sample Wt (gm)</u>	<u>Total Gas Per Unit</u>	
			<u>(cc/gm)</u>	<u>(ft³/ton)</u>
1211.6 - 1212.4	474	1312	0.36	11.52
1209.5 - 1210.5	202	1498	0.13	4.16
1223.0 - 1224.0	200	1249	0.16	5.12

Colorado - Confidential Well No. 4

STATUS

Field operation complete

August 1979

CO-OPERATING COMPANY

Confidential

Confidential Well No. 4 - Colorado

CONTRACT(S)

FIELD TEST PERIOD(S)

23 - 31 August 1979

OBJECTIVE

To determine the quantity and quality of the coal, the methane content of the coal, and some reservoir properties of two coal seams. This effort will help determine the potential productivity of coalbed methane from this resource area.

FIELD ACTIVITY PROGRESS

- Testing was performed during the original drilling at 5877 feet.

<u>Tests Performed</u>	<u>Results/Comments</u>
Conventional coring	● 45 feet of core. Coal at 879.15 - 882.48 ft, 904.3 - 912.0
Logging	● Borehole geophysical logs run - electric, gamma-ray, gamma-gamma density, and caliper

OTHER TESTING

- Desorption of coal samples
 - Laboratory analysis of coal samples to be completed in future.
-

ANALYSIS STATUS

- Desorption in progress - initial indications of low gas content.
-

FIELD ACTIVITIES

26 August - Pilot hole logged, twin core hole spudded.

28 August - Core point reached (depth 870 feet), began coring two coal seams.

<u>Seam</u>	<u>Depth (ft)</u>	<u>Thickness (ft)</u>
"C"	879.15 - 882.48	3.3
"B"	904.3 - 912.0	7.7

28 August - Completed coring, demobilization

ANALYSIS ACTIVITIES

- Coal desorption in progress
- Laboratory analysis of coal planned.

RESULTS

RESOURCE ENGINEERING

Projects - Firm Planning

STATUS

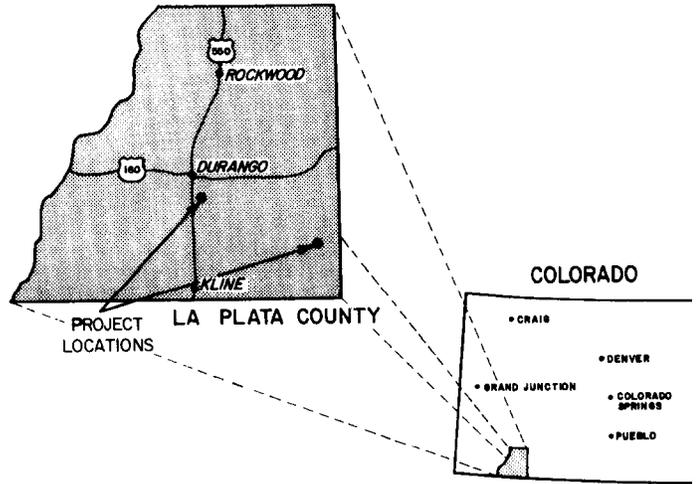
Firm Planning

CO-OPERATING COMPANY
Fuel Resources Development
Co. (Fuel co)
Denver, Colorado
(303) 571-7703

Locations: J-16-34(SU)-9-N - Section 16, T34(SU)N, R9W
F-31-33-6-N - Section 31, T33N, R6W

CONTRACT(S)

FIELD TEST PERIOD(S)
Summer, 1979



OBJECTIVE

To determine the quantity and quality of the coal, the methane content of the coal, and some reservoir properties of the coal seams in the Ignacio Field Fruitland - Pictured Cliffs Formations, in the San Juan Basin. This effort will help determine the potential producibility of coal bed methane from this resource area.

FIELD ACTIVITY PROGRESS

Planned Tests

- Conventional Coring - Up to 120' in each well
- Drill Stem Testing - One DST in each well
- Sidewall Coring - Up to 50 cores in each well
- Geophysical Logging - Laterolog, Neutron Density, Sonic, Gamma, Caliper

OTHER TESTING

- Desorption of coal samples
- Lab analyses of coal samples

ANALYSIS STATUS

FIELD ACTIVITIES

ANALYSIS ACTIVITIES

RESULTS

STATUS

Firm Planning

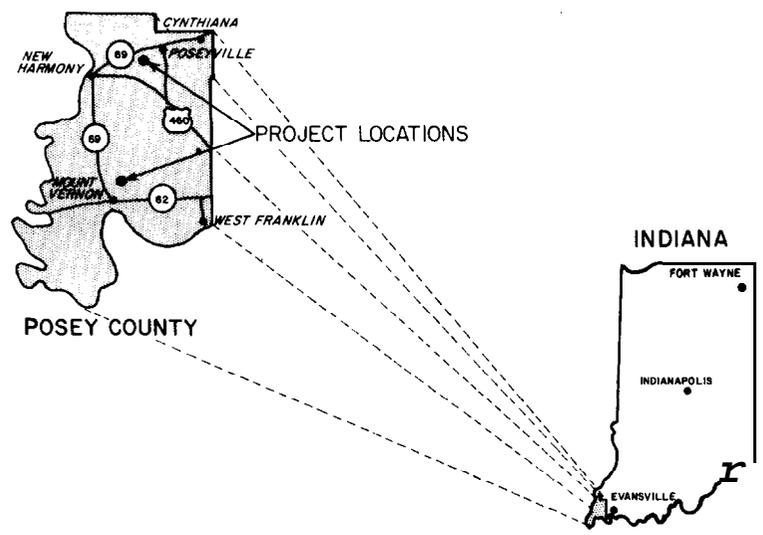
CO-OPERATING COMPANY
Indiana Geological Survey
Bloomington, Indiana
(812) 337-2862

Location: Site A Sec. 33, T6S, R 13W
Site B Sec. 26, T4S, R 13W

CONTRACT(S)

FIELD TEST PERIOD(S)

June - July 1979



OBJECTIVE

Provide gas content and desorption data from coals in the southeast part of the Illinois Basin in areas previously untested by MRCP. Two wells in Posey County, Indiana, will be cored and logged.

FIELD ACTIVITY PROGRESS

Planned Tests

- Conventional Core - Up to 150' per well
- Borehole geophysical logging - S.P. and resistivity and gamma-ray by Indiana Geological Survey.

OTHER TESTING

- Desorption of coal samples
- Laboratory analyses of coal samples

ANALYSIS STATUS

FIELD ACTIVITIES

ANALYSIS ACTIVITIES

RESULTS

Powder River Basin
Big Horn County, Montana

Montana Bureau of Mines and Geology

STATUS

Firm Planning

CO-OPERATING COMPANY

Montana Bureau of Mines
and Geology

Locations: Site I: 290 ft FNL, 1800 ft FWL, Sec. 7, T9S, R40E
Site II: 600 ft FNL, 1700 ft FEL, Sec. 5, T7S, R40E

CONTRACT(S)

FIELD TEST PERIOD(S)

Early August

OBJECTIVE

To determine the quantity and quality of the coal, the methane content of the coal, and some reservoir properties of the coal seams in the Powder River Basin. This effort will help determine the potential producibility of coalbed methane from this resource area.

FIELD ACTIVITY PROGRESS

Planned Tests: Conventional coring - Less than 150 feet in each well
Geophysical coring - Gamma-gamma density, SP, resistivity log,
Gamma-ray, and caliper

OTHER TESTING

Desorption of coal samples
Physical properties analyses of overburden, interburden, and underburden

ANALYSIS STATUS

FIELD ACTIVITIES

ANALYSIS ACTIVITIES

RESULTS

Arkoma Basin
Latimer County, Oklahoma

Mustang Production Company

STATUS

Firm Planning

CO-OPERATING COMPANY

Mustang Production Company

Location: Latimer County, Oklahoma

CONTRACT(S)

FIELD TEST PERIOD(S)

OBJECTIVE

To determine coal thickness and gas content and some reservoir characteristics of these coals

FIELD ACTIVITY PROGRESS

2 Wells - Tests Planned:

- Drilling
- Coring
- Logging

OTHER TESTING

Computer analysis of the coal seams for relative rank, thickness, moisture, mineral content, and ash content; desorption of coal samples; laboratory analysis of coal samples.

ANALYSIS STATUS

FIELD ACTIVITIES

ANALYSIS ACTIVITIES

RESULTS

TECHNOLOGY TEST PROJECTS

STATUS

Design and Validation Phase Work in Progress - Contracts Approved.

August 1979

CONTRACT(S)

DE-AC21-78MC08089
Subcontract: H15730JJ96

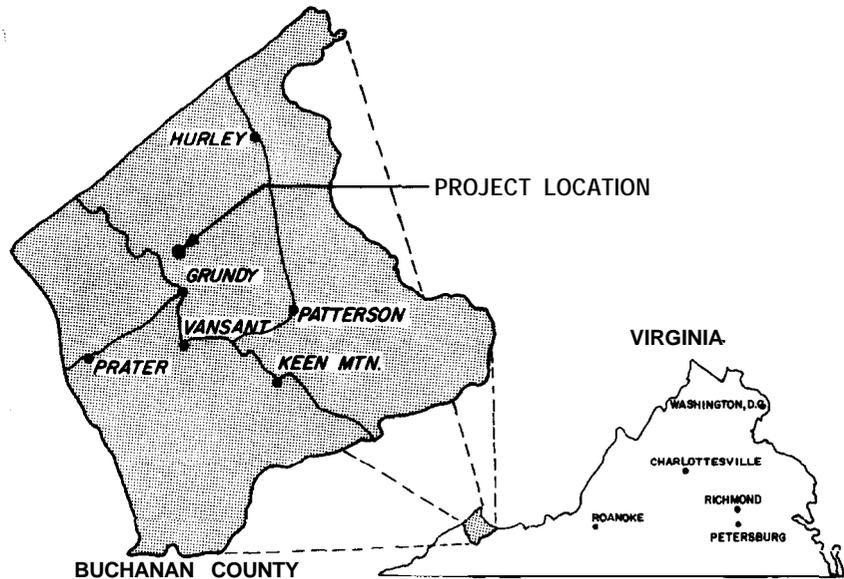
Location Island Creek Coal, Virginia Pocahontas Mine No. 5

CO-OPERATING COMPANY

Occidental Research Corp (ORC)
Irvine, California with Island
Creek Coal Co., Lexington, KY

GENERAL SCHEDULE

Concept Phase - March 78 to
Aug 78
Design and Verification Phase - Sep 78 to
Sep 79
- Implementation Phase Oct 79
- Jul 81



OBJECTIVE

To develop a technique for recovery of methane from long horizontal holes drilled from within the mine and using the gas to produce LNG or in a similar application.

PROGRESS TO DATE

- Basic drilling techniques proven (multiple shot and long-holes).
- Utilities in place
- Drilling of long-hole for validation in progress.
- In-mine piping for test site complete.

RECOVERY SYSTEM SUMMARY

(10) 2000 ft horizontal holes drilled into **longwall** panel from mine. Use of a drill bit guidance system. Development of fail-safe piping system for in-mine use.

UTILIZATION SYSTEM SUMMARY

Pipeline to nearby mine site to small capacity developmental LNG or similar application if LNG not viable use. Alternate uses - Pipeline injection, **minehead uses.**

DESIGN AND ANALYSIS ACTIVITIES

- All parties have agreed to contract terms. Signing by ORC is imminent. Patent rights variation request by ORC is under consideration by ORO.
- Total project review scheduled for September with in-mine observations to occur shortly thereafter.
- Preliminary utilization decision pending.

FIELD ACTIVITIES

- Drilling of first long-hole was stopped at 1600 feet due to high pressure and flow.
- Drilling has been initiated on the second long-hole. This part of the effort is for validation of techniques and to provide drilling baseline data. The hole will also be the first of five production holes.

SCHEDULE

MILESTONE/ACTIVITY	1979											
	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
Complete Drill & Piping Shakedown			△									
Complete Initial 2000 ft. holes					A'	.		△			A	
Complete Vertical Venthole (test)												
Complete LNG Utilization Analysis						△						
Complete Testing & Evaluation					A	-		△			△	

STATUS

Concept phase Complete - Subcontract negotiations complete - Approval Pending. August 1979

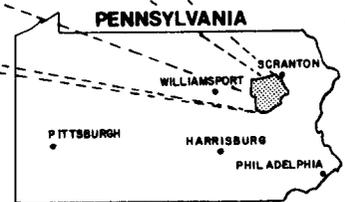
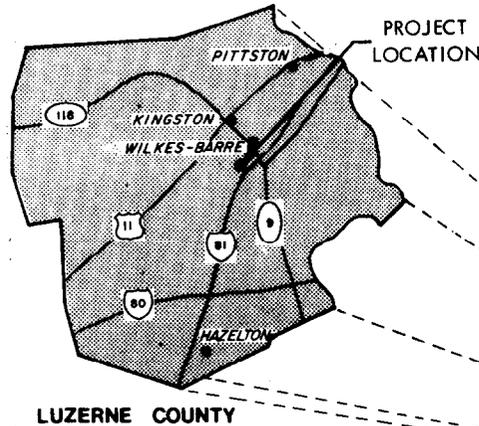
CONTRACT(S)

DE-AC21-78MC08089

Location Southwest of Wilkes-Barre on the Susquehanna

CO OPERATING COMPANY

Pennsylvania Energy Resources, Inc. (PERI)
 Wilkes-Barre, Pennsylvania



GENERAL SCHEDULE

Concept Phase- June 1976 to Aug 1978
 Design and - Sept. 1979
 Verification to Feb. 1980
 Implementation- March 1980 to
 Phase March 1981

OBJECTIVE

To develop and demonstrate a system for the recovery of methane from anthracite coal using stimulated multiple, multiple completion wells and utilizing the gas by injection into a local pipeline.

PROGRESS TO DATE

- Experimental well drilled in 1976. Initial production was 85 MCFD before well was killed during hydraulic fracturing.
- Detail plan established for design and verification activities.
- Cost estimates completed for next phases.

RECOVERY SYSTEM SUMMARY

(3) Multiple completion wells in Red Ash veins of Northern anthracite fields. Stimulation by gas, explosive or hydraulic fracturing.

UTILIZATION SYSTEM SUMMARY

Recovered gas to be utilized by injection into pipeline serving local area.

DESIGN AND ANALYSIS ACTIVITIES

- Statement of work has been structured to provide for one well to be drilled and tested during CY 1979. Completion will be delayed until CY 1980.

FIELD ACTIVITIES

- Site inspection conducted in mid-July.

SCHEDULE

MILESTONE/ACTIVITY	1979											
	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
Drilling Preparation - complete site selection - complete legal arrangements - complete well design					A		▲	△				
Complete Initial Utilization System Design									△	A	A	
Prepare Maps											A	
Update Design												A
Develop Procurement specifications						△				△	A	
Drill First Well												
Phase II Design Report												

STATUS,

Design and Validation Phase in Progress

August 1979

CONTRACT(S)

DE-AC21-78MC08089

Subcontract: H12719JJ9S

CO-OPERATING COMPANY

Waynesburg College
Waynesburg, Pennsylvania

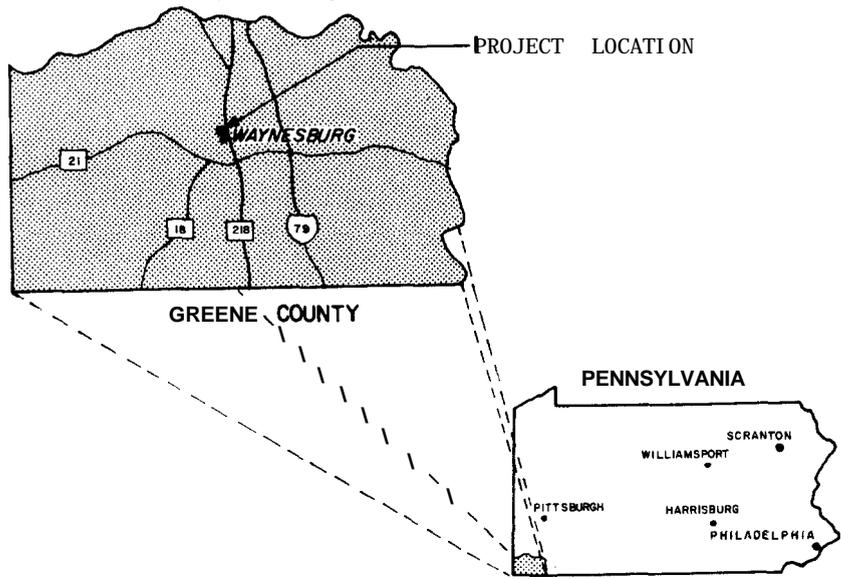
GENERAL SCHEDULE

Concept Phase - Mar 1978
to Aug 78

Design and Verification Phase - Aug 1979
Oct 1979

Implementation Phase - Nov 1979
Mar 1980

Location: Purman Run Tract on college campus North of Waynesburg



OBJECTIVE To develop and demonstrate a multiple completion technique system considering a variable need for dewatering each zone and utilizing the recovered methane in a local distribution pipeline.

PROGRESS TO DATE

- Basic site and target coal seams identified.
- Pipeline route and tie-in point identified.
- Cost estimate complete.
- Potential benefits estimated.
- Subcontract negotiated and signed.
- EIA in progress

RECOVERY SYSTEM SUMMARY Single well drilled into three seams overlain by the college facilities. Isolation and stimulation of individual zones planned. Multiple dewatering pumps considered in design.

UTILIZATION SYSTEM SUMMARY Recovered gas to be utilized in college's distribution system. Estimates of production will satisfy 70 percent of peak demand.

MULTIPLE COMPLETION DEVELOPMENT TEST PROJECT - Waynesburg College

DESIGN AND ANALYSIS ACTIVITIES

- Started design and verification phase.
- Environmental assessment in progress.
- Cost estimates were revised and backed up by vendor quotes. Cost remains at approximately \$250K (\$150 DOE).
- Drilling plan being developed to be used in EA.
- Drill rig availability and operational options being developed.

FIELD ACTIVITIES

- Environmental sampling in progress.

SCHEDULE

MILESTONE/ACTIVITY	1979											
	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
Phase I Report	▲											
Begin Coring							△					
Complete Coring								△				
Complete Well Design								△				
Complete Drilling Operations										△		
Complete Multiple Fracturing										△		
Start Pipeline Hookup Tests										△		
Phase II Design Report												△

5. SCHEDULES

Three types of schedules are shown in this section: the Master Schedule showing major project milestones, critical milestones for the next month, and major events scheduled for the following quarter.

5.1 MASTER SCHEDULE

The major milestones for the TRW MRCP for CY 1979 are shown in Figure 5-1.

5.2 PLANS FOR SEPTEMBER 1979

Engineering Support

Early September	Provide additional inputs to the Gas Resources Management Plan
Early September	Continue support to the advance drilling technology planning effort
14 September	Complete preparation of MRCP 1979 Symposium Proceedings
Mid-September	Complete draft MRCP 1980 PPD

Resource Engineering

6 - 12 September	Drilling, coring, logging, and desorption on Montana BuMines and Geology wells (2) in Big Horn County, Montana in the northern Powder River Basin
Mid-September	Negotiate participation in Type III test in the Arkoma Basin with Mustang Production (Barringer #1-11)
20 September	Powder River Basin Report to DOE for review
25 September	San Juan Basin Report to TRW/McLean for review
Mid-Late September	Drilling, coring, logging, and desorption of samples from wells in Posey County, Indiana by the Indiana Geological Survey
Late September	Completion of contract and initiation of drilling with SX-UNM in the southern San Juan Basin
September	Continued participation in Confidential Well No. 6, Type III testing in the Green River Basin.

MASTER PROJECT SCHEDULE — CY 1979

MODIFIED MARCH 1979
UPDATED AUGUST 1979

MILESTONES/ACTIVITIES	CY 1978			CY 1979												CY 1980		
	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	JAN	FEB	MAF
PROJECT MANAGEMENT, PLANNING AND ANALYSIS																		
— PROJECT PLAN DOCUMENT																		
— SEMI-ANNUAL REPORT INPUTS																		
— ANNUAL REPORT																		
— TURBO DRILL TESTING																		
RESOURCE ENGINEERING																		
— RESOURCE DELINEATION PLAN																		
— COMPLETED FIELD TESTS (NO. TESTED)																		
— BASIN REPORTS																		
— FIELD SITE GEO. INVESTIGATION																		
TECHNOLOGY TEST PROJECTS																		
— HORIZONTAL HOLES IN MINE																		
— MULTIPLE COMPLETION																		
— ANTHRACITE COAL																		
INFO MANAGEMENT/TECHNOLOGY TRANSFER																		
— INFORMATION MGMT PLAN																		
— TECHNOLOGY TRANSFER PLAN																		
— SYMPOSIA/WORKSHOPS																		

Resource Engineering (Continued)

October/ November	Potential cooperation with Beeson Oil in deep drilling in the western Kentucky portion of the Illinois Basin
October/ November/ December	Continued participation in Confidential Well No. 6, Type III test, Green River Basin

Technology Test Projects

October	-	Drill PER1 Well No. 2
Early October	-	In-Mine test observation at ORC project (DOE/TRW)
Mid-October	-	Initiate Waynesburg College coring operations
Late October	-	Complete detailed drilling plan for Waynesburg College project
November	-	Prepare PER1 Phase II report
Early November	-	Implementation phase go-ahead for Waynesburg College project
Early November	-	Complete first production longhole (final validation test hole) for ORC project
Mid-November	-	Complete preliminary study of utilization options for ORC
Mid-November	-	Occidental implementation phase go-ahead (DOE/TRW).
Late November	-	Complete production well casing and cementing at Waynesburg College site
Mid-December	-	Stimulate Waynesburg College well.

Technology Test Projects

- 6 September - Review with TPO at McLean, Virginia
- 12 - 13 September - Review of Waynesburg College project at Waynesburg, Pennsylvania
- Mid-September - Award PER1 subcontract
- 18 September - Signing of ORC subcontract
- 19 September - Total project updating and review of plans for Occidental project at Irvine, California
- 21 September - Meet with PER1 to review EA and obtain update to project schedule
- 28 September - Complete first draft of EA for Waynesburg College

5.3 PLANS FOR OCTOBER, NOVEMBER, AND DECEMBER 1979

Engineering Support

- October Begin preparation of the MRCP input to the UGR Semi-Annual Report covering the period April 1, 1979 through September 30, 1979
- Mid-October - Begin Phase II testing of 5-3/8 inch turbodrill
- November Evaluate Phase II testing results.

Resource Engineering

- October Participate with Rocky Mountain Energy Company on Green River Basin coreholes
- October/
November Drilling, coring, desorption, and DST on two Fuelco wells in San Juan Basin
- October/
November Type III testing of Mustang Production, Barringer #1-11, in the Arkoma Basin
- October/
November Potential cooperation with Peabody Coal in deep drilling in western Kentucky, Illinois Basin

6. DELIVERABLE STATUS

The deliverables for the TRW effort are specified in Article III of the Contract. The status of each of the deliverables follows.

Reference: Article III, 1 Reports

<u>Paragraphs and Description</u>	<u>Delivery Date</u>	<u>Completion Status</u>
a. Monthly Progress Reports	Within 10 days after each month of contract performance.	PERIODIC
b. Monthly Financial Reports	Within 10 days after calendar month of performance.	PERIODIC
c. Contractor's Reports on Government-owned Capital Equipment	With each voucher.	AS APPLICABLE
d. Annual Reports	Within 15 days after annual period of contract.	CY 1978 - COMPLETED FEBRUARY 1979
e. Phase Reports	Within 10 days after completion of each phase of the work.	COMPLETED - DECEMBER 1978
f. Draft Final Report	Within 54 months after effective date of the contract.	WHEN APPLICABLE
g. Final Report	Within 30 days of DOE approval or recommended change of Draft.	WHEN APPLICABLE
h. Post Contract Reports	Semiannually after completion of the contract, if work continues at contractor's expense.	WHEN APPLICABLE

Reference: Appendix A, 1.2 Deliverables, 1.2.1 Phase I.

<u>Paragraphs and Description</u>	<u>Delivery Date</u>	<u>Completion Status</u>
a. Plan for Readily Available Central Data Base Information System.	A Phase I deliverable. Exact due date not specified.	IN PREPARATION
b. Plan for Delineation of the Coalbed Methane Resource.	A Phase I deliverable. Exact due date not specified.	COMPLETED - FEBRUARY 1979
c. A preliminary & System Design d. for site developed for the first project.	A Phase I deliverable. Exact due date not specified.	COMPLETED - NOVEMBER 1978
e. A Program Plan	A Phase I deliverable.	FY 1979 VERSION COMPLETED IN DECEMBER 1978
f. A List and Ranking of Potential Resource Contractors.	A Phase I deliverable. Exact due date not specified.	COMPLETED - MARCH 1979
g. A complete Technology Transfer Plan	A Phase I deliverable. Exact due date not specified.	DELAYED - PENDING INFO/ MANAGEMENT PLAN COMPLETION
h. An updated Cost Estimate for Phase I Options	A Phase I deliverable. Exact due date not specified.	COMPLETED - JULY 1978
i. An updated Cost Estimate for Phase II Options	A Phase I deliverable. Exact due date not specified.	COMPLETED - DECEMBER 1978
j. Oral Presentation to TPO MERC at completion Phase I.	A Phase I deliverable.	COMPLETED - NOVEMBER 1978

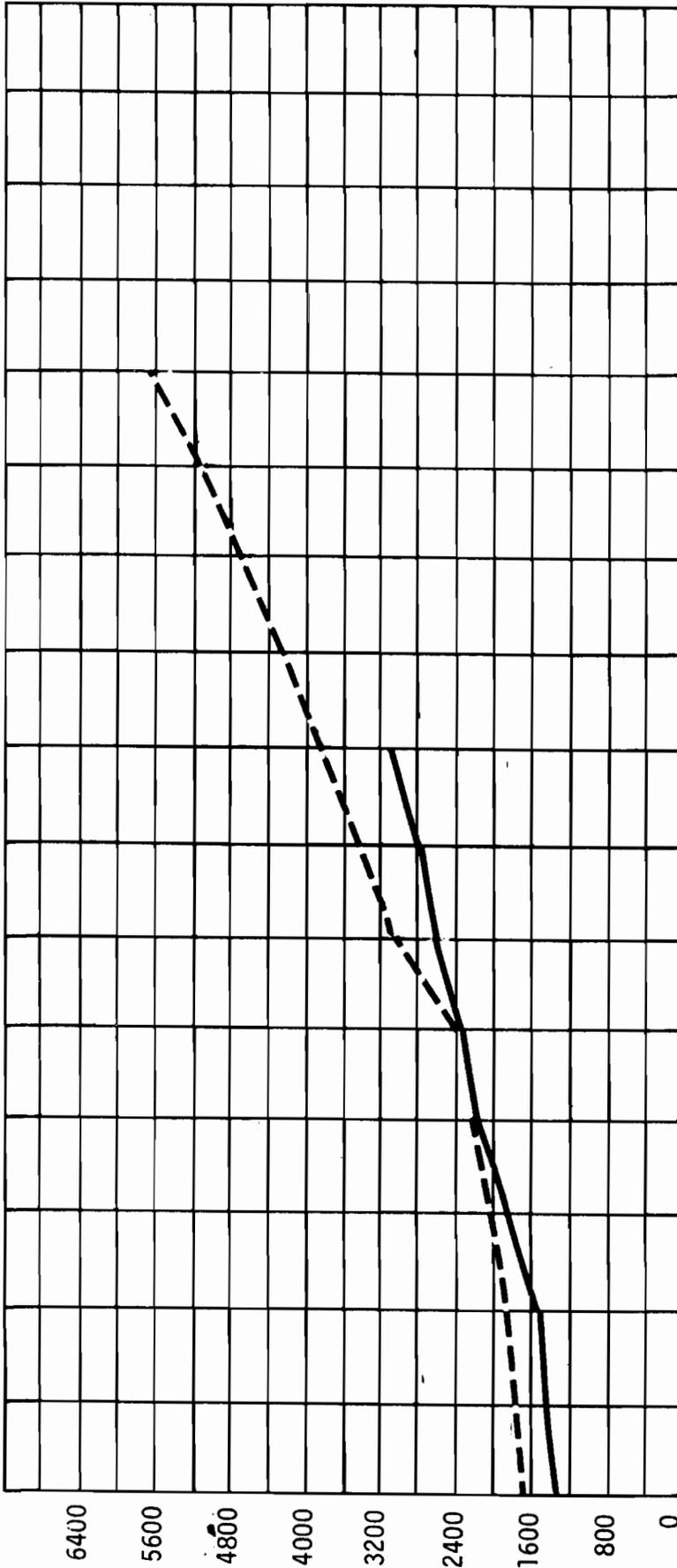
Reference: Contract Modifications Covering CY 1979 Effort (TBS)

<u>Paragraphs and Description</u>	<u>Delivery Date</u>	<u>Completion Status</u>
a. Well Test Reports	90 days after tests. Reports for CY 1978 tests due ASAP.	REQUIRED: <u>18</u> DELIVERED: <u>13</u> PAST DUE: <u>0</u>
b. Basin Reports	Approximately 6 week intervals starting in June	REQUIRED: <u>6</u> DELIVERED: <u>1</u> PAST DUE: <u>0</u>
c. Detailed Site Investigation Report	November 1979	FIELD ACTIVITIES WILL NOT START UNTIL LATE SUMMER 1979.
d. Phase II Design Report	30 days after completion of design.	REQUIRED: <u>3</u> DELIVERED: <u>0</u> IN WORK: <u>0</u>

7. EXPENDITURE STATUS

The expenditure plan and actual costs through the current reporting month are shown in Figure 7-1.

CONTRACT SUMMARY REPORT		CONTRACT TITLE Methane Recovery From Coalbeds		CUSTOMER DOE	PERIOD ENDING 8/24/79
SALES NUMBER 97141	CONTRACT NUMBER DE-AC21- 78MC08089	CONTRACT TYPE CPFF	CONTRACT PERIOD FROM: 12/12/77	COST 5645	CONTRACT VALUE (\$ 000)
			TO: 12/31/79	FEE % 451 8	TOTAL 6097



	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
PLAN	1441	1516	1830	2128	2345	2994	3379	3764	4285	4702	5119	5645
ACTUAL	1770	1815	1830	2128	2345	2994	3379	3764	4285	4702	5119	5645
VARIANCE	329	299	185	-	-	451	702	709				
COMMIT.	373	371	215	215	157	536	659	635				

DEVELOPMENTS/PROBLEMS THIS REVIEW PERIOD: This report reflects cost only. The actual cost for the month of August is \$335K.		PROJECT MANAGER A.D. Starbird
		OPERATIONS MANAGER R.L. Robertson

Figure 7-1. Expenditure Schedule