Methane Recovery from Coalbeds Project

Monthly Progress Report

Contract Number DE-AC21-78MC08089

OCTOBER 1980

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

BY

TRW
ENERGY SYSTEMS PLANNING DIVISION

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1. SUMMARY OF PROGRESS - OCTOBER 1980

This section of the report highlights progress made by TRW Energy Systems Group through September 1980 on the Methane Recovery from Coalbeds Project (MRCP) under DOE Morgantown Energy Technology Center Contract No. DE-AC21-MC08089. A discussion of progress accomplished during this period is contained in Section 3.

1.1 PROGRESS DURING THE MONTH

Planning and Support

- Delivered "Specifications for the Methane Recovery from Coalbeds Project Resource Data Base" to DOE/METC for review and implementation.
- Initiated work on the MRCP section of the UGR Semi-Annual Report for the period ended 30 September 1980.
- Began work on draft UGR Drilling Technology Project Plan Document for FY 1981.
- Completed the new display panels for the MRCP section of the UGR exhibit.

Resource Engineering

- Completed arrangements for fourteen well tests planned for the 1980 drilling season.
- Cooperated on a USGS/Conservation Division well in the Warrior Basin.
- Cooperated on a USGS/Navajo Nation well in the San Juan Basin.
- Cooperated with Bass Enterprises in testing a well in the Power River Basin.
- Cooperated with Anschutz Corporation on a well in the Powder River Basin.
- Cooperated with USGS/Coal Branch on a well in the Wind River Basin.
- Published a limited number of copies and delivered to DOE/METC the San Juan Basin Detailed Site Investigation Report.
- Field work on the Piceance Basin Detailed Site Investigation is in progress and will be complete in early November.
- The western Washington Detailed Site Investigation is deferred until spring to allow participation by the State Survey.

- Completed preliminary drafts of Warrior and Uinta Basin Reports.

- Incorporated review comments in the Raton Mesa Region Report; report is now being published with delivery to DOE/METC scheduled early November.

Technology Test Projects

- Occidental Research Corporation Project

  - The higher capacity vacuum pump has been delivered to the mine for increasing CH_4 venting operations.

  - J-Tee safety system is fully operational.

  - After positioning of equipment and piping, drilling of Oxy #12 was begun.

  - Preliminary plans for drilling of the second vent hole have been made.

- Waynesburg College Project

  - Analysis of the well dewatering level confirms that the well has been pumped off.

  - Adjusted pump jack cycle to allow sufficient influx water to collect before the pump is cycled to operate.

  - Equitable Gas Company has prepared a college for Waynesburg College's review and signature. The College lawyers are currently reviewing the contract before execution.

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 preparation and publication of FY 1979, FY 1980, and FY 1981 MRCP Project Plan Documents
- Assisted in preparation of the MRCP Technical Implementation Plan (TIP)
- Assisted in preparation of the Unconventional Gas Recovery RD&D Plan
- Assisted in preparation of the UGR Advanced Drilling PPD for FY 198C.

Technical Review of Proposals

- Supplied formal review and evaluation of four R&D proposals, three technology test project proposals, and twelve 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
- Provided MRCP inputs used in the preparation of exhibits for the International Petroleum Exposition and other meetings
- Provided inputs and assistance for preparation and publication of Unconventional Gas Recovery Semi-Annual Reports for the periods ending September 1978, March 1979, September 1979, and March 1980.
- Prepared draft MRCP Technology Transfer Plan
- Prepared draft Information Management Plan
- Prepared and published specifications for first phase of the MRCP resource data base
- Authored or co-authored the following papers on Methane Recovery from Coalbeds:

  1. A. A. Lee, "The Delineation of Methane Resources in Unminable 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. Rightmirc, 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, Oklahama.

3. H. D. Shoemaker, A. Gillies, and C. L. Sturgill, "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 Coalheds," presented at the 1979 Society of Petroleum Engineers Annual Technical Conference and Symposium, September 23-26, 1979, in Las Vegas, Nevada.

5. H. H. Rieke, C. T. Rightmire, and W. H. Fertl, "Evaluation of Gas-Bearing Coal Seams," presented at the 1979 Society of Petroleum Engineers Annual Technical Conference and Symposium, September 23-26, 1979, in Las Vegas, Nevada.

6. W. H. Fertl and H. H. Rieke, "Gamma Ray Spectral Evaluation Techniques Identify Fractured Shale Reservoirs and Source Rock Characteristics," presented at the 1979 Society of Petroleum Engineers Annual Technical Conference and Symposium, September 23-26, 1979, in Las Vegas, Nevada.

7. D. R. Watkins and H. D. Shoemaker, "Testing for Methane in Coal Seams," presented at the Energy Sources Technology Conference and Exhibition in New Orleans, Louisiana, February 3-7, 1980.

8. H. H. Rieke, F. G. Galliers, and S. A. Friedman, "Stratigraphic Relationship of Desmoinesian Coals in the Kiowa Syncline, Pittsburg County, Oklahoma," presented at the South-Central Section Meeting of the Geological Society of America, Wichita, Kansas, March 3-4, 1980.

9. J. P. McCord, "Potential for Coalbed Methane Production from the Greater Green River Coal Region," presented at the 1980 Symposium on the Geology of Rocky Mountain Coal in Golden, Colorado, April 28-29, 1980.

10. H. H. Rieke, "Preliminary Methane Resource Assessment of Coalbeds in the Arkoma Basin," presented at the Unconventional Gas Recovery Symposium in Pittsburgh, Pennsylvania, May 18-20, 1980.

11. P. L. Archer, D. D. Carr, and D. Harper, "The Coalbed Methane Resource of the Illinois Basin," presented at the Unconventional Gas Recovery Symposium in Pittsburgh, Pennsylvania, May 18-20, 1980.

Technology Transfer and Information Management (Continued)

12. A. Gillies, A. J. Snygg, D. A. Dickehuth, and S. M. Howarth, "Utilization and Recovery Economics for Vertical Wells in Coalbed Methane," presented at the Unconventional Gas Recovery Symposium in Pittsburgh, Pennsylvania, May 18-20, 1980.

13. J. N. Kirr, G. E. Eddy, R. Rahsman, and N. F. McGinnis, "Waynesburg College Multiple Coal Seam Methane Extraction 'Yell," presented at the Unconventional Gas Recovery Symposium in Pittsburgh, Pennsylvania, May 18-20, 1980.*

14. H. A. von Schonfeldt, B. R. Pothini, and G. N. Aul, "Advance Methane Control and Its Impact on Gas Emissions in the Pocahontas #3 Coal Seam," presented at the Unconventional Gas Recovery Symposium in Pittsburgh, Pennsylvania, May 18-20, 1980.*

15. C. T. Rightmire, H. H. Rieke, and W. H. Fertl, "Resource Evaluation of Gas-Bearing Coalbeds," presented at the AAPG/SEPM/EMD Annual Convention, Denver, Colorado, June 9-11, 1980.

16. H. H. Rieke, D. W. Oliver, W. H. Fertl, and J. P. McCord, "Successful Application of Carbon/Oxygen Logging to Coalbed Exploration," presented at the 55th Annual SPE Technical

R&D Surveillance

- Developed test plans for Phase I and II testing of the Maurer turbodrill
- Completed Phase I testing of the Maurer turbodrill
- Completed interim Phase II turbodrill testing in January 1980
- Completed Phase I Turbodrill Test Report August 1980.

RESOURCE ENGINEERING

Planning and Analysis

- Assisted in preparation and publication of the following:
  - Unminable Coal Drilling Project Plan
  - Resource Delineation Plan

*Prepared as a result of Technology Test Projects subcontracted by TRW.

Planning and Analysis (Continued)

- Prepared and published the following basin reports:
  - Illinois Basin Report
  - Powder River Basin Report
  - San Juan Basin Report
  - Greater Green River Basin Report
  - Western Washington Coal Region
  - Arkoma Basin Report

- Participated in industry coordination meetings as follows:
  - Unmined Coal Project Organization
  - Resource Delineation Workshops
  - Desorption Methods and Standards

- Developed contractual agreements with companies for cooperative participation in 38 wells of the 47 planned for the 1978-1980 program.

Basin	Tests Completed (to date)	Additional Projected (1980 Program)
Arkoma	4	0
Green River	4	2
Illinois	5	0
Northern Appalachian	2	0
Piceance/Uinta	10	1
Powder River	8	1
San Juan	3	4
Southern Appalachian/ Warrior	1	1
Western Washington	1	2
TOTAL	38	11

University Subcontracts

- Negotiated and signed subcontracts with Pennsylvania State University, Virginia Polytechnic Institute, Colorado School of Mines, and University of New Mexico to support the resource delineation effort.
  - Colorado school of Mines has provided a compendum of published information on rock mechanics, properties of coal, and coal-measure rocks. Additional reports completed to date under this contract include:
    - Hydraulic Fracture Propation-Direction as Related to Preliminary Methane Drainage
    - Basic Theories and Mechanisms of Hydrofracturing-- State-of-the-Art

University Subcontracts (Continued)

- Design and Construction of the New Triaxial Testing Machine in the Edgar Mine, CSM

- Potential Methane Drainage Using Hydro-Fracturing, Carbondale Coal Field, Pitkin County, Colorado.

- The University of New Mexico has initiated field verification of a desorption technique employing drilling cuttings. Samples will be collected from multiple wells in the San Juan Basin in cooperation with Northwest Pipeline. Physical characterization of natural coal samples has begun with the Laboratory determination of surface area and sorption isotherms.

- Penn State is involved in mapping a mine through of a hydraulic stimulation in a Cumberland coal mine. Mine ventilation air methane monitoring system lacks one component for completion and will be tested as soon as possible.

- VPI & SU is completing the work on a report on the geologic framework and methane potential for the Richmond Basin and other Triassic Basins in the southeastern United States. Evidence of methane presence has been gleaned from historical records of mine accidents and reports of gas shows during drilling in this area.

Field Activities

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

Alabama
- Fayette County
- Walker County

Colorado
- Mesa County
- Moffat County
- Rio Blanco County

Illinois
- Clay County
- Marion County

Indiana
- Posey County

Kentucky
- Webster County

Montana
- Big Horn County
- Powder River County

New Mexico
- San Juan County

Oklahoma
- Haskell County
- LeFlore County
- Pittsburg County

Pennsylvania
- Greene County

Washington
- Thurston County

Wyoming
- Campbell County
- Carbon County
- Fremont County
- Sheridan County
- Sublette County

Field Activities (Continued)

- Ten geological coal areas have been sampled by conventional and sidewall coring operations. Approximately 4,738 feet of conventional core and 92 sidewall cores were recovered since field operations began in April 1978. The total thickness is approximately 842 feet; 207 coal samples have been collected for desorption analysis as have 30 samples of roof and floor rock. In addition, 20 samples of cuttings were collected for chip desorption from three wells (1 in the Green River and 2 in the Powder River Basins).

- The ranges of gas contents of coalbeds tested to date, by basin, are:

Basin	Gas Content (cf/ton)
Arkoma	72
Green River	90 - 301 540
Illinois	23 - 83
Northern Appalachian	70 - 195
Piceance	0 - 339
Powder River	161 - 30
San Juan	17 - 104 73
Warrior	
Western Washington	20 - 75
Wind River	Testing in Progress

TECHNOLOGY TEST PROJECTS

- Completed Conceptual system designs for three candidate sites:

Company	Types of Systems	
	Recovery	Utilization
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 which ranked 12 major proposed activities

- Occidental Research Corporation Project

  - After finalizing a subcontract with Occidental Research Corporation (ORC) in cooperation with Island Creek Coal Company for developing a long horizontal borehole technique within an operating mine for methane recovery, Phase I, Concept Development, was initiated. A drilling concept was developed for drilling three 500 foot wells in Coalbed #3.

- Following validation of the techniques, Phase II was begun, and three wells (#4, #5, and #6) varying in length from 500 to 1700 feet were drilled, completing the design and verification phase. Gas production approximated 200 Scfd per foot of horizontal hole with occluded methane at 400 to 500 cf/ton.

- During this phase, implementation, Phase III, was begun. The following wells have been drilled:

#7	383 feet	No. 4 Coalbed
#8	675 feet	No. 4 Coalbed
#9	1,020 feet	No. 3 Coalbed
#10	abandoned	No. 3 Coalbed
#11	1,400 feet	No. 3 Coalbed

  Nominal gas flow rates have been 19,000 Scfd, 32,000 Scfd, and 160,000 Scfd, with Oxy #11 producing 600,000 Scfd.

- Concurrent with the drilling activity, a J-Tee Safety Warning System has been installed. This system is oriented towards gas leakage detection.

- In addition, a second specialized Acker drill rig has been procured and moved into the mine to augment the existing Acker rig. (The Acker rigs were purchased using ORC capital funds and are, therefore, not charged to this contract.)

- A larger vacuum pump has been procured to increase the CH_4 vent to surface rate.

• Waynesburg College Project

- Entered into a subcontract with Waynesburg College to develop and demonstrate a multiple completion technique system for methane recovery from bituminous coal and utilizing the gas by injection into a private pipeline.

- Completion of the Environmental Assessment and coring program was followed by preparation of Drilling, Completion, and Stimulation Plans.

- Because of Pennsylvania State regulations, a variance to standard completion techniques was necessary to satisfy future mining and mine safety requirements.

- Casing was set and cemented after completion of drilling and logging of the well borehole. Based on coring and logging information, three zones containing coal seams with methane potential were perforated and incrementally stimulated with nitrogen foam and 20/40 sand proppant.

- This fracturing activity was followed by bailing frac sand and swabbing the well preliminary to setting production tubing and a sucker rod pump. Dewatering operation has begun and surface gas processing equipment procured.

- Dewatering operations have dropped the wellbore water level to 950 feet. Concurrent with dewatering activity, drawdown and gas flow measurements were made in preparation for installation of surface process equipment.

- Surface processing equipment has been installed.

- Pennsylvania Energy Resources, Inc. Project

  - Completed negotiations with Pennsylvania Energy Resources (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. This project is being held in abeyance due to the current MRCP funding limitation.

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. For Calendar Year 1980, work under each task is delineated as follows:

Task 1 - Engineering Assistance to METC

Task Objective

Provide technical assistance to the Methane Recovery from Coalbeds Project.

Subtask Objectives

Subtask 1 - Project coordination and preparation and updating of MRCP planning inputs for Project Planning Documents, Project Technical Implementation Plans, and Project Strategy Plans.

Subtask 2 - Review and analyze MRCP-related technical proposals 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 Recovery from Coalbeds Project, as directed by METC.

Task 2 - Resource Engineering

Task Objective

Provide technical assistance and subcontracting support for the resource delineation activities. The task objectives 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 of 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 to METC detailed design, development, analysis, initial implementation, evaluation, and reporting of technology test projects.

Subtask Objectives

Subtask 1 - Provide for the definition and implementation, analysis, and reporting of the technology test projects defined in the discussions of Task 3, Subtasks 2 and 4 of the basic proposal.

Subtask 2 - Continue implementation of the 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 - Continue implementation of the 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 - Reserved.

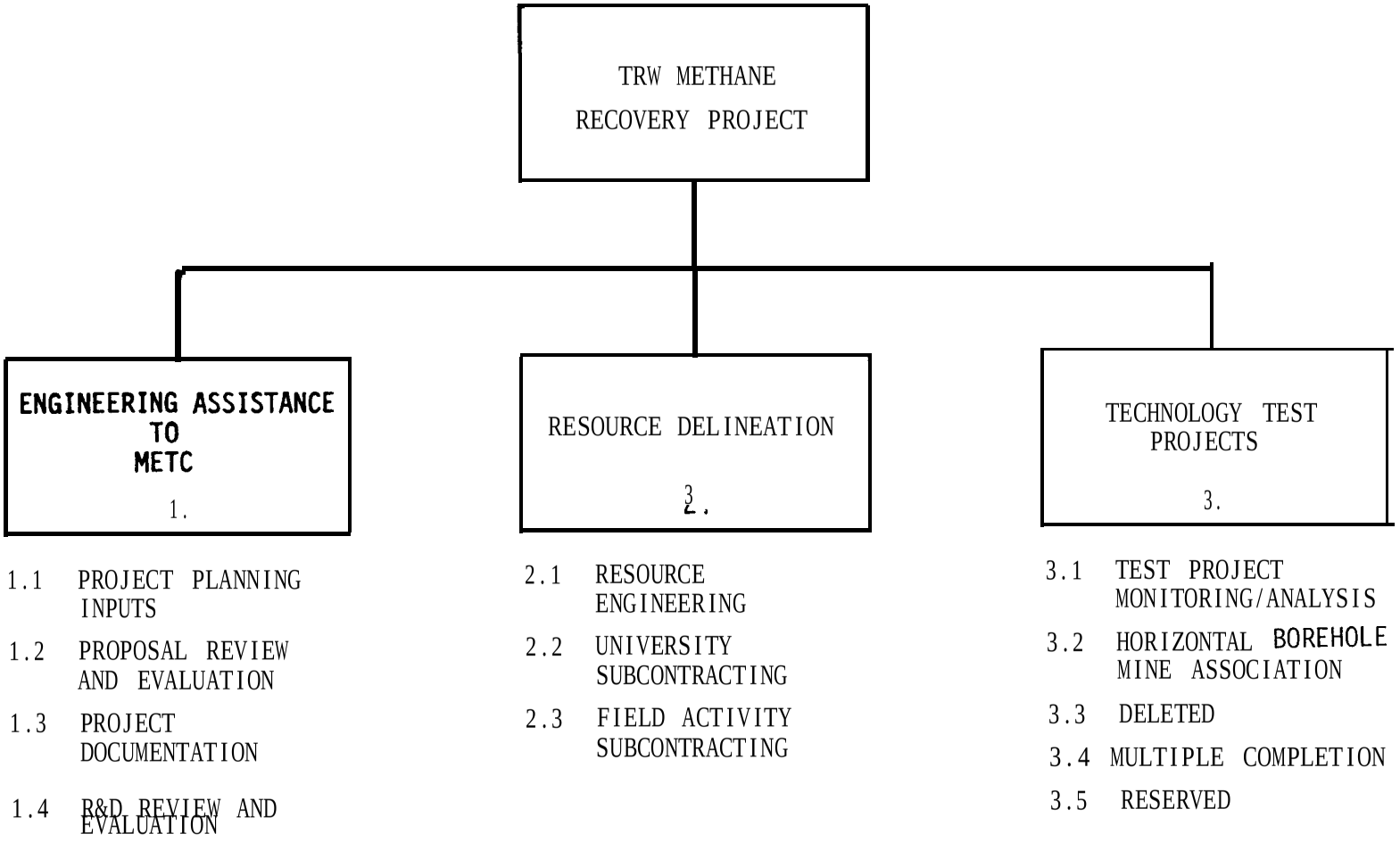


Figure 2-1. TRW MRCP Work Breakdown Structure
(Revised 6/30/79)

3. DISCUSSIONS OF PROGRESS DURING OCTOBER 1980

The following items are brief discussions of progress during the month of October. Additional data and descriptions of field projects in progress and in firm planning are contained in Section 4; Appendix A contains data and descriptions of completed field projects.

3.1 ENGINEERING SUPPORT

- The Specifications for the Methane Recovery from Coalbeds Resource Data Base have been completed and submitted to the MRCP senior geologist at METC. METC will structure the data base using the MRI System 2000 currently at the MITRE Corporation facility in McLean.

  The first phase is intended to cover MRCP well test data; the second phase, scheduled for implementation by next summer will include data from other well tests, as well as production data from MRCP production technology development projects.

- Work is progressing on the MRCP section of the UGR Semi-Annual Report. The first draft will be ready for review in early November with delivery of the final draft scheduled for 17 November 1980.

  METC has reformatted the report to increase readibility by having some of the detailed information on previous work accomplished deleted by the contractors.

- At the request of the project manager, TRW will provide support in the preparation of a FY 1981 Project Plan Document (PPD) for the UGR Drilling Technology Project. A schedule and an outline were delivered to the TPO; writing will take place during November.

- The MRCP section of the UGR exhibit was revised with attention focused on Resource Engineering and Production Technology Development. Most of the photographs used were taken by the DOE project manager, others were provided by TRW personnel, and a few were provided by project subcontractors.

- Arrangements are being made for the annual MRCP Resource Delineation Workshop, tentatively scheduled for January 20 or 21. This workshop will consist of four working groups covering Stimulation, Completion, Exploration and Testing, and Production Prediction.

3.2 RESOURCE ENGINEERING

- Arrangements are complete for the 14 well tests planned for 1980. Of these, 12 tests have been completed, 4 are in progress with contracts being finalized for 2 tests--Coors (Piceance Basin) and El Paso Natural Gas (San Juan Basin). Proposals for co-operative testing in the San Juan Basin are expected shortly from Dugan Production, Energy Reserves, and Southland Royalty.

- Current Well Test Schedule:

	Cooperator	Basin	Date
Firm Planning:	USGS/Conservation	Warrior	Mid-November
	Adolph Coors	Piceance	Mid-November
	El Paso	San Juan	Early December
In Negotiation:	Dugan Production	San Juan	Late November
	Energy Reserves	San Juan	Early November
	Southland Royalty	San Juan	Late November
	Belco Petroleum (Type III)	Green River	ASAP

- Coring operations were completed on a USGS/Conservation Division well in the Warrior Basin. Because only 14 inches of coal was recovered, the coalbed was not considered thick enough to sample for desorption analysis.

- Cooperative testing with the USGS/Navajo Nation was conducted on two wells in the San Juan Basin. Core samples collected from those wells will undergo desorption analysis.

- Cooperative testing was conducted on a Bass Enterprises well in the Powder River Basin. Testing included mud logging and chip desorption.

- Cooperative testing was conducted with Anschutz Corporation on a well in the Powder River Basin. Testing included mud logging, chip desorption, and borehole geophysical logging.

- Operations were conducted with USGS/Coal Branch on a few wells in the Wind River Basin. Numerous difficulties have showed down the core collection progress.

- A test plan is being developed for potential production testing (Type III) with Belco Petroleum in the Green River Basin in Sublette County, Wyoming.

- Limited distribution of the Detailed Site Investigation-Northern San Juan Basin was made to the MRCP office at METC. A copy of this report will be available in the MRCP Open-Files at METC in early November.

- Field work on the Piceance Basin Detailed Site Investigation is in progress with completion scheduled by early November.

- The western Washington Detailed Site Investigation is deferred until spring to allow participation by the State Survey.

- The preliminary draft Uinta and Warrior Basin Reports have been prepared and are being delivered to METC for review.

- The Raton Mesa Region Report has been reviewed by METC and TRW. Comments have been incorporated and the document is in the publication cycle.

- Members of the Resource Engineering team participated in a "Coalbed Methane Resource Review for Western Basins" on 30 October 1980 at DOE/METC during which the MRCP data base was discussed with project participants,

3.3 TECHNOLOGY TEST PROJECTS

- Occidental Research Corporation Project

  - The entire project was delayed this month because of persistent gas-off conditions.

  - Oxy #12 was spudded in at a position down panel from Oxy #11 and oriented to avoid the deviations experienced in drilling Oxy #11.

  - In order to increase CH_4 venting from the horizontal wells, ORC will drill another vent shaft in addition to installing a higher capacity pump.

- Waynesburg College Project

  - A gas exchange contract with Waynesburg College was drawn up by Equitable Gas. Sign-off will take place after review by the College's lawyers.

  - The well is considered dewatered; preliminary methane production is ranging between 20-30 thousand SCFD with the pump jack on a cyclic rate of one hour off-15 minutes on. This cycle allows sufficient intrusion water to collect before the pump operates.

4. FIELD ACTIVITIES

A summary sheet for each project in the Engineering Support, Resource Engineering , and Technology Test areas having substantial field activity, planning for field activity, or analysis activity immediately following field activity is contained in this section.

Summary sheets are included for the following projects:

Engineering Support

R&D Projects

Maurer Turbodrill Testing

Resource Engineering

Field Operations in Progress

None at this time.

Field Operations in Planning

Cooperator	Basin
USGS/Conservation Division	Warrior
Adolph Coors	Piceance
USGS/Conservation Division	Green River
Kemmerer Coal	Green River
El Paso Natural Gas	San Juan
Dugan Production Company	San Juan
Northwest Fuel	Western Washington
USGS/Coal Branch	Wind River Basin

Field Operations Complete

Summary sheets for projects with completed field activities are contained in Attachment A of this report. Projects with completed field activities include the following:

Basin	No. of Sites
Northern Appalachian	1
Southern Appalachian/ Warrior	1
Illinois	5
Arkoma	4
Piceance	10
Green River	4
San Juan	3
Powder River	8
Western Washington	1

Technology Test Projects

Occidental Research Corporation
Waynesburg College
Pennsylvania Energy Resources

ENGINEERING SUPPORT

R&D Projects

TURBODRILL TESTING PROJECT
HOUSTON AND FORT WORTH, TEXAS

July 1980

STATUS

Phase II Performance Tests are completed and testing program terminated

CO-OPERATING COMPANY

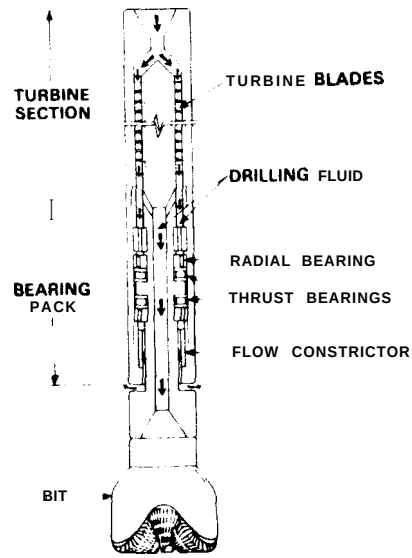
Maurer Engineering Inc.
Houston, Texas
TRW Mission Manufacturing
Houston, Texas
Gearhart-Owen Indus., Inc.
Fort Worth, Texas

CONTRACT(S)

DE-AC21-78MC08089

FIELD TEST PERIOD(S)

Performance
Phase I - February 1979
Field Tests
Phase II - December 1979
Directional Drilling Test
Phase III - Not Schedule



OBJECTIVE

Determine performance and wear characteristics along with 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 in-house development testing in December 1978 after which they made some design changes, and the prescribed Phase I testing began in early February 1979.
- Because of premature bearing failure, Phase I testing was terminated in late February 1979.
- After bearing pack modifications, Phase II testing was begun in March 1979 and completed in April 1979. This portion of the testing program was conducted in Salt Lake City, Utah, and Los Alamos Fenton Hill site.

OTHER TESTING

Prior to beginning the Phase I testing, Maurer conducted shakedown testing at their facility consisting of no-load bench tests.

ANALYSIS STATUS

Phase I and Phase II test data has been analyzed.

DISCUSSION OF TEST ACTIVITIES

Maurer Engineering performed during December 1978 five short-duration shakedown tests of the turbodrill in which baseline performance data were obtained. Teardown and inspection of the drill motor components revealed design problems. Maurer instituted design modifications to the floating-piston seal assembly in preparation for subsequent Phase I testing at Mission Manufacturing facility. DOE/METC exercised an option to proceed into a modified testing project using the flow-through version of the bearing pack.

After unit modifications, Maurer decided to run the turbodrill in actual drilling operations at a TerraTek site in Utah. Here, sophisticated instrumentation would be utilized while running the unit under actual downhole conditions. Twenty-three holes were drilled before the unit locked up. Upon disassembly and examination, it was apparent that sand and mud had damaged the lower thrust bearing.

Phase II testing resumed the week of 21-25 January 1980. Bearing failures resulted in both turbodrill versions locking up. The tachometer did not produce discernible signals to indicate rotary speed downhole in the first test but indicated rotary speeds of 2400 to 2600 rpm in the second.

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

RESULTS

- Preliminary baseline performance curves (at zero imposed bit-end pressure drops), have been determined from the shakedown tests and Phase I testing.
- 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 Phase I data show characteristic torque, power, efficiency, and rotary speed relationships as expected. However, pressure drops through the drill bit appear to be considerably higher than expected.
- Results of turbodrill teardown following resumed Phase II testing are:
  - The lowest and uppermost radial roller bearings failed in the first motor: the outer races were cracked in both cases. The roller cage in the lowest radial bearing was bent and extruded in part between two rollers. Two rollers in that bearing were broken. Other parts of the uppermost radial bearing were intact.
  - In the second motor, the lower thrust bearing failed because of excessive loading due to hydraulic downthrust of the turbine.

RESOURCE ENGINEERING

Field Operations in Progress

RESOURCE ENGINEERING

Firm Planning

WARRIOR BASIN
TUSCALOOSA COUNTY, ALABAMA

STATUS

Firm Planning

CO-OPERATING COMPANY

USGS/Eastern Region
Washington, D. C.

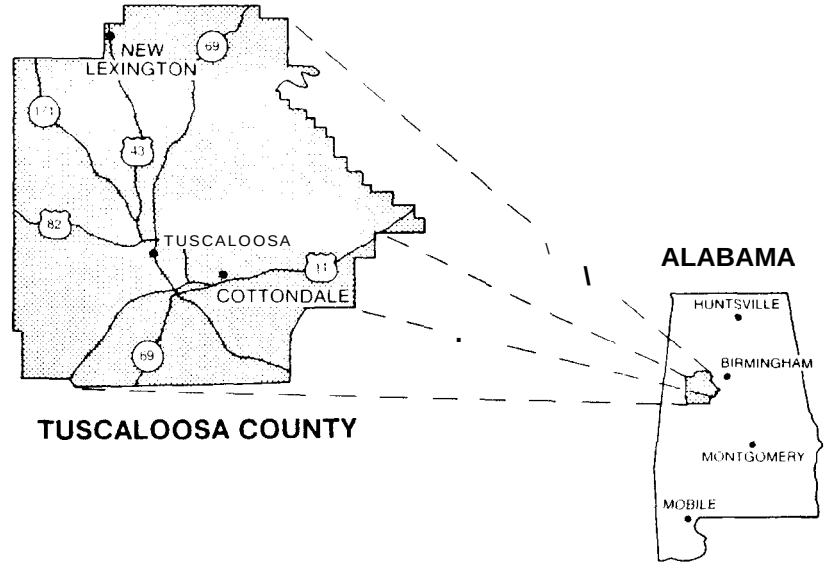
Alabama Geological Survey
Tuscaloosa, Alabama

CONTRACT(S)

FIELD TEST PERIOD(S)

November 1980

Location: Well #32 (depth 1650') SE/4, Sec. 31, T18S, R9W
Well #42 (depth 1640') SW/4, Sec. 20, T17S, R9W



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

Planned Tests

- Conventional Coring - Entire well cored by USGS
- Geophysical Logging

OTHER TESTING

- Desorption of coal samples
- Lab analyses of coal samples

ANALYSIS STATUS

FIELD ACTIVITIES

ANALYSIS ACTIVITIES

RESULTS

PICEANCE BASIN
MESA COUNTY, COLORADO

STATUS

Firm Planning

CO-OPERATING COMPANY

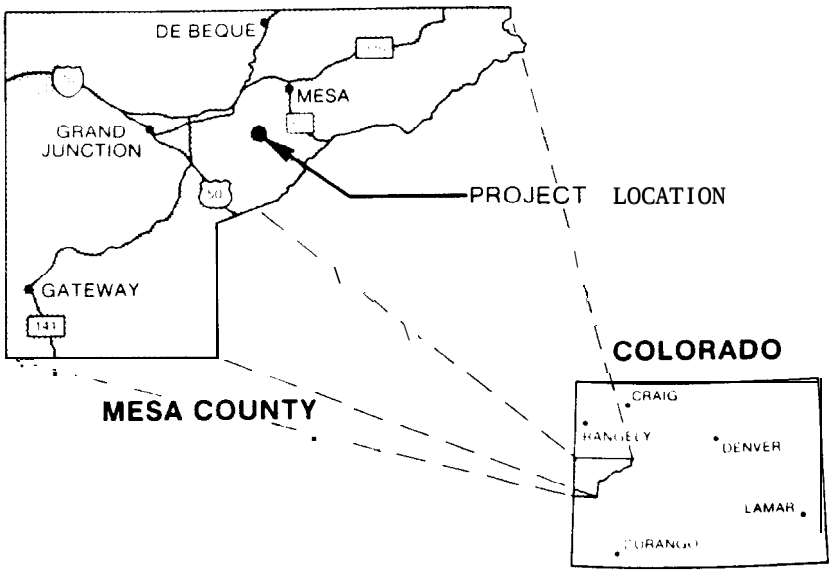
Adolph Coors Company
Exploration Division

CONTRACT(S)

FIELD TEST PERIOD(S)

Mid-November 1980

Location: Nichols #1-23CM, Sec. 23, T10S, R97W



OBJECTIVE

To determine methane content and reservoir characteristics of the Mesaverde coals in the Piceance Basin.

FIELD ACTIVITY PROGRESS

Planned Tests

- Conventional core up to 180 feet
- Conduct up to 2 drill stem tests
- Borehole Geophysical Logging supplied by Coors
  - dual induction
  - compensated neutron
  - formation density

OTHER TESTING

ANALYSIS STATUS

FIELD ACTIVITIES

ANALYSIS ACTIVITIES

RESULTS

GREEN RIVER BASIN
CARBON COUNTY, WYOMING

STATUS

Firm Planning

CO-OPERATING COMPANY

USGS/Conservation Division
Denver, Colorado

CONTRACT(S)

FIELD TEST PERIOD(S)

Postponed until 1981

Location: Drill Hole DPI-D72, Sec. 13, T15N, R91W or D72 (alt) Sec. 18, T15N, R90W; B-D26, Sec. 3, T14N, 90W or B-D26 (alt) Sec. 34, T15N, R90W

OBJECTIVE

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

FIELD ACTIVITY PROGRESS

Planned Tests

- Conventional Coring - Parts to be cored will be determined in field
- Geophysical Logging

OTHER TESTING

- Desorption of coal samples
- Lab analyses of coal samples

ANALYSIS STATUS

FIELD ACTIVITIES

ANALYSIS ACTIVITIES

RESULTS

GREEN RIVER BASIN
CARBON COUNTY, WYOMING

STATUS

Firm Planning

CO-OPERATING COMPANY

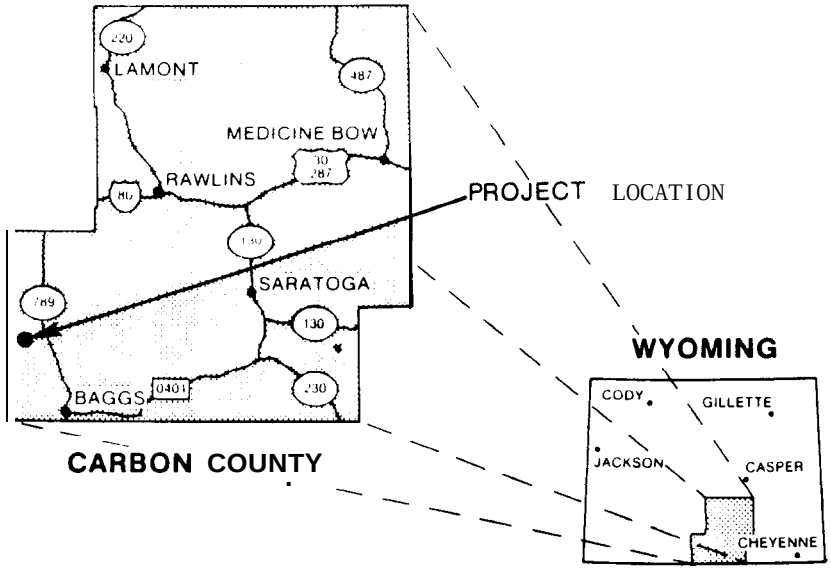
Kemmerer Coal Company
Denver, Colorado

CONTRACT(S)

FIELD TEST PERIOD(S)

Postponed until 1981

Location: Barrel Springs Unit 32-2, Sec. 32, T16N, R93W



OBJECTIVE

To determine the methane content and reservoir properties of three coal zones within the Fort Union Formation in the Green River Basin as part of an effort to delineate the potential for production from this resource area.

FIELD ACTIVITY PROGRESS

Planned Tests

- Conventional Coring - Up to 160 feet in three coal zones
- Drill Stem Testing - Conduct tests of two zones
- Geophysical Logging - formation compensated borehole density (neutron), caliper, dual induction, natural gamma ray

OTHER TESTING

- Desorption of coal samples
- Lab analyses of coal samples

ANALYSIS STATUS

FIELD ACTIVITIES

ANALYSIS ACTIVITIES

RESULTS

SAN JUAN BASIN
SAN JUAN COUNTY, NEW MEXICO

STATUS

Firm Planning

CO-OPERATING COMPANY

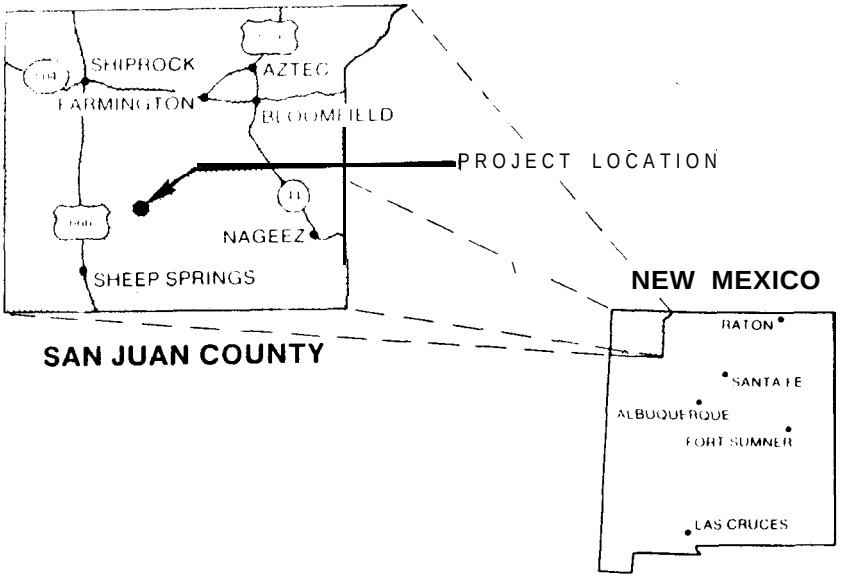
El Paso Natural Gas
Farmington, New Mexico

CONTRACT(S)

FIELD TEST PERIOD(S)

1 November 1980

Location: Russell No. 12, NE/4, Sec. 24, T28N, R8W



OBJECTIVE

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

FIELD ACTIVITY PROGRESS

Planned Tests

- Conventional Coring - Up to 120 feet at a depth of 2570 to 2790 feet
- Geophysical Logging - Dual induction laterolog, gamma ray, formation compensated density, compensated neutron log
- Drill Stem Testing - Up to 2 tests with agreement of El Paso on-site personnel
- The Fruitland Formation is 220 feet thick; the total coal thickness is about 75 feet.

OTHER TESTING

- Desorption of coal samples
- Lab analyses of coal samples

ANALYSIS STATUS

FIELD ACTIVITIES

ANALYSIS ACTIVITIES

RESULTS

SAN JUAN BASIN
RIO ARRIBA COUNTY, NEW MEXICO

STATUS

Firm Planning

CO-OPERATING COMPANY

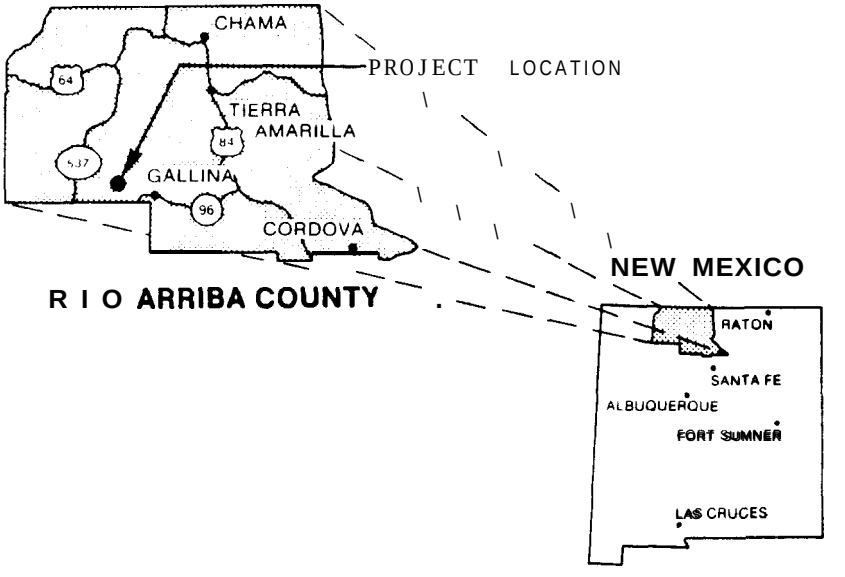
Dugan Prod./J. P. McHugh
Farmington, New Mexico

CONTRACT(S)

FIELD TEST PERIOD(S)

November 1980

Location: Di's Delight #1, Sec. 17, T24N, R2W



OBJECTIVE

To determine the methane content and reservoir characteristics of Fruitland Formation coals in the southeastern San Juan Basin.

FIELD ACTIVITY PROGRESS

Planned Tests

- Conventional core up to 120 feet
- Conduct up to 2 drill stem tests
- Conduct borehole geophysical logging

OTHER TESTING

- Desorption of coal samples
- Lab analyses of coal samples

ANALYSIS STATUS

FIELD ACTIVITIES

ANALYSIS ACTIVITIES

RESULTS

WESTERN WASHINGTON
WHATCOM COUNTY, WASHINGTON

STATUS

Firm Planning

CO-OPERATING COMPANY

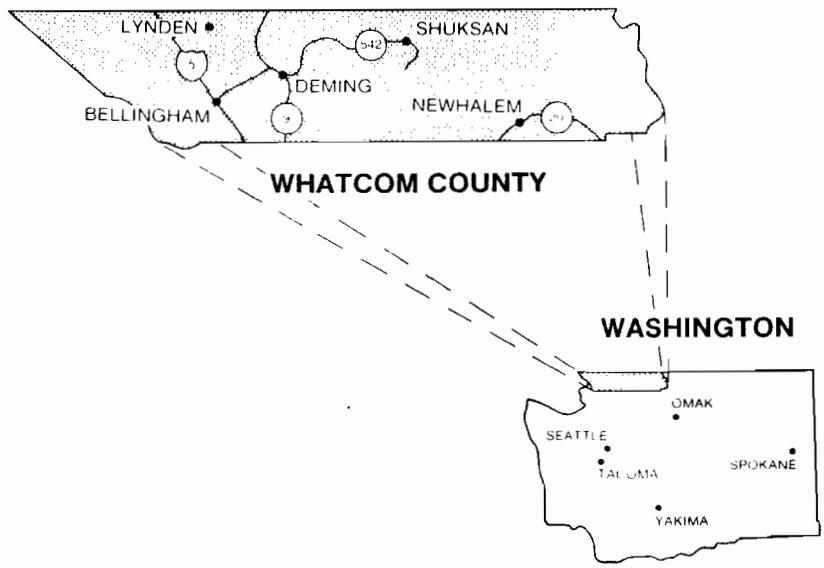
Northwest Fuel Development, Inc.
Portland, Oregon

CONTRACT(S)

FIELD TEST PERIOD(S)

Postponed until 1981

Location: Whatcom County, Washington
T38N, R2E



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 N.W. Washington Basin. This effort will help determine the potential producibility of coalbed methane from this resource area.

FIELD ACTIVITY PROGRESS

Planned Tests

- Conventional Coring - Bellingham coalbed in the Chuckanut Formation. Core up to 30 feet at about 1400 feet deep.
- Geophysical Logging - Resistance, spontaneous potential, natural gamma ray, neutron density, caliper, dip meter, and formation density
- Drill Stem Testing - One test of about 20 feet interval, unless the Northwest Fuel's on-site representative determines such testing will endanger the hole.

OTHER TESTING

- Desorption of coal samples
- Lab analyses of coal samples

ANALYSIS STATUS

FIELD ACTIVITIES

ANALYSIS ACTIVITIES

RESULTS

WIND RIVER BASIN
FREMONT COUNTY, WYOMING

STATUS

Firm Planning

CO-OPERATING COMPANY

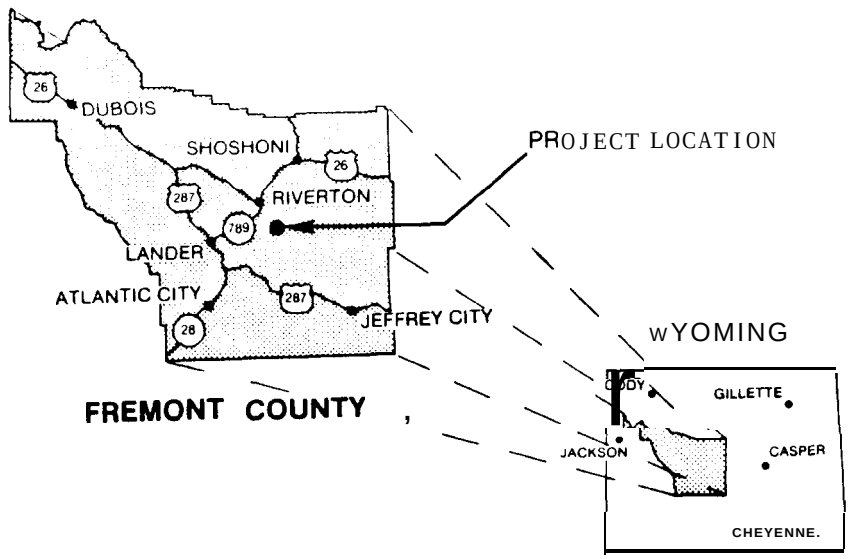
USGS/Coal Branch
Denver, Colorado

CONTRACT(S)

FIELD TEST PERIOD(S)

Early October 1980

Location: 80-WR-19, SE/4, SW/4, Sec. 10, T1S, R6E



OBJECTIVE

To determine gas content of Mesaverde coals in the sparsely drilled Wind River Basin.

FIELD ACTIVITY PROGRESS

Planned Tests

- Conventional Coring
- Geophysical Logging

OTHER TESTING

- Desorption of coal samples
- Lab analyses of coal

ANALYSIS STATUS

FIELD ACTIVITIES

ANALYSIS ACTIVITIES

RESULTS

TECHNOLOGY TEST PROJECTS

LONG HORIZONTAL HOLES, ACTIVE MINE TEST PROJECT
BUCHANAN COUNTY, VIRGINIA

STATUS

Implementation Phase in Progress - Contracts Approved. October 1980

CONTRACT(S)

DE-AC21-78MC08089
Subcontract: H15730JJ96

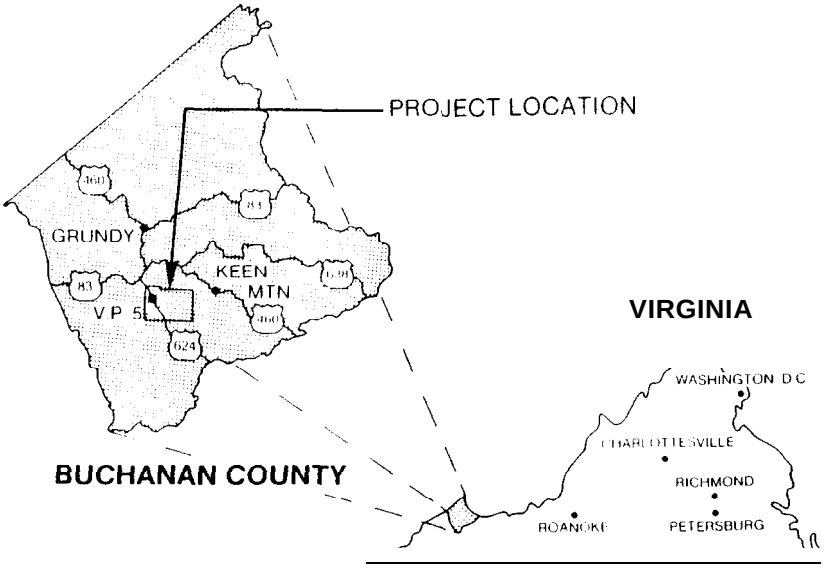
CO OPERATING COMPANY

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

GENERAL SCHEDULE

Concept Phase	- March 1978 to August 1979
Design and Verification Phase	- Sept. 1978 to October 1979
Implementation Phase	Nov. 1979 to - July 1981

Location: Island Creek Coal, Virginia Pocahontas Mine No. 5



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

- Basin drilling techniques proven (multiple short- and long-holes), utilities emplaced and surface vent hole installed
- In-mine piping for test site complete and extended
- Technique for drilling through roof and along overriding seam for degasification demonstrated
- Concept and Design and Verification Phases completed; Implementation Phase begun
- Wells Completed to Date:

	Well No.	Length,	Coalbed
Concept Development - Phase I	1	500	No. 3
	2	502	No. 3
	3	502	No. 3
Design & Verification - Phase II	4	505	No. 3
	5	1,550	No. 3
	6	1,720	No. 3
Implementation - Phase III	7	383	No. 4
	8	675	No. 4
	9	700	No. 3
	10	400	No. 3
	11	1,200	No. 3

RECOVERYSYSTEM SUMMARY

(5) 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.

Long Horizontal Active Mine Test Project

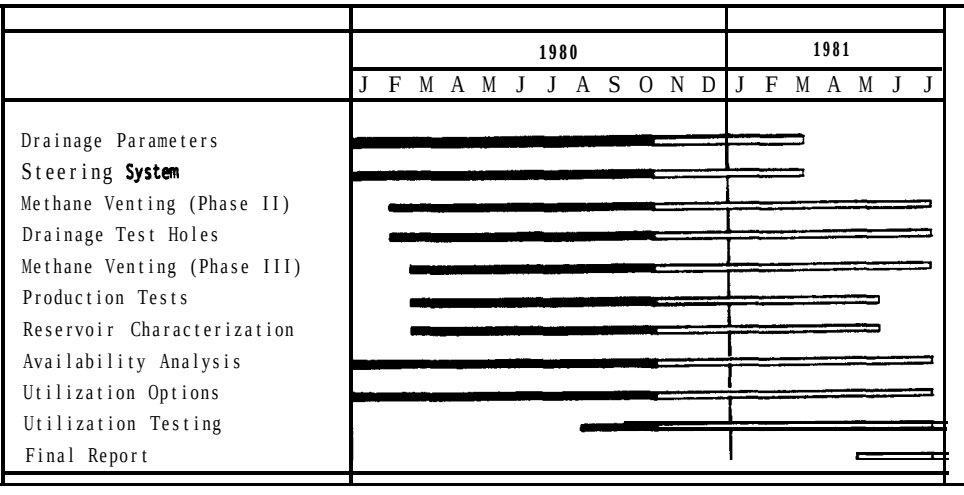
DESIGN AND ANALYSIS ACTIVITIES

- Patent rights variation request by ORC still under consideration by ORO. Contract was signed 17 September. Go-ahead given by METC August 1979.
- Formal project review was held 1 November 1979 and 21 May 1980 by TRW and DOE representatives.
- Preliminary utilization analyses show that at least two options are viable: coal drying and ventilation fan power. Other options, e.g., LNG, are still under study.
- Received DOE Implementation Phase approval. Executed contract modification.
- CY 1980 contract was negotiated and approved.
- Implementing coal drying system as Oxy funded project. Other pipeline uses are in study.
  Conducted an evaluation of J-Tee in-mine safety warning system; based on the results, ORC has ordered the complete system for installation.
- Consideration being given to increasing the capacity of the surface vacuum pump in order to accommodate high flow rate of Oxy #11.
  Because of current venting limitations, thought is being given to a second vertical vent shaft.

FIELD ACTIVITIES

- Stopped drilling of first long-hole at 1550 feet due to high pressure and flow.
- Completed drilling on the second long-hole at 1730 feet. This part of the effort was for validation of techniques and to provide drilling baseline data. The hole will also be the first of five production holes. Gas production approximates 800 Mcfd from the two long-holes and one 400 foot hole.
- Drilled exploratory holes (#7 and #8) into the #4 overriding seam. This unmined seam occasionally vents significant amounts of gas into the mining area (#3 seam); some predrainage is desirable.
- Completed communication tests on Nos. 4, 5, and 6 holes with #6 in full operation.
- Initiated drilling on #9 hole.
- Installed vent to surface and added 5000 feet of vent lines.
- Experiencing directional control problems with drill string in #9 hole. String became stuck due to formation shift in adjacent shaft; however, fishing operations have recovered all steel.
- First Acker drill rig was moved and set up to drill Oxy 110. Drilling terminated at 780 feet due to unstable conditions similar to that experienced in Oxy #9.
- Second Acker drill rig on site has been moved underground and is positioned to begin drilling Oxy #11.
- An inspection visit of the drilling and in-mine pipeline systems was conducted by TRW, DOE, and other Government personnel.
- Permanent piping was installed for Oxy #11; the J-Tee system installation is completed and operational.
- A higher capacity vent shaft vacuum pump has been delivered for venting the methane to the surface.
- A decision was made to drill a second vent shaft and negotiations with a driller initiated.
- Oxy #12 was spudded in down panel from Oxy #11.

SCHEDULE



MULTIPLE COMPLETION DEVELOPMENT TEST PROJECT
GREENE COUNTY, PENNSYLVANIA

STATUS

Implementation Phase in Progress — October 1980

CONTRACT(S)

DE-AC21-78MC08089

Subcontract: H1271GJJ9S

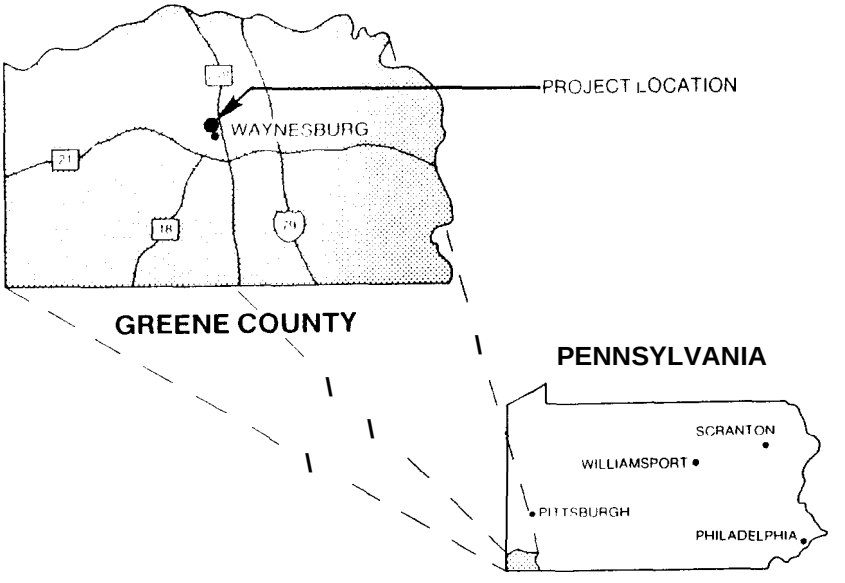
CO-OPERATING COMPANY

Waynesburg College
Waynesburg, Pennsylvania

GENERAL SCHEDULE

Concept Phase	Mar 1978 Aug 1978
Design and Verification Phase	Aug 1979 Oct 1979
Implementation Phase	Nov 1979 Nov 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 and pipeline route and tie-in point identified
- Cost and potential benefits estimated
- Subcontract negotiated and signed and the Environmental Assessment completed
- Drilling plan, preliminary geological work-up and permitting tasks completed
- Core drilling and core analysis activities completed, and well completion options evaluated
- Production well drilled, cased, cemented, and logged
- Perforated casing and nitrogen/foam fractured target seams
- Installed down hole water pump, rods, tubing after bailing and swabbing
- Begin dewatering operations
- Surface gas process equipment procured, and 90% of the items delivered
- Conducted special drawdown, flow back, and gas production tests
- Surface equipment has been installed less gas company gauge and meter requirements.
- Equitable Gas Company contract with the college has been drawn up.
- Dewatering of the well is complete.

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

DESIGN AND ANALYSIS ACTIVITIES

- Design and verification and implementation phase completed; production phase in progress
- Environmental Assessment, drilling and completion techniques completed
- Technique for coal stimulation evaluated in light of recent frac job conducted in Pennsylvania and other states
- Results of coal core analyses are indicated below:

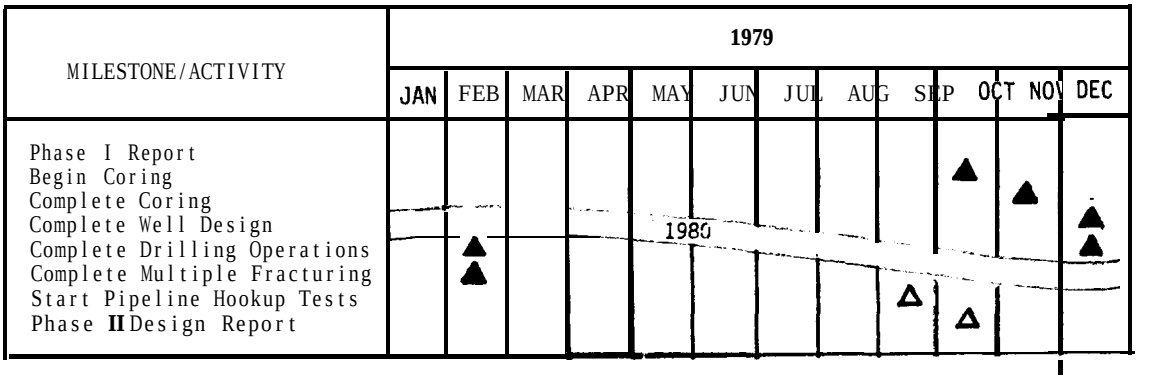
Sample No.	Coal	Depth (ft)	Lost Gas cc/gm	Desorbed Gas cc/gm	Residual Gas cc/gm	Total Gas cc/gm	Total Gas cf/ton
41	Waynesburg	149	0.06	1.58	1.15	2.8	90
42	"	153	0.02	1.07	1.06	2.2	70
43	Sewickley	371	0.07	2.66	2.01	4.7	150
44	"	486	0.05	1.88	2.63	4.6	147
45	Pittsburgh	489	0.08	2.15	1.89	4.1	131
						5.6	180
46	"					4.2	134
J-L-1	Bakerstown (Ri der)	491 493 888	0.15 0.10 0.04	2.82 2.75 2.53	2.60 1.33 1.78	4.4	141
J-L-2	Upper Freeport	1085	0712	1.48	2.12	3.6	115
47	Upper Kittanning	1187		3.07	1.64	4.8	154
156	(Predom. Shale)	1188	0.35	3.75	2.00	6.1	195
48	Middle Kittanning	1238	?	2.41	0.67	3.1	99
142	Clarion	1292	0.10	2.93	1.39	4.4	141

- Analysis of pre-production test data is complete.

FIELD ACTIVITIES

- Site survey and mud pit and access road constructed
- Coring contractor initiated coring on October 23 and,completed on December 18
- Production well drilled to TD January 29 and required geophysical logs run
- Well completed and stimulated. Down hole pump, tubing, and electric power service installed
- Completed abandonment operations on old well discovered during well #1 frac job
- Pump jack installed; dewatering operations begun
- Pulled pump and tubing to correct erratic pumping problem
- Replaced pump motor due to pumping imbalance overload problem
- Began water level measurements with an Echometer
- Coal seam dewatering operations continuing
- Conducted well site pre-production water and gas tests
- Manufacturer replaced pump jack and motor with a heavier duty version of same size unit
- Surface equipment had been installed less gas company connecting components
- Well has been dewatered and production of CH_4 begun.

SCHEDULE



ANTHRACITE COAL DRAINAGE TEST PROJECT
LUZERNE COUNTY, PENNSYLVANIA

STATUS

Concept Phase Complete - Project deferred due to lack of DOE funding. As of 11/79

CONTRACT(S)

DE-AC21-78MC08089

CO-OPERATING COMPANY

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

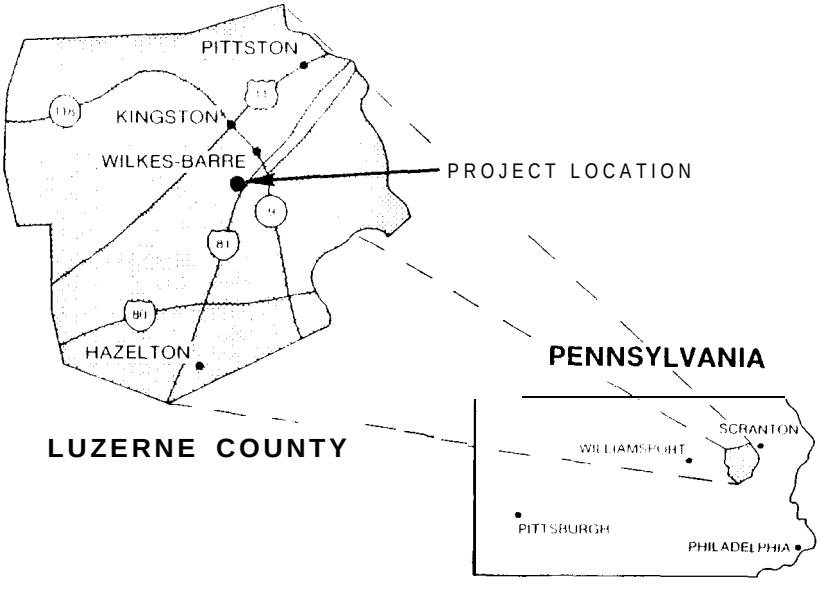
GENERAL SCHEDULE

Concept Phase- June 1976 to Aug 1978

Design and Verification — Indefinitely Deferred

Implementation Phase

Location Southwest of Wilkes-Barre on the Susquehanna



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.
- First draft of EA completed.

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.

ANTHRACITE COAL DRAINAGE TEST PROJECT

DESIGN AND ANALYSIS ACTIVITIES

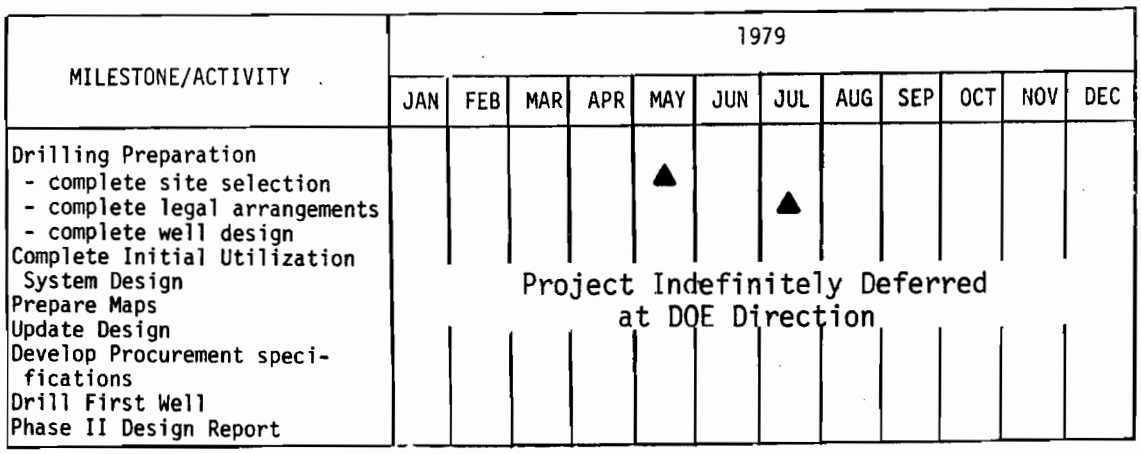
- Statement of Work has been structured to provide for one well to be drilled and tested during CY 1979. Completion will be delayed until CY 1980.

NOTE: The 1979 and 1980 work has been temporarily suspended at the direction of METC.

FIELD ACTIVITIES

- Site inspection conducted in mid-July, 1979
- Field trip for environmental planning conducted in August, 1979.

SCHEDULE



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 portions of CY 1979 and CY 1980 are shown in Figure 5-l.

5.2 PLANS FOR NOVEMBER 1980

Engineering Support

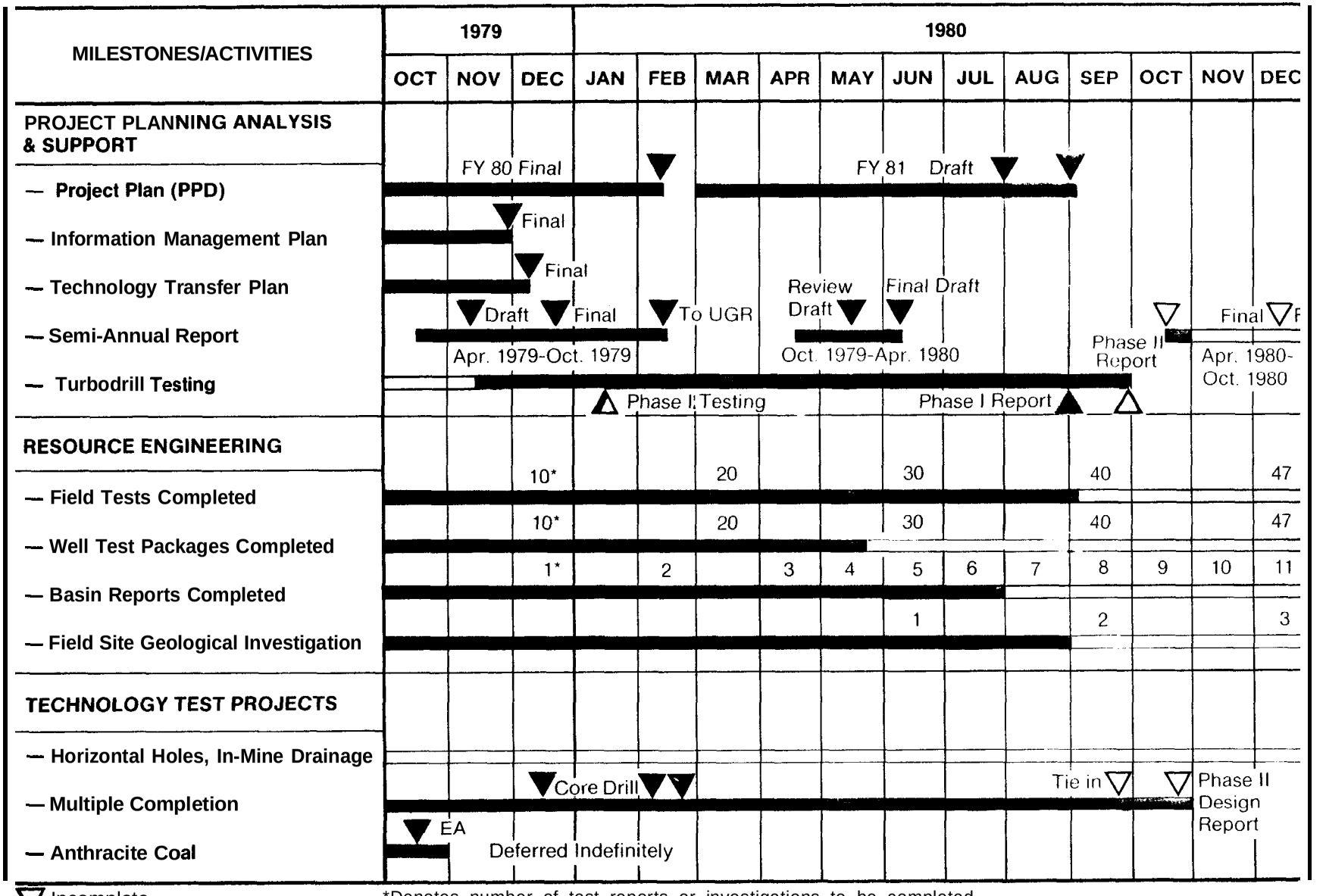
- 3 November - Deliver MRCP display materials for UGR exhibit to METC
- 5 November - Deliver draft MRCP inputs of the UGR Semi-Annual Report to METC for review
- 11 November - Review draft FY 1981 UGR Drilling Technology PPD with METC
- 15 November - Publish and deliver Phase II Turbodrill Test Report to METC
- 18 November - Deliver camera-ready masters of MRCP section of UGR Semi-Annual Report to METC
- 25 November - Publish and deliver FY 1981 UGR Drilling Technology PPD to METC

Resource Engineering

- 3 November - Deliver draft Warrior and Uinta Basin Reports to METC for review
- 3-8 November - Cooperative testing with USGS/Coal Branch in Wind River Basin
- 3-10 November - Cooperative testing with Dugan Production in San Juan Basin
- 5-12 November - Cooperative testing with Coors in the Piceance Basin
- 11 November - Review proposed production test plan with Belco Petroleum
- 12 November - Review proposed cooperative well tests with Energy Reserves

MASTER PROJECT SCHEDULE

Modified June 1980
Updated June 1980



*Denotes number of test reports or investigations to be completed.

15-20 November - Cooperative testing with USGS/Conservation in the Warrior Basin

15 November - Complete field work in conjunction with Piceance Basin Detailed Site Investigation

20-25 November - Cooperative testing with Energy Reserves in the San Juan Basin.

Technology Test Projects

10 November - Signing of contract with Equitable Gas by Waynesburg College

15 November - Begin drilling second vent hole at ORC/Island Creek site

15 November - Complete hookup of Waynesburg College methane well to pipeline

30 November - Complete drilling of OXY #12

5.3 PLANS FOR DECEMBER, JANUARY AND FEBRUARY

Engineering Support

Early December - Prepare forms for computerized resource data base

Resource Engineering

Early December - Publish and deliver final draft Uinta and Warrior Basin Reports to METC

Early December - Cooperate with El Paso Natural Gas on a well in the San Juan Basin

Late December - Deliver Piceance Basin Detailed Site Investigation to METC for review.

Mid-January - Participate in Resource Engineering workshop in Denver, Colorado

Early February - Publish and deliver Wind River and Piceance Creek Basin Reports to METC

Technology Test Projects

Early December - Conduct review of Occidental Research Corporation project

Early December - Complete installation of higher capacity vacuum pump at ORC site

Early December	- Emplace permanent piping for Oxy #12 at ORC site
Late December	- Complete second vent hole at ORC site

5. DELIVERARLE 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

Paragraphs and Description	Delivery Date	Completion Status
a. Monthly Progress Reports	Within 15 days after each month of contract performance.	Periodic
b. Monthly Financial Reports	Within 15 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 20 days after annual period of contract.	CY 1978 - Completed CY 1979 - Completed
e. Draft Final Report	June 21, 1981	When Applicable
f. Final Report	Within 30 days of DOE approval or recommended change of Draft.	When Applicable
g. 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.

	Paragraphs and Description	Delivery Date	Completion Status
a.	Plan for Readily Available Central Data Base Information System	A Phase I deliverable. Exact due date not specified.	Completed - November 1979
b.	Plan for Delineation of the Coal-bed Methane Resource	A Phase I deliverable. Exact due date not specified.	Completed - February 1979
c. & d.	A preliminary System Design 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 1980 Annual Update Completed December 1979 FY 1981 Annual Update Completed September 1980
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.	Completed - November 1979
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 1979/1980 Effort (TBS)

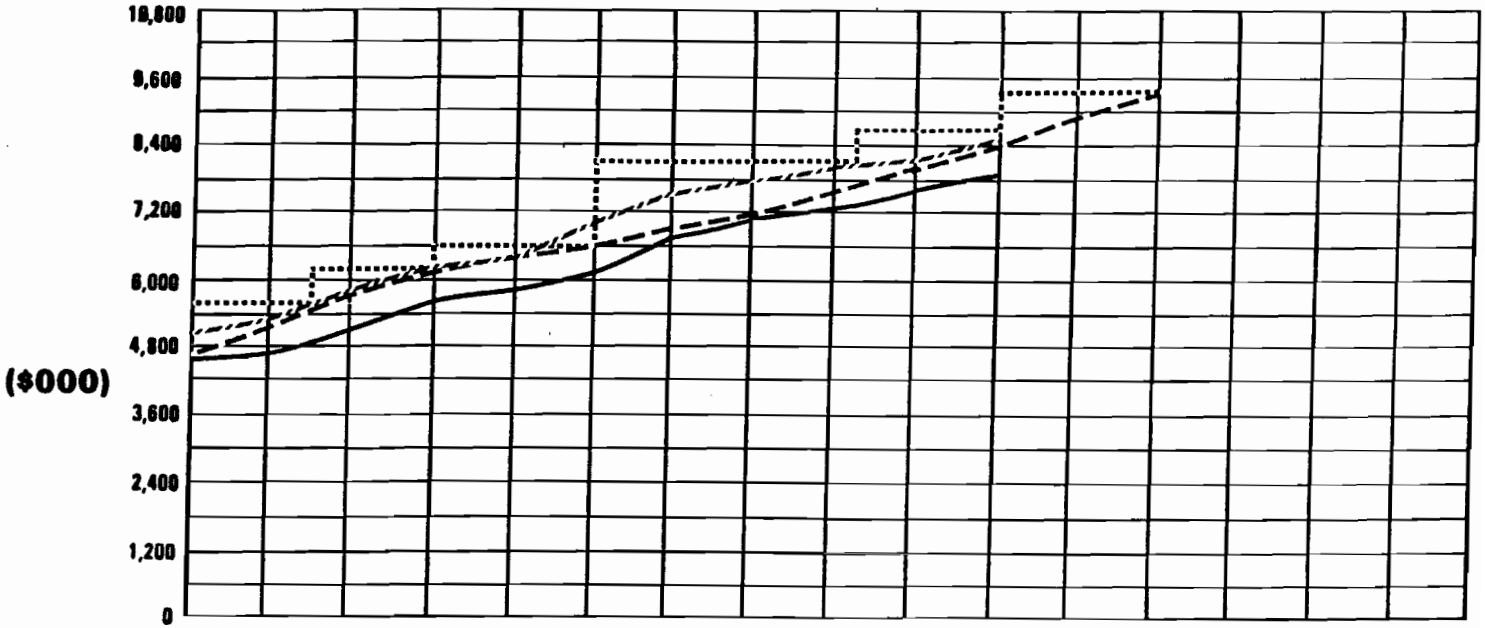
	Paragraphs and Description	Delivery Date	Completion Status	
a.	Well Test Reports	90 days after tests.	Required: Delivered: Past Due:	32 28 0
b.	Basin Reports	Approximately 6 week intervals starting in June.	Required: Delivered: Past Due:	11 6 0
c.	Detailed Site Investigation Report	November 1980	Required: Delivered: In Work: Deferred:	3 1 1 1
d.	Phase II Design Report	30 days after completion of design.	Required: Delivered: In Work:	2 0 2
e.	Maurer Turbodrill	Phase I Phase II	Delivered: Delivered:	9/2/80

7. EXPENDITURE STATUS

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

CONTRACT SUMMARY REPORT	CONTRACT TITLE	CUSTOMER	PERIOD ENDING
	Methane Recovery From Coalbeds	DOE	10/24/80

SALES NUMBER	CONTRACT NUMBER	CONTRACT TYPE	CONTRACT PERIOD	CONTRACT VALUE ($ 000)			
				COST	FEE	%	TOTAL
97141	DE-AC21-78MC08089	CPFF	FROM: 12-12-77 TO: 12-31-80	9354	712	7.6	10066



	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
PLAN	5166	5645	6145	6465	6600	7032	7186	7609	8155	8400	8937	9354
ACTUAL	4601	5137	5575	5895	6168	6680	7008	7216	7646	7895		
VARIANCE	565	508	570	570	432	352	178	393	509	505		
COMMIT.	959	610	701	564	763	861	822	796	644	605		

DEVELOPMENTS/PROBLEMS THIS REVIEW PERIOD:

*Commitments reflected include invoices pending to book against subcontracts.

PROJECT MANAGER: A. Gillies

OPERATIONS MANAGER: R.L. Robertson

— — — PLAN
——— ACTUAL
····· FUNDING
–·–· COMMIT.*

Figure 7-1. Expenditure Schedule

ATTACHMENT A

RESOURCE ENGINEERING

Field Operations Complete

TABLE OF CONTENTS

NORTHERN APPALACHIAN BASIN

NORTHERN APPALACHIAN BASIN
GREENE COUNTY, PENNSYLVANIA

Site AAA

STATUS

Complete

July 1979

CO-OPERATING COMPANY

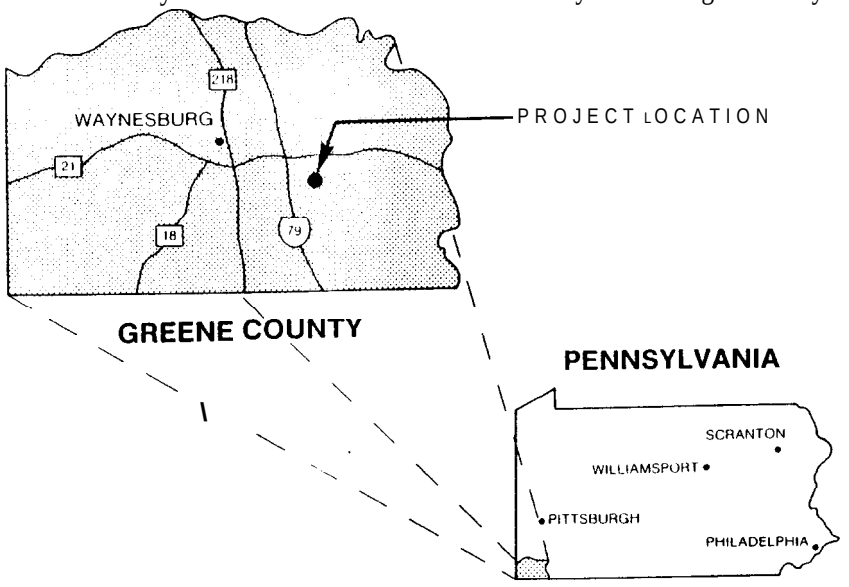
Kinloch Development Co.
Waynesburg, Pennsylvania

CONTRACT(S)

FIELD TEST PERIOD(S)

3 April - 23 June 1978

Location: #1 Murdock Well; Whiteley Township, Greene County, Pennsylvania ~1 mi. No. of Fordyce along Frosty Run



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 - #1 Murdock Well Site AAA

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 bond 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 to 426 cf/ton with the higher values from samples of the lower perforated coals.
- Pre-frac water injection test through acidized perfs 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.

WARRIOR BASIN

WARRIOR BASIN
FAYETTE COUNTY, ALABAMA

Site CAA

STATUS

Testing Complete - Analysis Complete

May 1980

CO-OPERATING COMPANY

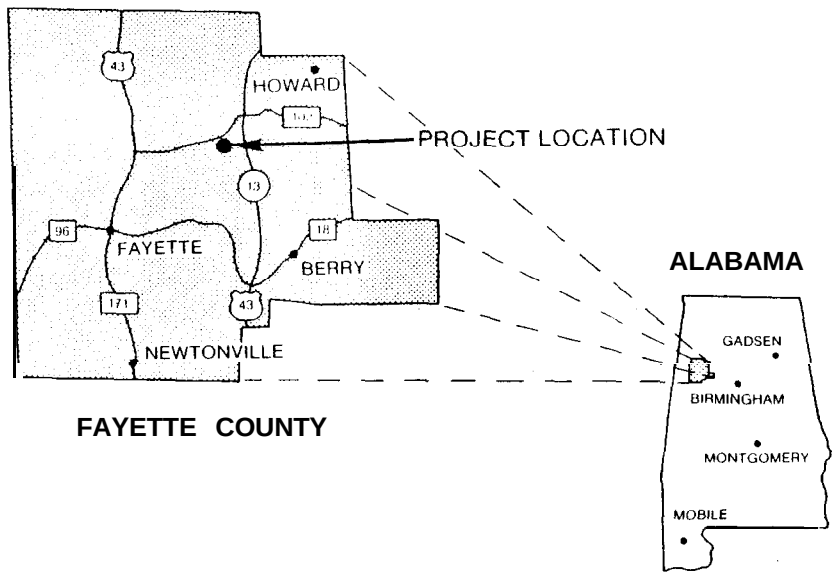
Grace Petroleum Corp.
Jackson, Mississippi

CONTRACT(S)

FIELD TEST PERIOD(S)

6-23 July 1979

Location: Davis Chapel Field, Sec. 34, T14S, R11W
Well No. 1 - Grimsley 35-15



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, 1879-1882.
Logging	• 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 complete
- Laboratory analysis complete.

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 complete
- Laboratory analyses of coal samples complete
- Ultimate and proximate analyses complete.

RESULTS

Desorption data from conventional cores:

Sample Depth (ft)	Lithology	Sample Weight (gm)	Desorbed Gas (cc/gm)	Residual Gas (cc/gm)	Lost Gas (cc/gm)	Total Gas (cc/gm)	Per Unit (cf/ton)
593	Coal	1789	2.2	0.2	0.4	2.8	90
1102	Coal	657	2.3	0.3	0.6	3.2	102
1675	Coal	1198	0.2	0.2	0.2	0.6	19
1880	Coal	1113	1.2	0.9	0.1	2.2	70

WARRIOR BASIN
WALKER COUNTY, ALABAMA

Site CAB

STATUS

Field Operations Complete

October 1980

CO-OPERATING COMPANY

USGS/Eastern Region
Washington, D. C.

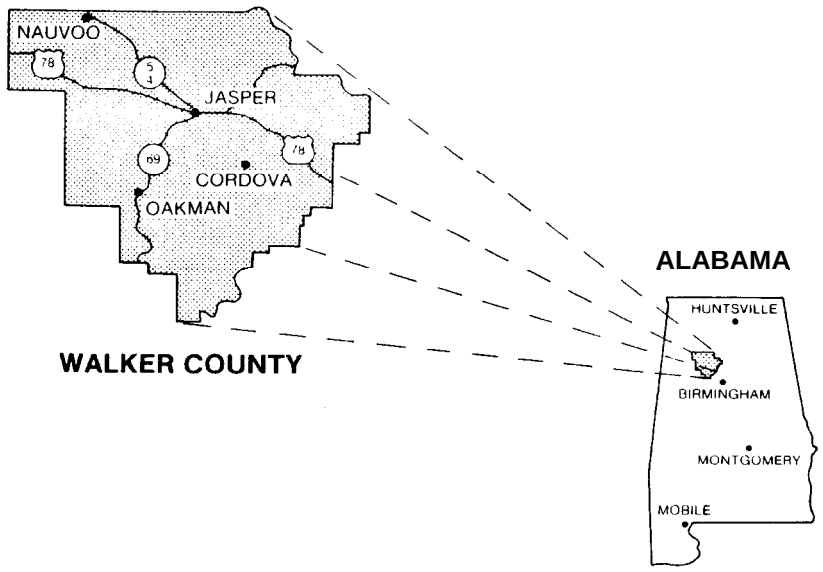
Alabama Geological Survey
Tuscaloosa, Alabama

CONTRACT(S)

FIELD TEST PERIOD(S)

16-21 October 1980

Location: Well #57 (depth 1000') SW/4, Sec. 19, T14S, R9W



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

Tests Performed

- Conventional Coring - Entire well cored by USGS
- Geophysical Logging

OTHER TESTING

- Desorption of coal samples
- Lab analyses of coal samples

ANALYSIS STATUS

FIELD ACTIVITIES

October 16-21 - Cored through the Mary Lee coal zone and encountered 14 inches of coal

By prior agreement with USGS this was insufficient coal to permit sampling for coalbed methane desorption.

ANALYSIS ACTIVITIES

RESULTS

ILLINOIS BASIN

ILLINOIS BASIN
CLAY COUNTY, ILLINOIS

Site DAA

STATUS

Testing Complete/Analysis Complete

May 1980

CO-OPERATING COMPANY

Hagen Oil Company
Clay City, Illinois

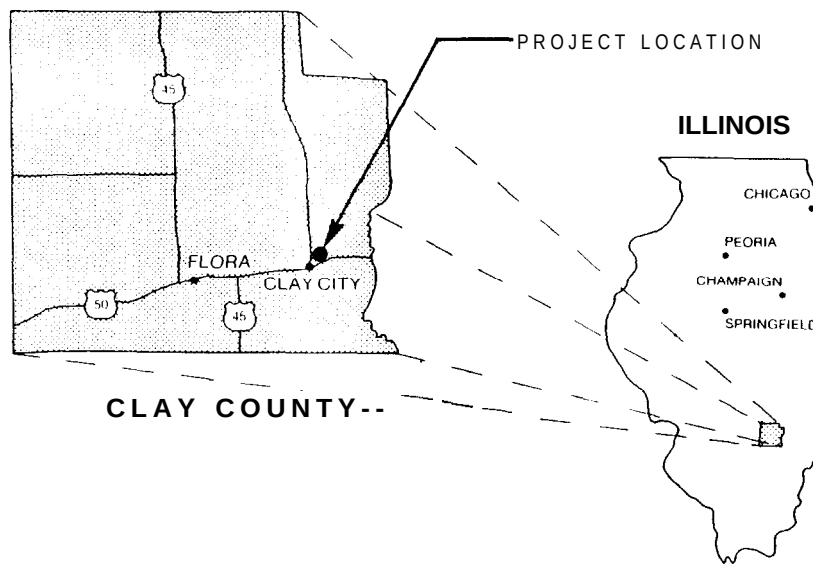
CONTRACT(S)

DE-AC21-78MC08089

FIELD TEST PERIOD(S)

25-28 October 1978

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



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 of coal
- Laboratory analyses

ANALYSIS STATUS

- Laboratory analysis complete
- Desorption complete.

Hagen Oil Company - Henderson #2 Well — Site DAA

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 psig; 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 cf/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

Desorption data from conventional cores:

Sample Depth (ft)	Lithology	Sample Weight (gm)	Desorbed Gas (cc/gm)	Residual Gas (cc/gm)	Lost Gas (cc/gm)	Total Gas (cc/gm)	Per Unit (cf/ton)
994	Coal	1700	0.8	0.5	0.1	1.4	45
995	Coal	1640	0.9	0.3	0.1	1.3	42
1035	Coal	2080	0.6	0.3	0.1	1.0	32
1036	Coal	1890	0.5	0.5	0.1	1.1	35
1034	Shale	3050	0.3	0.0	0.0	0.3	10
1077	Coal	1780	0.4	0.5	0.1	1.0	32
1090	Coal	1350	0.7	0.3	0.1	1.1	35
1352	Coal	860	0.9	0.4	0.3	1.6	51

ILLINOIS BASIN
MARION COUNTY, ILLINOIS — Site DAB

STATUS
Field and Laboratory Activities Completed/Evaluation Complete — June 1980

CO-OPERATING COMPANY

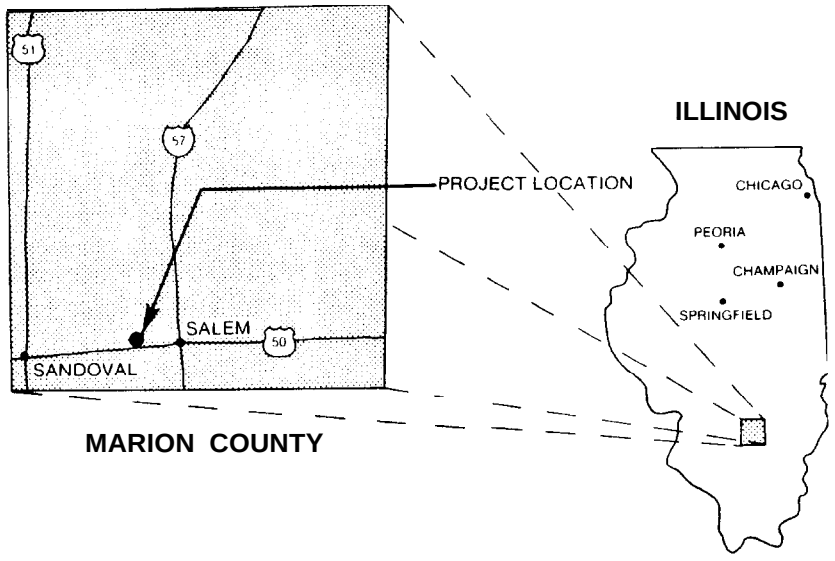
GeoWest Inc.
Billings, Montana
(406) 252-0070

CONTRACT(S)

FIELD TEST PERIOD(S)

12-17 May 1979

Location: Sec. 7, T2N, R2E



OBJECTIVE To determine coal thickness, 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
- Laboratory analysis complete

FIELD ACTIVITIES

May 12 - Location selection

May 13 - Site preparation

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

Seam	Depth (feet)	Thickness (feet)
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

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

May 17 - Plug hole

ANALYSIS ACTIVITIES

- Coal desorption complete
- Porosity/Permeability and bulk density determination of roof and floor rock samples complete
- Proximate/Ultimate analyses complete

RESULTS

Desorption data from conventional cores:

Sample Depth (ft)	Lithology	Sample Weight (gm)	Desorbed Gas (cc/gm)	Residual Gas (cc/gm)	Lost Gas (cc/gm)	Total Gas (cc/gm)	Per Unit (cf/ton)
665	Coal	1776	0.7	0.1	0.0	0.8	25
698	Coal	1748	0.8	0.3	0.0	1.1	35
727	Coal	1349	0.4	0.3	0.0	0.7	23
736	Coal	1544	0.8	0.1	[illegible]	0.9	29
733	Coal	1441	0.9	0.0	0.0	0.9	29
732	Coal	1349	0.5	0.3	0.0	0.8	26

ILLINOIS BASIN
POSEY COUNTY, INDIANA

Site DAC

STATUS

Field Activities Complete/Analyses in Progress

July 1980

CO-OPERATING COMPANY

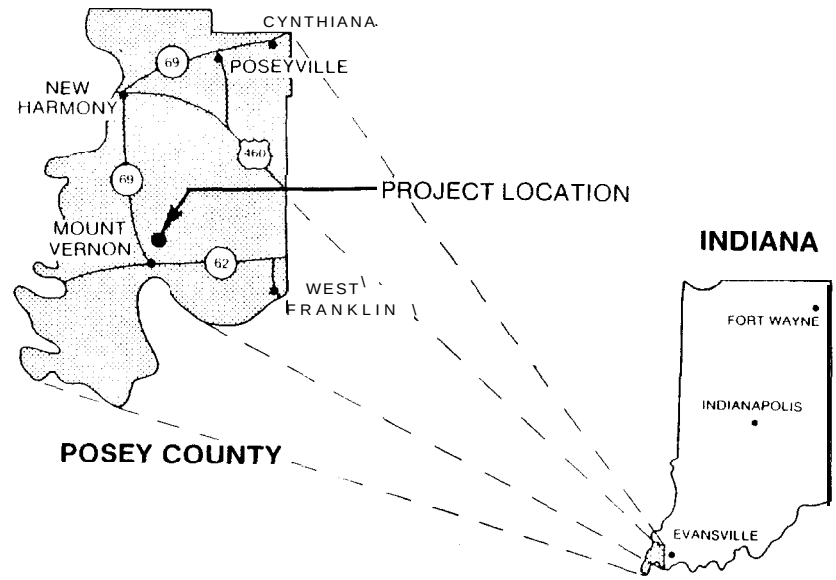
Indiana Geological Survey
Bloomington, Indiana
(812) 337-2862

CONTRACT(S)

FIELD TEST PERIOD(S)

3 October -
16 November 1979

Location: Sec. 33, T6S, R13W



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

- Field operations complete
- Desorption samples taken from the following coals:

Depth (ft)	Coal	Thickness (ft)
467.7	VII	2.0
517.5	Herrin	3.7
		3.5
618.9	IVa	2.2
786.7	IV	1.3
879.0	III (Upper Split)	1.7
889.0	III (Lower Split)	5.0

- Borehole geophysical logs run: gamma-ray, SP, resistivity

OTHER TESTING

- Desorption of coal samples
- Laboratory analyses of coal samples

ANALYSIS STATUS

- Desorption complete

FIELD ACTIVITIES

October 16 - At initial core point
October 18 - Coal VII cored, sampled for desorption test
October 23 - Herrin Coal member cored, sampled for desorption test
October 25 - Coal V cored, sampled for desorption test
October 31 - Coal IVa cored, sampled for desorption test
November 1 - Coal IV cored, sampled for desorption test
November 14 - Coal III (Upper Split) cored, sampled for desorption test
November 14 - Coal II I (Lower Split) cored, sampled for desorption test
November 14 - Geophysical logs run
November 15 - Hole plugged

ANALYSIS ACTIVITIES

- Coal core desorption complete
- Residual gas determination complete
- Proximate/ultimate analyses in progress planned for completion in July

RESULTS

Desorption data from conventional cores:

Sample Depth (ft)	Lithology	Sample Weight (gm)	Desorbed Gas (cc/gm)	Residual Gas (cc/gm)	Lost Gas (cc/gm)	Total Gas Per Unit (cc/gm)	Total Gas Per Unit (cf/ton)
467	Coal	1980	1.0	0.1	0.0	1.1	35
518	Coal	1660	0.0*	0.5	0.0	?	?
616	Coal	2059	0.3	0.4	0.1	0.8	26
728	Coal	1154	1.4	0.4	0.0	1.8	58
787	Coal	1009	1.5	0.5	0.1	2.1	67
879	Coal	937	0.3	0.5.	0.0	0.8	26
889	Coal	1207	2.1	0.4	0.1	2.6	83

*Canister leaked

ILLINOIS BASIN
POSEY COUNTY, INDIANA

Site DAD

STATUS

Field Operations Complete

August 1980

CO-OPERATING COMPANY

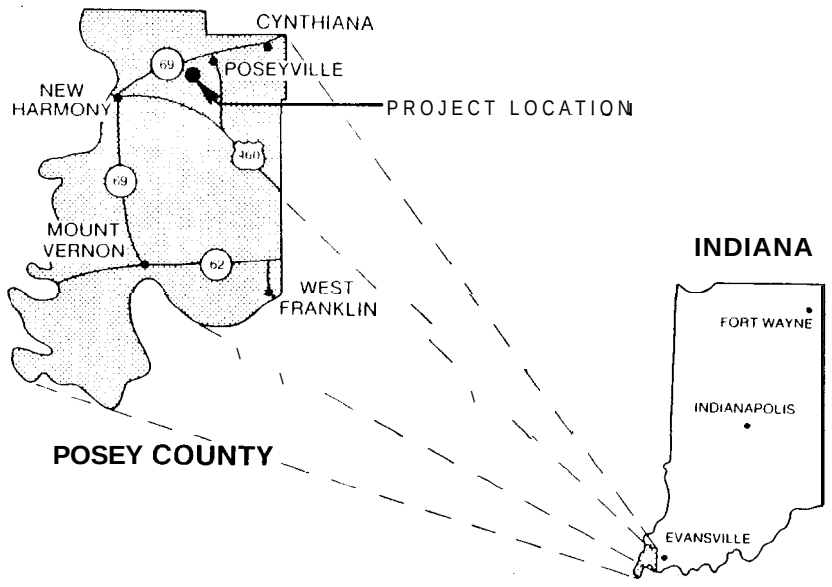
Indiana Geological Survey
Bloomington, Indiana

CONTRACT(S)

FIELD TEST PERIOD(S)

26 November 1979 -
22 May 1980

Location: Sec. 26, T4S, R13W



OBJECTIVE

Provide gas content and desorption data from coals in the southeast part of the Illinois Basin in areas previously untested by MRCP.

FIELD ACTIVITY PROGRESS

- Drilling initiated; coring of initial hole complete
- The following coals were intercepted:

Depth (ft)	Coal	Thickness (ft)
506.0	VII	3.0
562.0	Herrin	4.9
665.4	V	4.1
772.0	IVa	2.2
827.0	IV	2.5
906.5	IIIa	0.7
933.1	III	11.5

- Borehole geophysical logs run include: gamma ray, SP, and resistivity
- Twin hole to recore Coal V complete

OTHER TESTING

- Desorption of coal samples
- Laboratory analyses of coal samples upon completion of desorption

ANALYSIS STATUS

- Desorption in progress

FIELD ACTIVITIES

December 20 - At initial core point
December 21 - Coal VII cored; sampled for desorption test

Break for Holidays

January 8 - Herrin coal cored; sampled for desorption test
January 24 - Coal V cored; sampled for desorption test
January 28 - Mechanical and hole problems delayed progress
February 19 - Coal IVa cored; sampled for desorption test
February 22 - Coal IV cored; sampled for desorption test
February 26 - Mechanical difficulties delayed progress
April 2 - Coal IIIa cored; sampled for desorption
Mechanical difficulties delayed progress
April 16 - Coal III cored, thickest coal seam ever recovered in Posey County; sampled for desorption
April 17 - Hole logged; hole sloughing precluded complete suite being run
April 21 - Hole plugged
April 29 - Rig skidded over to drill to Coal V in twin hole
May 21 - Coal V cored; sampled for desorption test
May 22 - Hole logged and plugged

ANALYSIS ACTIVITIES

- Coal core desorption in progress
- Coal quality - ultimate/proximate analyses begun
- Gas composition - including isotopic analyses, complete

RESULTS

Preliminary desorption from conventional cores:

Sample Depth (ft)	Lithology	Sample Weight (gm)	Desorbed Gas (cc/gm)	Residual Gas (cc/gm)	Lost Gas (cc/gm)	Total Gas (cc/gm)	Per Unit ((cf/ton)
505	Coal (VII)	1196	1.9	0.2	0.1	2.2	70
562	Coal (Herrin)	1358	2.4	+	0.1		
665	Coal (IVa)	1445	1.8*	0.3		1.4	45
772	Coal (IV)	1491 961	2.7	0.5	0.1	2.4	77
827	Coal				0.1		
993	Coal (IIIa)		2.7		0.1		
995	Coal (III)	1348 1413	3.4	+t	0.2		
667	Coal (III)	1243	2.1	t	0.1		
669	Coal (V)	1550	2.0	t	0.2		

*Canister leaked
+Samples sent to USBM Laboratory for Residual Gas determination and Proximate/Ultimate analysis

ILLINOIS BASIN
WEBSTER COUNTY, KENTUCKY

Site DAE

STATUS

Field Operations Complete

May 1980

CO-OPERATING COMPANY

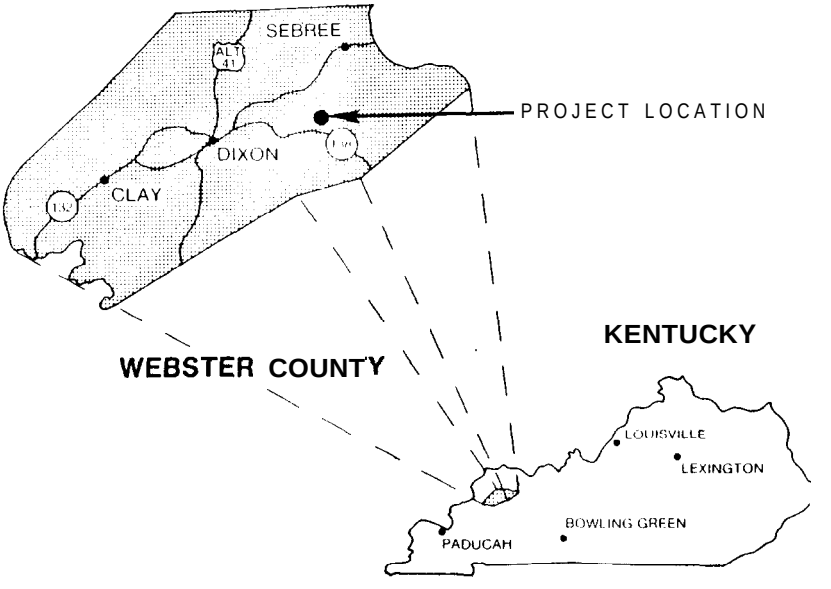
R. W. Beeson Oil Producer
Evansville, Indiana

CONTRACT(S)

FIELD TEST PERIOD(S)

18-22 January 1980

Location: 1475' FSL, 925' FWL, 4 L 24



OBJECTIVE

To test the methane content of coals in the deep part of the Illinois Basin from which no specific gas content data is available.

FIELD ACTIVITY PROGRESS

- Field activity complete
- Coal cored as follows:

Depth (ft)	Coal	Thickness (ft)
1200.0	No. 13	5.7
1304.7	No. 9	5.0

- Geophysical logs run: resistivity, gamma ray, density, neutron, SP, sonic, and caliper
- DST performed in each coal horizon: Formations were very tight -- permeability very low

OTHER TESTING

- Desorption of coal samples
- Lab analysis of coal, roof, and floor rocks

ANALYSIS STATUS

- Desorption complete
- Mechanical properties analysis complete

R. W. Beeson Oil Producer — Site DAE

FIELD ACTIVITIES

January 18 - Site preparation, rig up, spud well

January 19 - Core #1 - No. 14 coal not encountered

January 20 - Core #2 - No. 13 coal sampled for desorption testing

- Cores #3 and #4 - No. 11 coal missing from section

January 21 - Core #5 - No. 9 coal sampled for desorption testing

- TD @ 1324 feet
- Geophysical logs run
- DST initiated

January 22 - DST completed

- Hole plugged

ANALYSIS ACTIVITIES

- Desorption complete
- Roof and floor rock property testing complete
- Coal log computer analysis complete
- Coal quality - ultimate/proximate analyses complete
- Gas quality - including isotopic composition in progress

RESULTS

Desorption data from conventional cores:

Sample Depth (ft)	Lithology	Sample Weight (gm)	Desorbed Gas (cc/gm)	Residual Gas (cc/gm)	Lost Gas (cc/gm)	Total Gas (cc/gm)	Per Unit (cf/ton)
1200	Coal	1908	0.6	0.8	0.0	1.4	45
1204	Coal	2074	0.8	0.6	0.0	1.4	45
1305	Coal	1650	0.6	0.8	0.0	1.4	45
1308	Coal	1732	0.5	0.9	0.0	1.4	45

ARKOMA BASIN

ARKOMA BASIN
PITTSBURG COUNTY, OKLAHOMA — Site EAA

STATUS

Testing Complete - Analysis complete — May 1980

CO-OPERATING COMPANY

Arkla Exploration Co.
Shreveport, Louisiana

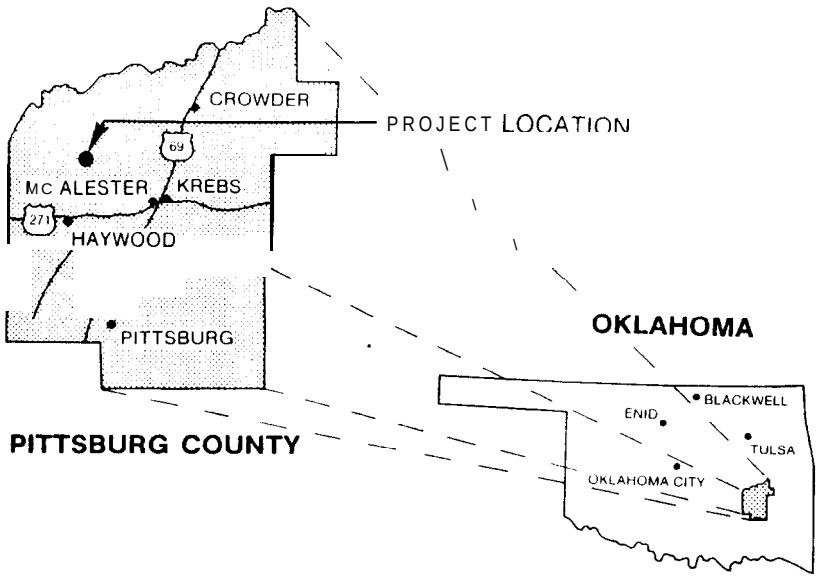
CONTRACT(S)

DE-AC21-78MC08089

FIELD TEST PERIOD(S)

9-11 October 1978

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



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
Logging	• Logging by Arkla - Induction Later log, neutron density, and sonic

OTHER TESTING

- Desorption of core samples

ANALYSIS STATUS

- Desorption completed

FIELD ACTIVITIES

October 8 - Drilling reached 3150 feet, logging completed
- Sidewall cores taken

Interval	Shots	Cores Recovered
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 complete

RESULTS

Results from sidewall cores:

Sample Depth (ft)	Lithology	Sample Weight (gm)	Desorbed Gas (cc/gm)	Residual Gas (cc/gm)	Lost Gas (cc/gm)	Total Gas (cc/gm)	Per Unit (cf/ton)
1904	Coal					4.1	131
2128	Coal					6.6	211
2730	Coal					2.3	73

ARKOMA BASIN
PITTSBURG COUNTY, OKLAHOMA

Site EAB

STATUS

Field Operations Complete

May 1980

CO-OPERATING COMPANY

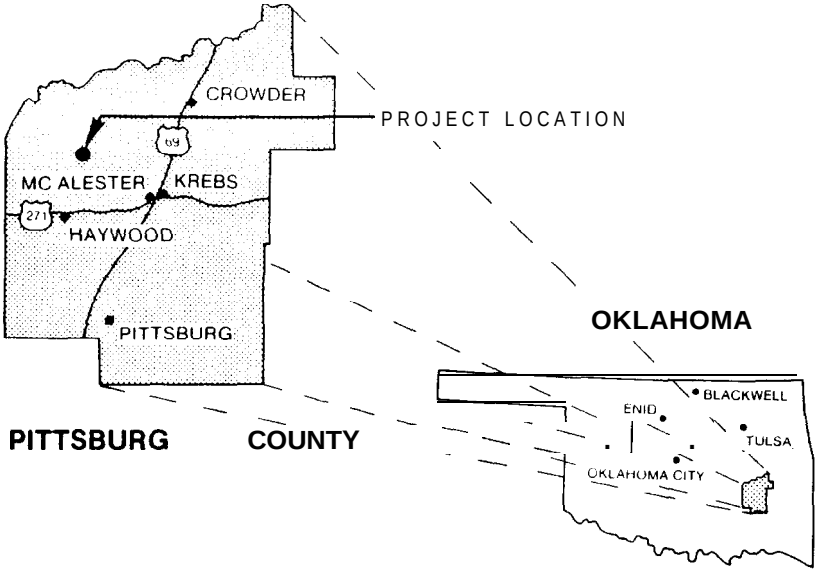
Mustang Production Co.
1100 East First National
Center
Oklahoma City, OK

CONTRACT(S)

FIELD TEST PERIOD(S)

4-26 July 1979

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



OBJECTIVE

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

FIELD ACTIVITY PROGRESS

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

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 complete
- Computer analysis complete
- Laboratory analysis complete

FIELD ACTIVITIES

July 11 - Coal horizon - Middle Booch, projected to be within the interval 3650 to 3662
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

- Design of fracture treatment was prepared.
- Pre-frac and post-frac testing programs were prepared.
- Field operations were begun on February 11 and were terminated on February 13. Several attempts were made to swage out the collapsed casing at 1710 feet and 1744 feet downhole. The casing could not be repaired to accept the required packer unit for subsequent well completion operations. As a result, the Barringer well was abandoned as a viable prospect for type III testing.

RESULTS

Desorption data from conventional cores:

Sample Depth (ft)	Lithology	Sample Weight (gm)	Desorbed Gas (cc/gm)	Residual Gas (cc/gm)	Lost Gas (cc/gm)	Total Gas Per Unit (cc/gm)	Total Gas Per Unit (cf/ton)
3651	Coal	1257	5.6	1.2	0.8	7.6	243

ARKOMA BASIN
HASKELL COUNTY, OKLAHOMA

Site EAC

STATUS

Field Operations Complete

August 1980

CO-OPERATING COMPANY

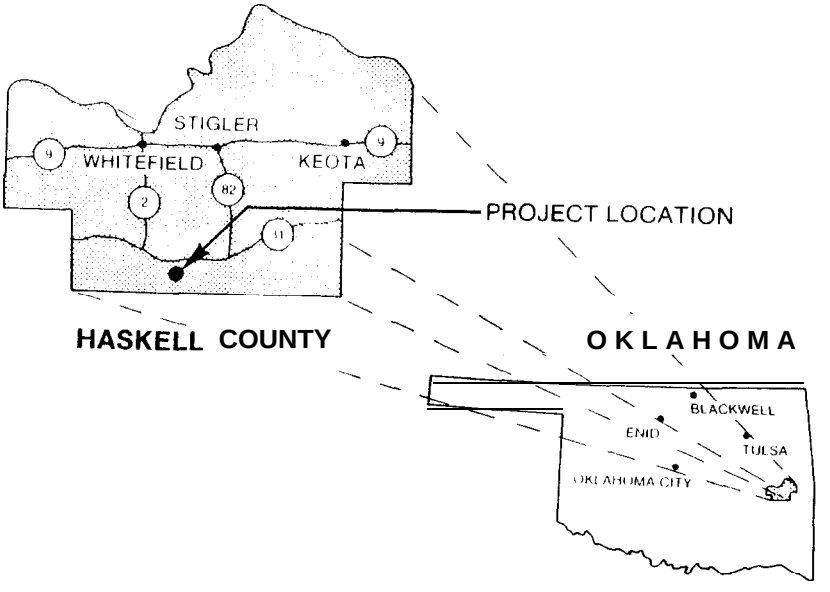
Mustang Production Company
Oklahoma City, OK

CONTRACT(S)

FIELD TEST PERIOD(S)

4-26 July 1979

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



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, neutron, and caliper

OTHER TESTING

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

ANALYSIS STATUS

- Computer analysis of coals completed

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 completed

RESULTS

ARKOMA BASIN
LE FLORE COUNTY, OKLAHOMA — Site EAD

STATUS
Field Operations Complete — June 1980

CO-OPERATING COMPANY

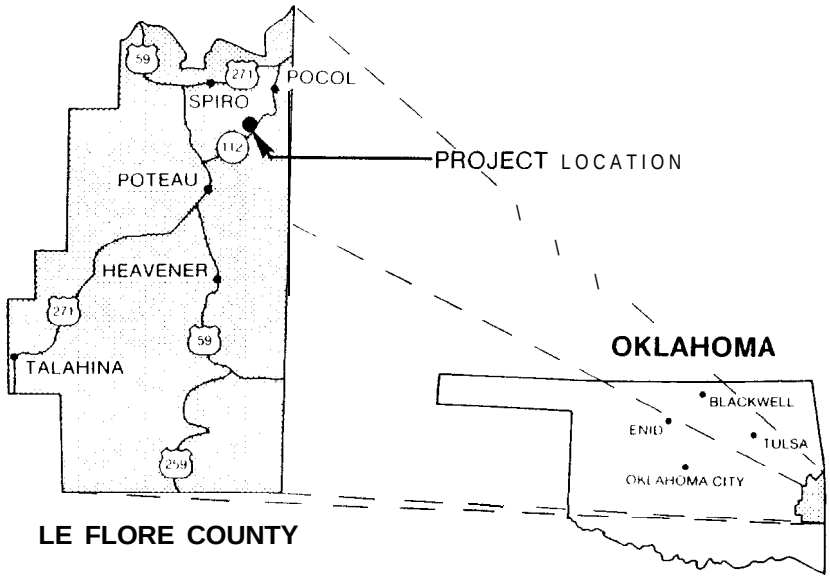
U.S. Bureau of Reclamation
Amarillo, Texas

CONTRACT(S)

FIELD TEST PERIOD(S)

6-14 September 1979

Location: Well #DH-A17. Section 14, T8N, R26E
SW ¼ of NW ¼



OBJECTIVE

To determine the quantity and quality of the coal, the methane content of the coal, and some reservoir properties of the Hartshorne Formation. This effort will help determine the potential productivity of coalbed methane from the eastern Arkoma Basin.

FIELD ACTIVITY PROGRESS

- Testing was performed during the original drilling at 460 feet.
- Tests Performed

Conventional Coring	• 10 ft of core. Coal at 191.6 - 194.5 feet.
Logging	• Borehole geophysical logs run - gamma-ray, caliper, and electric

OTHER TESTING

- Desorption of coal sample
- Laboratory analysis of coal sample complete

ANALYSIS STATUS

- Desorption complete

FIELD ACTIVITIES

September 6 - Spud date, began coring from surface to TD

September 11 - Recovered 2.9 feet of coal (Lower Hartshorne seam)

September 13 - Reached TD, USGS logged hole

ANALYSIS ACTIVITIES

- Coal desorption complete

RESULTS

Desorption data from conventional cores:

Sample Depth (ft)	Lithology	Sample Weight (cc/gm)	Desorbed Gas (cc/gm)	Residual Gas (cc/gm)	Lost Gas	Total Gas Per Unit (cc/gm)	Total Gas Per Unit (cf/ton)
192	Coal	1363	8.4	0.9	0.1	9.4	300

PICEANCE BASIN

PICEANCE BASIN
RIO BLANCO COUNTY, COLORADO — Site FAA

STATUS

Testing Complete/Analysis Complete — July 1980

CO-OPERATING COMPANY

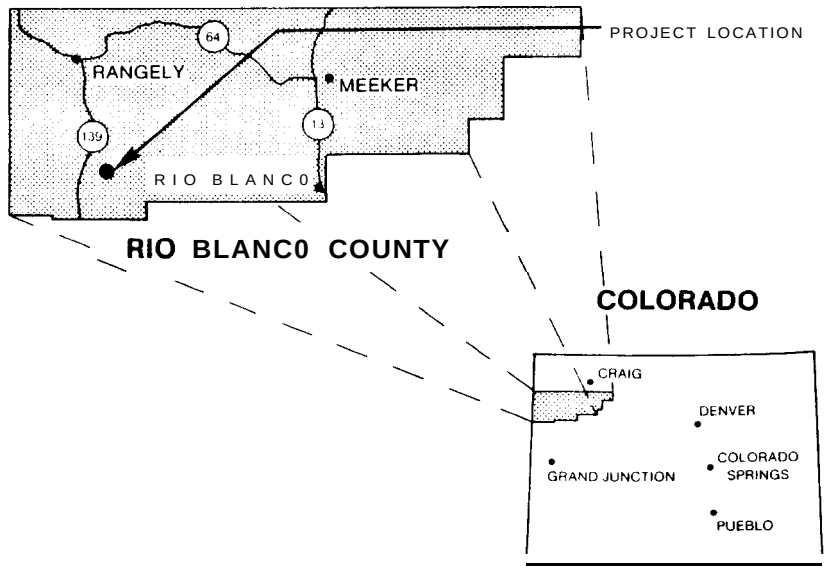
Fuel Resources Development Company
Denver, Colorado

CONTRACT(S)

FIELD TEST PERIOD(S)

9-10 September 1978

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



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

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

Fuelco - Cathedral 0-28-3-101-S Site FAA

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 AC1 IVITIES

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

RESULTS

Desorption data from conventional cores:

Sample Depth (ft)	Lithology	Sample Weight (gm)	Desorbed Gas (cc/gm)	Residual Gas (cc/gm)	Lost Gas (cc/gm)	Total Gas Per Unit (cc/gm)	(cf/ton)
1603	Coal	1584	0.5		1.0	2.5	18 81

PICEANCE BASIN
RIO BLANCO COUNTY, COLORADO

Site FAB

STATUS
Testing Complete
No Further Activity

July 1979

CO-OPERATING COMPANY

Twin Arrow Drilling Co.
Rangely, Colorado

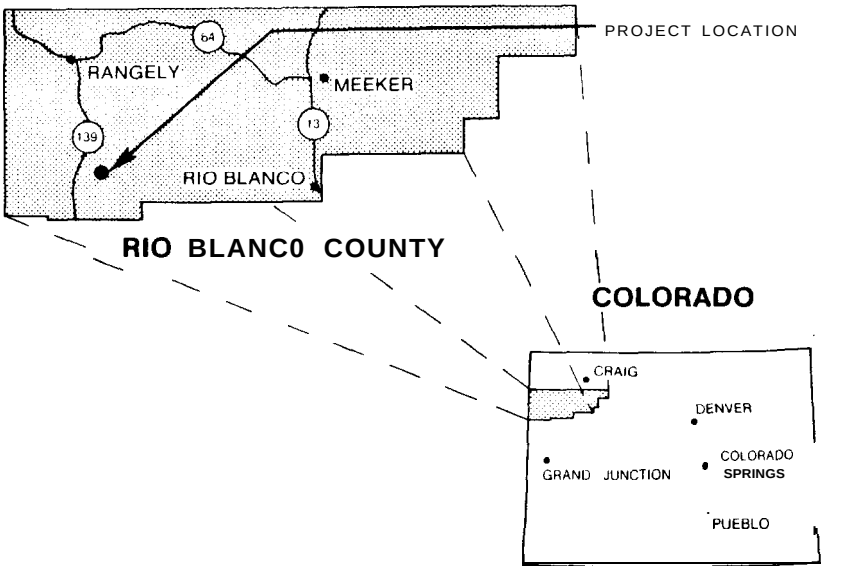
CONTRACT(S)

DE-AC21-78MC08089

FIELD TEST PERIOD(S)

3-7 October 1978

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



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	320 to 1050 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 tests	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- Halliburton - 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.

PICEANCE BASIN
RIO BLANCO COUNTY, COLORADO

Site FAC

STATUS
Testing Complete/Analysis Complete

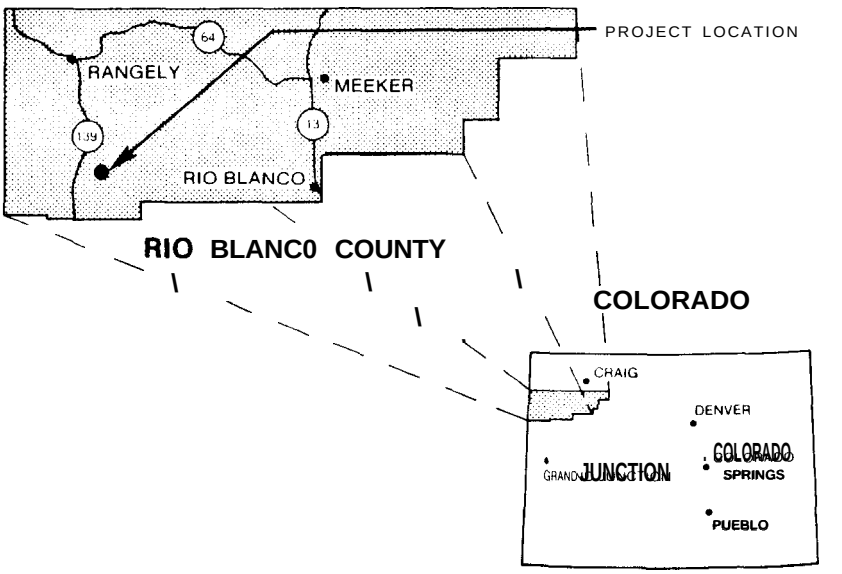
August 1980

CO-OPERATING COMPANY
Twin Arrow Drilling Company
Rangely, Colorado

CONTRACT(S)

FIELD TEST PERIOD(S)
November - December 1978

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



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

Conventional coring	• 150 feet of core. Coal desorption samples 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 complete
- No logs run due to lost hole; logs run on #4-14X at same location

ANALYSIS STATUS

- Desorption of cores complete

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 complete
- No well testing was performed because the hole was lost

RESULTS

Desorption data from conventional cores:

Sample Depth (ft)	Lithology	Sample Weight (gm)	Desorbed Gas (cc/gm)	Residual Gas (cc/gm)	Lost Gas (cc/gm)	Total Gas (cc/gm)	Per Unit (cf/ton)
685	Coal	355	1.0	0.1	2.5	3.6	115
698	Carb. shale/coal	353	0.7	0.8	5.2	6.7	214
772	Carb. siltstone	393	0.8	0.0	0.6	1.4	46
771	Carb. shale w/coal	593	0.5	0.0	0.3	0.8	24
759	Coal	397	0.9	0.8	1.0	2.7	86
809	Coal	119	2.8	2.5	2.9	7.6	243
802	Coal	306	0.8	0.6	1.3	2.7	88
804	Carb. Shale	643	0.5	0.2	0.7	1.4	46
986	Coal	653	0.9	1.2	1.4	3.5	111

PICEANCE BASIN
RIO BLANCO COUNTY, COLORADO

Site FAD

STATUS

Field Operation complete

July 1980

CO-OPERATING COMPANY

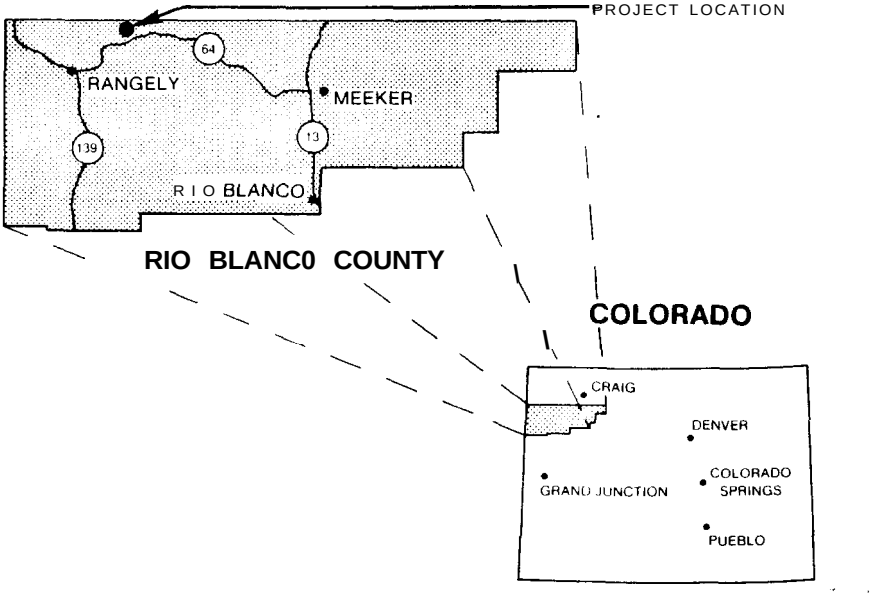
Western Fuels Assoc.
Lakewood, Colorado

CONTRACT(S)

FIELD TEST PERIOD(S)

11-20 June 1979

Location: Well No. 310136-Z Sec. 36, T3N, R101W



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

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

ANALYSIS STATUS

- Desorption in progress
- Laboratory analysis of coal samples in progress

Western Fuels Assoc. - Well No. 310136-2 Site FAD

FIELD ACTIVITIES

June 16 - Pilot hole logged

June 17 - Spud date for core hole

June 19 - Core point reached

Seam	Depth (ft)	Thickness (ft)
"E"	1324.7	2.4
"D"	1330.6	8.2
"C"	1351.2	0.9

June 20 - 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 in progress

RESULTS

Desorption data from contentional cores:

Sample Depth (ft)	Lithology	Sample Weight (gm)	Desorbed Gas (cc/gm)	Residual Gas (cc/gm)	Lost Gas (cc/gm)	Total Gas (cc/gm)	Per Unit (cf/ton)
1325	Coal	1558	1.9	-	0.0	1.9	61
1331	Coal	1599	1.9	-	0.0	1.9	61
1333	Coal	1614	1.7	-	0.0	1.7	54
1336	Coal	1651	1.5	-	0.0	1.5	48
1351	Coal	1453	1.5	-	0.0	1.5	48

PICEANCE BASIN
RIO BLANCO, COLORADO

Site FAE

STATUS

Field Operations Complete

July 1980

CO-OPERATING COMPANY

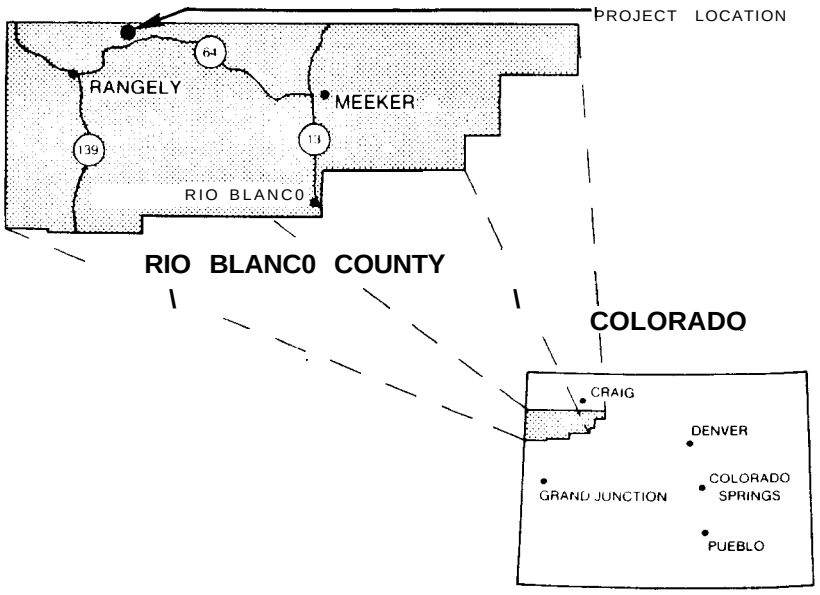
Western Fuels Assoc.
Lakewood, Colorado

CONTRACT(S)

FIELD TEST PERIOD(S)

26 June - 1 July 1979

Location: Well No. 21011-5, Sec. 1, T2N, R101W



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

OTHER TESTING

- Desorption of coal samples
- Laboratory analysis of coal samples

ANALYSIS STATUS

- Desorption in progress
- Laboratory analysis of coal samples in progress

Western Fuels Assoc. - Well No. 21011-5 — Site FAE

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

Seam	Depth (ft)	Thickness (ft)
"F"	741.75-748.18	6.43
"E"	758.71-761.01	2.30
"D"	764.92-772.5	7.58
"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) in progress

RESULTS

Desorption data from conventional cores:

Sample Depth (ft)	Lithology	Sample Weight (gm)	Desorbed Gas (cc/gm)	Residual Gas (cc/gm)	Lost Gas (cc/gm)	Total Gas Per Unit (cc/gm)	(cf/ton)
741	Coal	1703	0.2	0.1	0.2	0.5	16*
744	Coal	1820	1.9	-	0.2	2.1	69
759	Coal	1596	1.6	-	0.1	1.7	54
765	Coal	1731	2.1	-	0.1	2.2	70
772	Coal	1622	2.3	-	0.5	2.8	90
795	Coal	1646	1.8	-	0.1	1.9	64
797	Coal	1620	1.8	-	0.1	1.9	61
809	Coal	1665	1.1	-	0.0	1.1	35

*Possible canister leak

PICEANCE BASIN
RIO BLANCO COUNTY, COLORADO

Site FAF

STATUS
Field Operation complete

July 1980

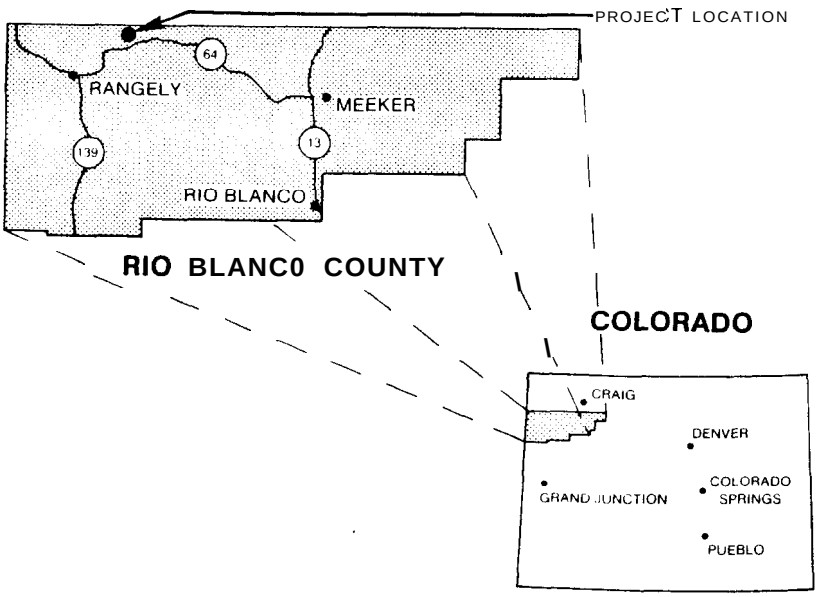
CO-OPERATING COMPANY
Western Fuels Assoc.
Lakewood, Colorado

CONTRACT(S)

FIELD TEST PERIOD(S)

23-31 August 1979

Location: Well No. 310129-4; Sec. 29, T3N, R101W



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.
- Tests Performed

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
- Laboratory analysis of coal samples in progress

Western Fuels Assoc. - Well No. 310129-4 Site FAF

FIELD ACTIVITIES

August 26 - Pilot hole logged, twin core hole spudded

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

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

August 28 - Completed coring, demobilization

ANALYSIS ACTIVITIES

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

RESULTS

Desorption data from conventional cores:

Sample Depth (ft)	Lithology	Sample Weight (gm)	Desorbed Gas (cc/gm)	Residual Gas (cc/gm)	Lost Gas (cc/gm)	Total Gas (cc/gm)	Per Unit (cf/ton)
880	Coal	1512	0.1	0.0	0.1	0.2	6
905	Interburden Siltstone	1785	0.1	0.0	?	0.1	3
911	Coal	1527	0.01	0.0	?	0.01	0.3*

*Does not include lost gas

PICEANCE BASIN
RIO BLANCO COUNTY, COLORADO — Site FAG

STATUS
Field Operations complete — July 1980

CO-OPERATING COMPANY

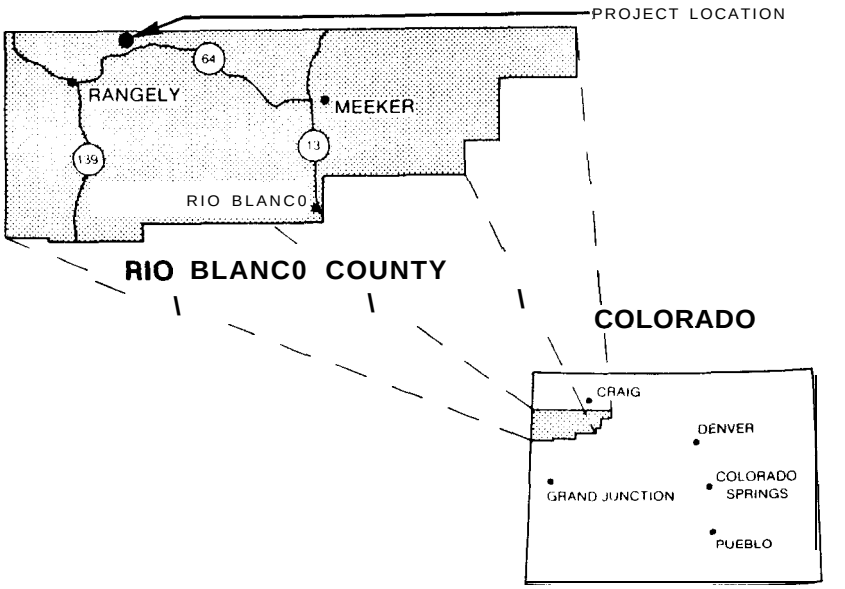
Western Fuels Assoc.
Lakewood, Colorado

CONTRACT(S)

FIELD TEST PERIOD(S)

23-31 August 1979

Location: Well No. 310135-4; Sec. 35, T3N, R101W



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 in progress

ANALYSIS STATUS

- Desorption in progress
- Laboratory analysis of coal in progress

Western Fuels Assoc. - Well No. 310135-4 Site FAG

FIELD ACTIVITIES

August 25 - Pilot hole logged, twin core hole spudded

August 29 - Core point reached (depth 1180 feet), began coring two coal seams

Seam	Depth (ft)	Thickness (ft)
"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 in progress

RESULTS

Desorption data from conventional cores:

Sample Depth (ft)	Lithology	Sample Weight (gm)	Desorbed Gas (cc/gm)	Residual Gas (cc/gm)	Lost Gas (cc/gm)	Total Gas (cc/gm)	Per Unit (cf/ton)
1191	S1 Floor Rock	2783	0.04	-	0.0	0.04	1.0*
1206	Coal	2018	0.9	-	0.1	1.0	32

*Does not include lost gas

PICEANCE BASIN
RIO BLANCO COUNTY, COLORADO

Site FAH

STATUS
Field Operations complete

May 1980

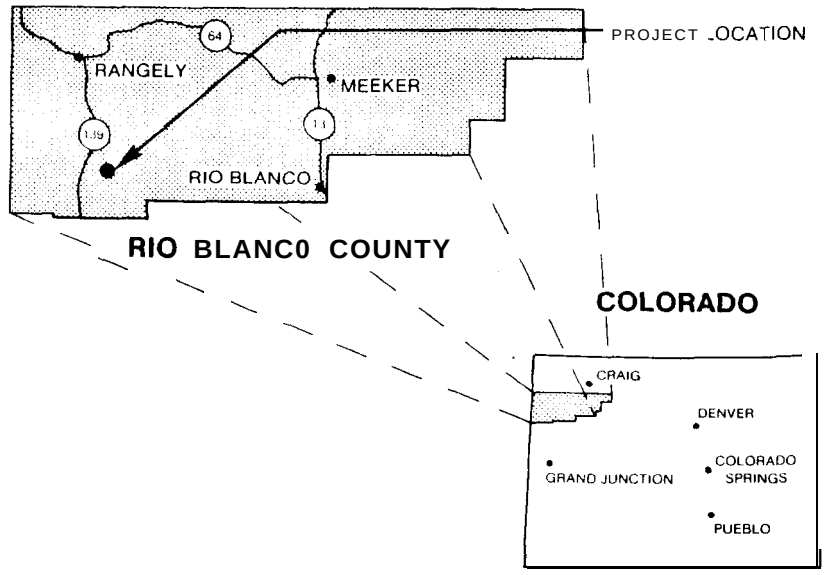
CO-OPERATING COMPANY
Fuel Resources Development Co. (Fuelco)
Denver, Colorado
(303) 571-7707

CONTRACT(S)

FIELD TEST PERIOD(S)

12-17 August 1979

Location: D-26-3-101-S Section 26, T3S, R101W



OBJECTIVE

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

FIELD ACTIVITY PROGRESS

- Testing was performed during the original drilling at 7387 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

- Desorption of coal samples
- Laboratory analyses of coal samples, roof rock and floor rock

ANALYSIS STATUS

- Desorption in progress
- Laboratory analyses of roof and floor rock complete

FIELD ACTIVITIES

August 13 - Spud date for core hole

August 14 - Core point reached, began coring operations

Seam	Depth (ft)	Thickness (ft)
"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 - 1217.8	8.7
Unnamed	1223.0 - 1225.0	2.0

August 15 - Completed coring, demobilization

ANALYSIS ACTIVITIES

- Coal desorption in progress
- Laboratory analysis of coal (proximate/ultimate, heating value, sulfur form) complete
- Laboratory analysis of roof rock (triaxial compressive strength w/elastic properties, permeability, porosity and natural bulk density) complete
- Laboratory analysis of floor rock (uniaxial compressive strength, permeability, porosity and natural bulk density) complete

RESULTS

Desorption data from conventional cores:

Sample Depth (ft)	Lithology	Sample Weight (gm)	Desorbed Gas (cc/gm)	Residual Gas (cc/gm)	Lost Gas (cc/gm)	Total Gas (cc/gm)	Per Unit (cf/ton)
1210	Coal	1498				0.5	16
1211	Coal	1312				0.8	26
1223	Coal	1249				0.6	19

PICEANCE BASIN
SPECIFIC LOCATION CONFIDENTIAL — Site FAI

STATUS

Field Operations complete; desorption in progress — September 1980

CO-OPERATING COMPANY

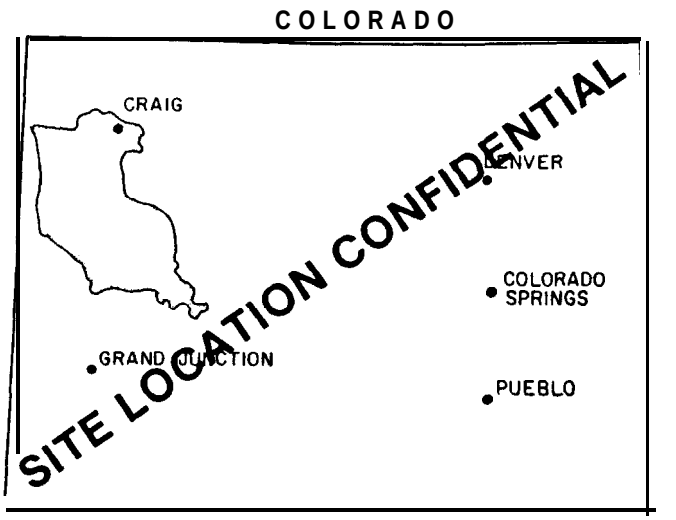
Confidential Well No. 6

CONTRACT(S)

FIELD TEST PERIOD(S)

18-30 April 1980

Location: Piceance Basin
Specific Location Confidential



OBJECTIVE

Provide gas content and desorption information on the Cameo coal zone in southeastern part of the Piceance Basin.

FIELD ACTIVITY PROGRESS

- Completed coring of 68 feet
- A total of about 42 feet of coal was encountered at the following depths:

Core Intervals (ft)	Core Composition
4682-4696 (14')	41.5 ft. of coal
4726-4759 (33')	5.0 ft. of carbonaceous shale
4798-4819 (21')	21.5 ft. of sandstone

Core recovery of shale + sandstone 100%
Core recovery of coal 25%

- Borehole geophysical logs run

OTHER TESTING

- Desorption of coal core and some cuttings is in progress (16 samples)
- Lab analysis of coal samples to be conducted on completion of desorption

ANALYSIS STATUS

FIELD ACTIVITIES

ANALYSIS ACTIVITIES

RESULTS

Desorption data from conventional cores

Sample Depth (ft)	Lithology	Sample Weight (gm)	Desorbed Gas (cc/gm)	Residual Gas (cc/gm)	Lost Gas (cc/gm)	Total Gas Per Unit* (cc/gm)	(cf/ton)
4682-4696	Coal	2255	1.0		0.3	1.3	41
4682-4696	Non-Carb. shale	1046	0.1		**	0.1	3
4724-4731	Coal/shale shaker	486	4.0		0.1	4.1	131
4724-4731	Coal/shale shaker	2278	4.1		0.9	5.0	160
4756	Coal	2009	4.5		1.0	5.5	176
4731	Coal	3003	2.6		0.7	3.3	105
4735	Carb. shale	3864	0.1		0.1	0.2	7
4726	Coal	3804	0.7		0.3	1.0	32
4755	Coal	1486	8.0		1.1	9.1	292
4753	Coal	2313	4.5		1.3	5.8	185
4796-4808	Coal/shale shaker	397	4.7		0.0	4.7	150
4804	Coal	1829	7.0		1.9	8.9	284
4801	Coal	1733	6.5		1.8	8.3	267
4799	Coal	1621	6.3		2.5	8.8	283
4808	Coal	631	5.0		0.8	5.8	186
4816	Rollins sandstone	2805	0.5		2.0	2.5	79

*Does not include residual gas
**Unable to calculate lost gas

PICEANCE BASIN
MESA COUNTY, COLORADO

Site FAJ

STATUS
Field Operations Complete

July 1980

CO-OPERATING COMPANY

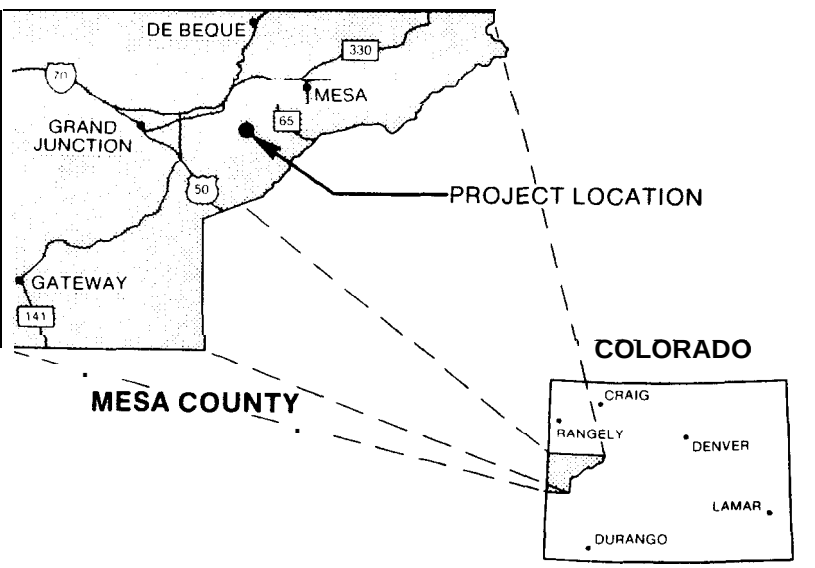
Adolph Coors
Golden, Colorado .

CONTRACT(S)

FIELD TEST PERIOD(S)

28 April - 25 June 1980

Location: Nichols #1-24 - NW/4, NW/4, Sec. 24, T10SW, R97W



OBJECTIVE

Complete well in one coal interval of the Cameo zone, frac, and test to determine water and producibility of the part of the Mount Garfield Formation.

FIELD ACTIVITY PROGRESS

- The well was fractured during the stimulation treatment performed in May 1980.
- A subsequent injectivity test was performed on June 24 and 25 to evaluate the results of the fracture.

OTHER TESTING

- Water samples taken during swabbing operations prior to the injectivity test are being analyzed by Dowel1 and a water testing laboratory.

ANALYSIS STATUS

Flow pressure response measured at wellhead during injectivity test calculated flowing bottom-hole pressure during injectivity test.

Adolph Coors - Nichols #1-24 Site FAJ

FIELD ACTIVITIES

- Well was initially drilled in 1978 to a depth of 3600 feet and cased with 5-1/2" casing to 3323 feet. Well was plugged back to 2720 feet and 2-3/8" tubing set as 2400 feet.
- Casing was perforated with four holes per foot over an eight-foot interval from 2625 to 2633 feet and fractured with 52,500 gallons of 75 percent quality foam and nitrogen. The frac fluid consisted of 13,230 gal water
  26 gal F75 (foaming agent)
  39 gal F78 (foaming agent)
  430,000 SCF nitrogen
  48,992 lbs 20/40 mesh sand
- Injectivity testing was performed on June 25, 1980

ANALYSIS ACTIVITIES

- The average effective post-frac permeability to water was estimated from injectivity test data to be approximately 19 md in the fractured formation.
- The initial reservoir pressure in the perforated interval (2625-2633 feet) was calculated to be 1079 psia based upon liquid level measurements made on June 24, prior to the start of the injectivity testing.

RESULTS

- Hydraulic Stimulation:
  - After flowing back well and swabbing frac fluid and nitrogen, well failed to produce methane in any production size rate. Small quantities of gas were observed, but flow fell off to zero in 5 to 10 minutes.
- Injectivity Test:
  - Data obtained in the injectivity test cannot be used to varify that the Cameo coal seam itself was fractured. The only conclusion that can be drawn from the test is that a formation previously stimulated accepted fluids during the injectivity test. Additional testing in the form of a differential temperature survey could indicate where produced fluids are coming from.
  - If it were known that the Cameo coal seam definitely contained producible quantities of gas, the absence of post-frac gas production would mean that the coalbed itself was not fractured and that the fracture proceeded elsewhere. It can be inferred, however, from the test results that the coalbed within the drainage area of the well contains insufficient gas to make it producible. This is based on the estimated average permeability to liquid being relatively high for a coalbed (about 19 md). The effective permeability to gas should be considerably higher provided that the formation is dewatered, which would be the case with a permeability to water of 19 md.
  - It is possible that the injected fluids entered an adjacent formation by channeling behind the casing for some distance up to down the well and/or through fractures created by the previous stimulation treatment. However, according to Coors Energy Division personnel, a cement bond log was run previously in the well as part of the original well completion procedures and indicated competent bonding between the casing string and cement sheath at that time.

GREEN RIVER BASIN

GREEN RIVER BASIN
MOFFAT COUNTY, COLORADO

Site GAA

STATUS

Type I testing complete

May 1980

CO-OPERATING COMPANY

Energy Reserves Group
Casper, Wyoming

CONTRACT(S)

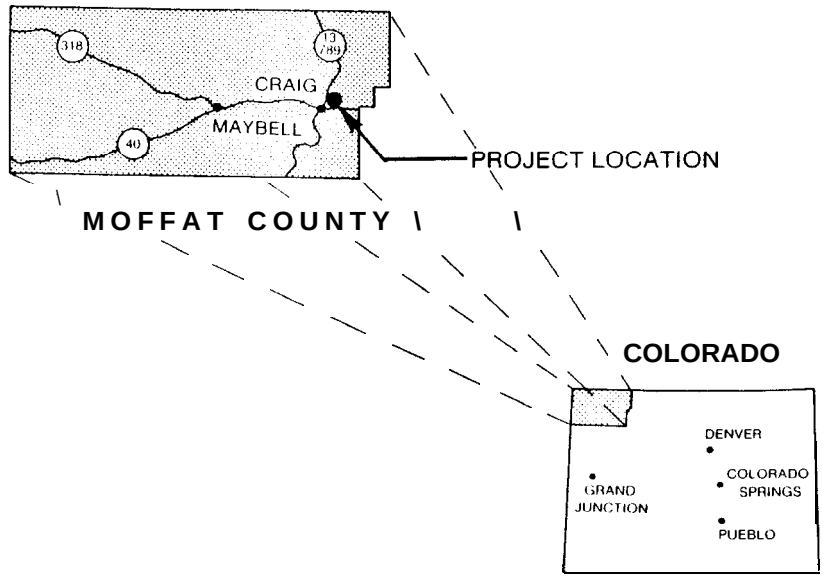
DE-AC21-78MC08089

GRI-5011-321-0101

FIELD TEST PERIOD(S)

November 1978 -
December 1979

Location: Sec. 29, T7N, R90W



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

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, borehole compensated sonic, dual induction
Sidewall coring	• 26 cores obtained
	• Sample depth 3683-4988 feet
Drill stem tests	• Interval tested 3700-3800, 4634-4714 feet

OTHER TESTING

- Coal core desorption
- Proximate/ultimate analysis
- Coal structural/strength testing at Colorado School of Mines

ANALYSIS STATUS

- Desorption completed
- Produced gas sample analysis: 48.8% CH_4, 31.7% N_2, 18.1% CO_2, and 1% ethane.

Energy Reserves Group — Site GAA

FIELD ACTIVITIES

November 6	- Spud date
November 16	- Began coring at 3642 feet, 30 foot core barrel
November 17, 18	- Cored 3642 - 3702 feet
November 19, 20	- Drill stem test #1, 3700 - 3800 feet
November 22, 28, 29	- Cored 3923 - 3953, 4649 - 4679, 4679 - 4709 feet
November 29	- Drill stem test #2, 4634 - 4714 feet
December 2	- Ran Schlumberger log for sidewall core points

Refer to type III testing report for frac and post-frac activities

ANALYSIS ACTIVITIES

- Laboratory analysis (Proximate/ultimate, heating value, sulfur form)
- Conventional core desorption complete
- Drill stem test results complete
- Sidewall core desorption results:

Depth	Lithology	Gas in Place (cf/ton)
4984	Coal	144
4982	Very carbonaceous shale	90
4980	Coal w/shale	157
4978	Coal	158
4976	Coal	142
4872	Coal	179
4868	Coal	157
4864	Coal	210
4986	Coal	133
4814	Coal	190
4720	Coal	136
4666	Coal	179

RESULTS

Desorption data from conventional cores:

Sample Depth (ft)	Lithology	Sample Weight (gm)	Desorbed Gas (cc/gm)	Residual Gas (cc/gm)	Lost Gas (cc/gm)	Total Gas (cc/gm)	Per Unit (cf/ton)
3675	Coal	1624	4.0	3.4	.6	8.0	256
3922	Coal	1162	0.8	2.6	.4	3.8	121
3930	Shale	511	0.9	2.2	.8	3.9	124
3948	Coal	987	0.8	1.4	.5	2.7	87
4654	Coal	1410	2.0	6.5	.5	9.0	288
4655	Coal	1785	1.5	6.5	.4	8.4	270
4656	Coal	1753	3.0	5.7	.6	9.3	296
4657	Coal	1403	2.6	6.2	.6	9.4	301
4658	Coal	1718	2.6	5.5	.5	8.6	274
4659	Coal	1389	3.3	6.3	.5	10.1	323
4708	Coal	1701	3.1	7.6	1.1	11.8	376

GREEN RIVER BASIN
MOFFAT COUNTY, COLORADO

Site GAA
(New test series)

STATUS

Type III pre-frac testing complete/post-frac testing in progress

May 1980

CO-OPERATING COMPANY

Energy Reserves Group
Casper, Wyoming

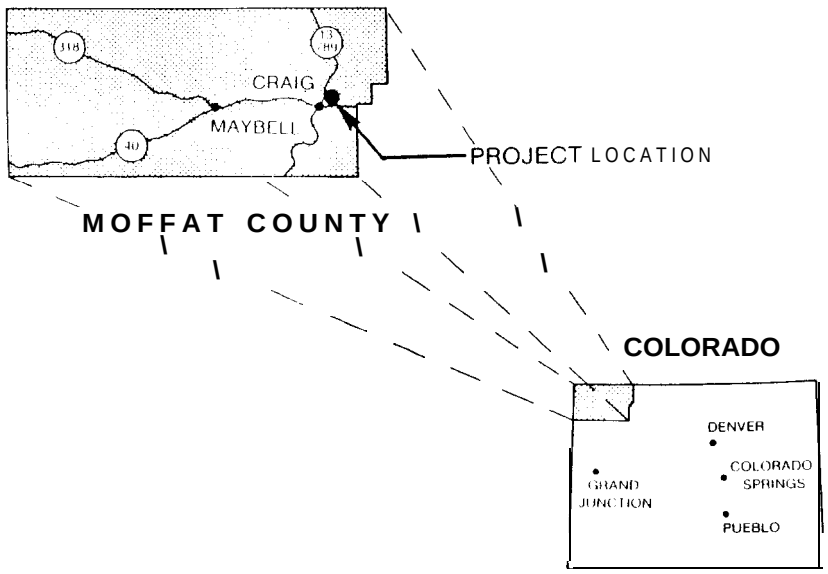
CONTRACTIS)

DE-AC21-78MC08089
GRI-5011-321-0101

FIELD TEST PERIOD(S)

December 1979 - February 1980

Location: Sec. 29, T7N,R90W



OBJECTIVE

Complete well in one coal interval, frac and conduct long-term production testing 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

- See initial test series performed during the original drilling at 6540 feet in Type I report.
- Tests Performed

Initial post-frac flow	• Producing 3-10 mcf gas/day, 3-4 bbl water/day
Present post-frac flow	• Producing less than 1 mcf gas/day
	• Water total production during November 1979 was 138.7 bbl
	• Still lack 128.5 bbl of load to recover

OTHER TESTING

- Coal structural/strength testing at Colorado School of Mines

ANALYSIS STATUS

- Post-frac well clean-up continuing
- Produced gas sample analysis: 48.8% CH_4, 31.7% N_2, 18.1% CO_2 and 1% ethane

FIELD ACTIVITIES

See initial field activities - Type I report

June 22, 1979	- Well completion began
June 27	- Injectivity-pressure fall-off testing
July 5	- Halliburton frac (guar gel hydraulic with nitrogen assist)
July 27	- Post-frac clean-up underway
September 9	- Water production -- 6.5 bbl/day
October 24	- Production rates (2-3 bbl/day water, 6 Mcf/day gas)
November 17	- Producing 5 bbl water/day, less than 0.5 Mcf/day gas
February	- Field operations complete

ANALYSIS ACTIVITIES

See initial series - Type I report

RESULTS

See initial results - November 1978

- Bottomhole pressure determined from pressure fall-off test is 2080 psi; average effective radial permeability is 1.6 md
- Continue post-frac flow testing until either rates fall off completely or all injected frac fluids are produced back

GREEN RIVER BASIN
SUBLETTE COUNTY, WYOMING — Site GAB

STATUS

Testing complete/analysis complete — August 1980

CO-OPERATING COMPANY

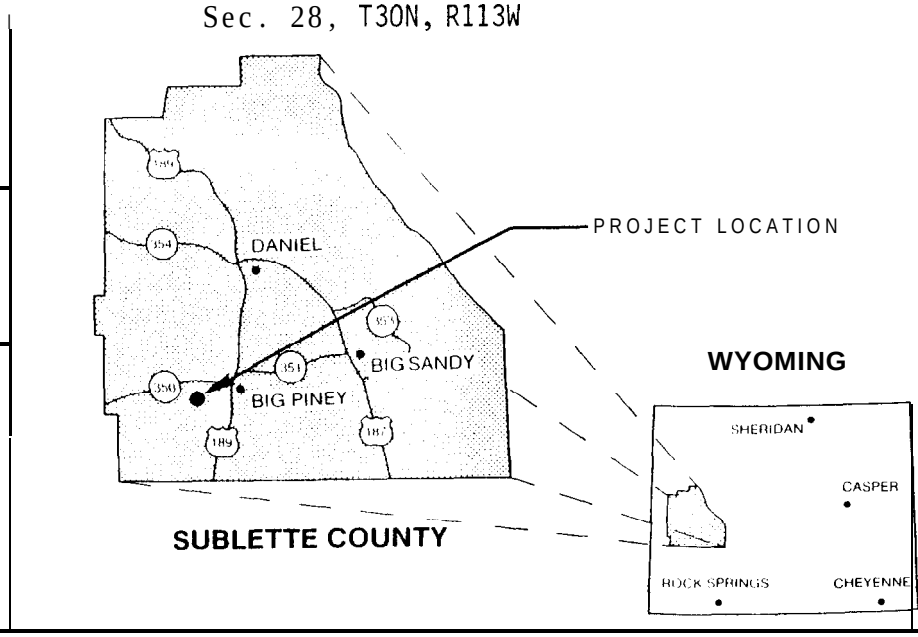
Belco Petroleum Corporation
Lakewood, Colorado

CONTRACT(S)

FIELD TEST PERIOD(S)

2-14 January 1979

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



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

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/gamma ray dual induction - SFL • Compensated neutron/formation density caliper
Sidewall coring	• 18 cores obtained • Sample depths: 3498' - 3500' 3484' - 3487' 3438' - 3440'

OTHER TESTING

- Coal core desorption
- Proximate/ultimate analysis

ANALYSIS STATUS

- Analysis by gas chromatograph complete
- Desorption complete

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 -laced 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 complete for conventional cores
- Sidewall core desorption complete
- Sidewall core desorption data by Geochem - March 11, 1979

Sample Depth Range (ft)	Lithology	Range of Total Gas (cf/ton)
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

RESULTS

Desorption data from conventional cores

Sample Depth (ft)	Lithology	Sample Weight (gm)	Desorbed Gas (cc/gm)	Residual Gas (cc/gm)	Lost Gas (cc/gm)	Total Gas Per Unit (cc/gm)	(cf/ton)
3479	Coal	856	13.5	0.7	0.9	15.1	485
3480	Coal	1269	13.8	0.5	0.9	15.2	485
3481	Coal	1312	12.6	0.5	0.5	13.6	435
3495	Coal	1321	15.4	0.2	1.2	16.8	539
3496	Coal	1057	15.5	0.5	0.8	16.8	539
3507	Coal	1864	5.6	0.4	0.6	6.6	210
3520	Coal	2065	0.9	0.0	0.2	1.1	33
3527	Coal	1342	13.1	0.2	1.3	14.6	466
3528	Coal	1167	14.2	0.3	1.5	16.0	513

GREEN RIVER BASIN
CARBON COUNTY, WYOMING

Site GAC

STATUS
Testing complete/analysis in progress

August 1980

CO-OPERATING COMPANY

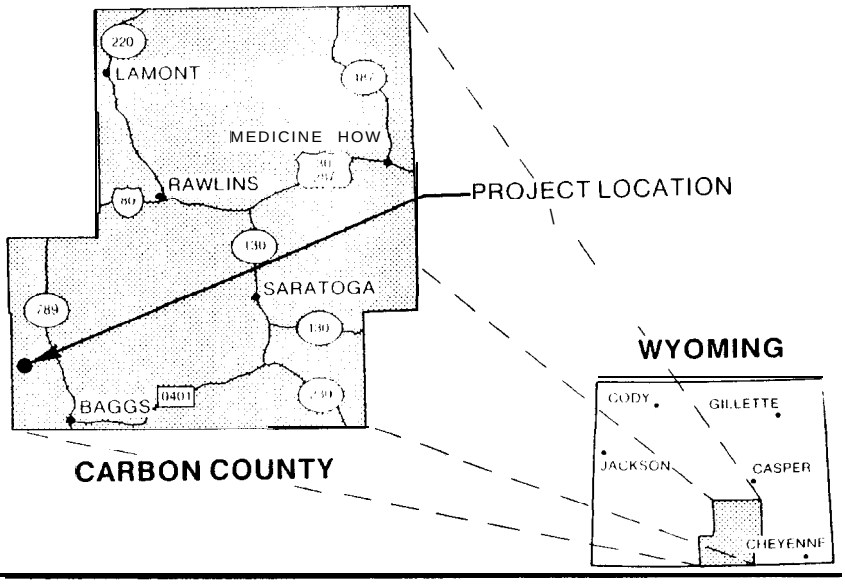
Kemmerer Coal Company
Denver, Colorado

CONTRACTIS)

FIELD TEST PERIOD(S)

24-30 June 1980

Location: Barrel Springs Unit 29-2
SE ¼, Section 29, T16N, R93W



OBJECTIVE

To determine the methane content and reservoir properties of three coal zones within the Fort Union 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 6550 feet.
- Tests Performed

Mud logging	• 1500 feet of the Fort Union Formation was logged (mud gas analysis from chromatograph and lithological description)
Drill chip collection	• Collected four samples from two coal beds (4638-4646, 4976-4986)

OTHER TESTING

- Borehole geophysical logging will be performed at a later date
- Desorption of coal chips

ANALYSIS STATUS

- Analysis by gas chromatograph complete
- Desorption of coal chips in progress

Kemmerer Coal Company - Barrel Springs Unit 29-2 Site GAC

FIELD ACTIVITIES

June 24 - Drilling in progress, depth 2160 feet, rate about 50 ft/hr

June 25 - Drilling continues, bit changed, depth 3050 feet, rate about 45 ft/hr

June 26 - Drilling rate slows to 15 ft/hr, mud logging begins at 4,000 feet

June 27 - Depth 4191 feet, drilling rate 15-17 ft/hr

June 28 - New bit installed, coal cuttings collected for desorption (poor sample - no gas)

June 29 - Depth 4638 feet, coal from 4638-4646 ("F" bed), two samples taken for desorption. Coalbed encountered at 4976-4586 ("H" bed), two samples of chips taken for desorption. Mud logging recorded gas kicks at both the "F" and "H" coalbeds.

June 30 - Obtained mud logs and left site

ANALYSIS ACTIVITIES

- Desorption of chips in progress

RESULTS

Preliminary desorption from coal chips:

Sample Depth (ft)	Lithology	Sample Weight (gm)	Desorbed Gas (cc/gm)	Residual Gas (cc/gm)	Lost Gas (cc/gm)	Total Gas (cc/gm)	Per Unit* (cf/ton)
4638	Coal/sh shaker	1293	0.4			0.4	13
4638	Coal/sh shaker	1197				0.3	10
			0.3				13
4976	Coal/sh shaker	1337	0.5		0.0	0.5	15

*Does not include residual gas

GREEN RIVER BASIN
CARBON COUNTY, WYOMING

Site GAD

STATUS

Field Operations Complete

October 1980

CO-OPERATING COMPANY

Confidential

CONTRACT(S)

FIELD TEST PERIOD(S)

1-6 October 1980

SITE LOCATION CONFIDENTIAL

OBJECTIVE

To determine the methane content of two coalbeds within the Almond Formation of the Mesaverde Group in the Little Snake River Coal Field. To field test new desorption apparatus and to collect coalbed gas samples for composition/quality analysis.

FIELD ACTIVITY PROGRESS

- Testing was performed during the original drilling at an elevation of 6657 feet.
- Tests Performed

Conventional coring	• 128 feet of core recovered. Coal at 481.0-483.8, 485.9-498.5, 686.0-709.0
Logging	• Gamma ray, spontaneous potential and single point resistivity
Gas sampling	• Intervals 485.9-498.5, and 686.0-709.0

OTHER TESTING

- Gas sampling from cased gas charged artesian water wells
- Coal core desorption
- Proximate/ultimate analysis

ANALYSIS STATUS

- Desorption in progress
- Gas analysis in progress

Green River Basin - Confidential #7 Site GAD

FIELD ACTIVITIES

October 2 - Spudded and drilled to core point (450 feet)
- Cored 10 feet of roof rock

October 3 - Cored from 460 to 490 feet
- Collected one roof rock and two coal core samples for desorption

October 4 - Cored from 490 to 510 feet
- Collected one coal core sample for desorption
- Reamed upper core interval and drilled to lower core point (650 feet)

October 5 - Cored from 650 to 680 feet
- Collected one roof rock sample for desorption

October 6 - Cored from 680 to 710 feet
- Collected five coal core samples for desorption
- Logged hole (gamma-ray, spontaneous potential and single point resistivity)

ANALYSIS ACTIVITIES

- Coal core desorption in progress
- Gas sample analysis in progress

RESULTS

Preliminary desorption for core samples:

Sample Depth (ft)	Lithology	Sample Weight (gm)	Desorbed Gas (cc/gm)	Residual Gas (cc/gm)	Lost Gas (cc/gm)	Total Gas Per Unit* (cc/gm)	(cf/ton)
479	SS	972	38			0.04	1
481	Coal	852	1379			1.61	52
486	Coal	998	1742			1.75	56
494	Coal	665	1005			1.51	48
678	SS	1114	61			0.05	2
686	Coal	839	1165			1.39	44
692	Coal	829	1169			1.41	45
696	Coal	879	1351			1.54	49
700	Coal	843	1266			1.50	48
706	Coal	1173	1928			1.64	53

*Does not include residual or lost gas

SAN JUAN BASIN

SAN JUAN BASIN
SAN JUAN COUNTY, NEW MEXICO

Site HAA

STATUS
Testinq and analysis complete
No further activity

May 1980

CO-OPERATING COMPANY

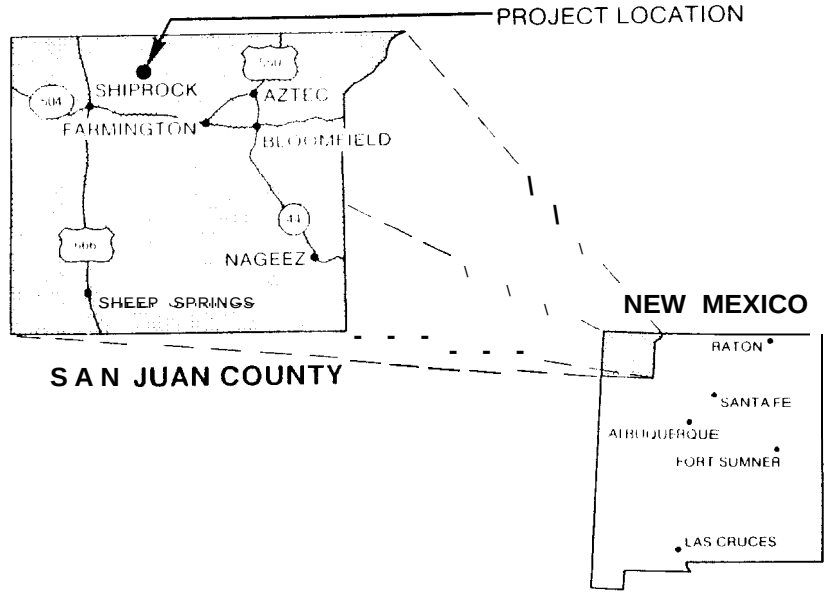
Western Coal Company
Albuquerque, New Mexico
(505) 842-1023

CONTRACT(S)

FIELD TEST PERIOD(S)

16-17 June 1978

Location: SE 1/4, Sec. 22, T30N, R15W



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

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 complete

FIELD ACTIVITIES

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

Coal Cored

Core No.	Coal Interval	Seam Thickness (ft)
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 coal samples completed
- Laboratory analyses (proximate/ultimate, heating value, sulfur forms) completed

RESULTS

Desorption data from conventional cores:

Sample Depth (ft)	Lithology	Sample Weight (gm)	Desorbed Gas (cc/gm)	Residual Gas (cc/gm)	Lost Gas (cc/gm)	Total Gas (cc/gm)	Per Unit (cf/ton)
398	Coal	526	2.1	0.0	.2	2.3	73
399	Coal	580	0.5	0.0	0.0	0.5	16

SAN JUAN BASIN
SAN JUAN COUNTY, NEW MEXICO

Site HAB

STATUS

Testing complete/analysis in progress

June 1980

CO-OPERATING COMPANY

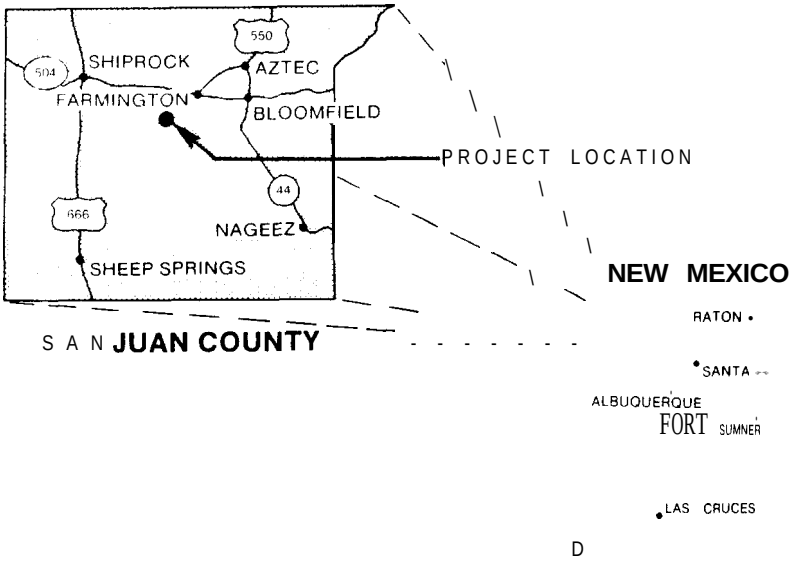
Navajo Nation Minerals Dept.
Window Rock, Arizona
USGS Coal Branch
Denver, Colorado

CONTRACT(S)

FIELD TEST PERIOD(S)

26-30 April 1980

Location: K-3 well, NW ¼ of SW ¼
Section 18, T28N, R14W



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 was performed during the original drilling at 5645 feet.
- Tests Performed

Conventional coring	• Cancelled due to blowout
Drill chip collection	• Coal chips were collected from a coalbed at 815-835 feet
Borehole geophysical logging	• Cancelled due to blowout

OTHER TESTING

- Drill chip desorption
- Sample of gas taken during blowout sent to laboratory for analysis

ANALYSIS STATUS

- Desorption in progress
- Analysis of gas from blowout in progress

Navajo Nation Minerals Dept./USGS Coal Branch - K-3 Well — Site HAB

FIELD ACTIVITIES

April 26 - Completed shakedown hole at location F-l and moved rig to K-3

April 27 - Spudded K-3, drilling rate 80-100 ft/hr. Pull down chain broke, drilling delayed for repairs

April 29 - Drilling resumed after repairs and inspection by Portadrill representatives. Samples taken from drill chips for desorption by University of New Mexico. Blowout occurred after penetrating bottom of coalbed between 815-835 feet.

April 30 - Well continued to flow gas to surface, lifting water from 400 to 500 feet. Samples of gas taken for laboratory analysis. Driller plugged hole.

ANALYSIS ACTIVITIES

- Desorption of coal chips in progress, initial indication of low gas content
- Analysis of gas sample taken during blowout in progress

RESULTS

SAN JUAN BASIN
SAN JUAN COUNTY, NEW MEXICO

Site HAC

STATUS
Testing complete/analysis in progress

October 1980

CO-OPERATING COMPANY

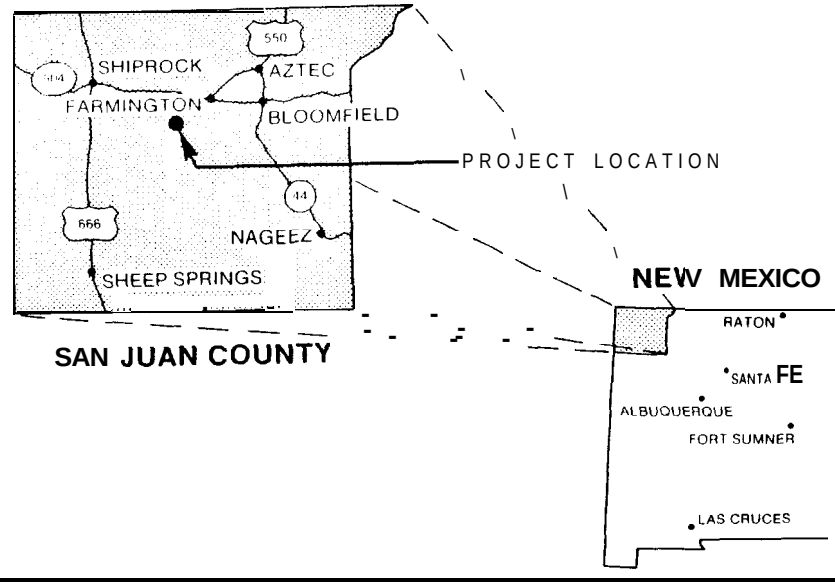
Navajo Nation Minerals Dept.
Window Rock, Arizona
USGS Coal Branch
Denver, Colorado

CONTRACT(S)

FIELD TEST PERIOD(S)

18-25 October 1980

Location: A-4 well, NW ¼ of NE ¼ of SE ¼
Section 35, T15N, R14W



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 was performed during the twin hole drilling at 6070 feet.
- Tests Performed

Conventional coring	• 49.9 feet cored, 44.55 feet recovered coalbeds cored: Bed A at 683.6 - 703.0 feet Bed B at 712.4 - 720.4 feet Bed C at 748.4 - 765.0 feet
Logging	• Borehole geophysical logs (gamma-ray, density, caliper, and resistivity)

OTHER TESTING

- Analysis of gas from desorption
- Laboratory analysis of coal

ANALYSIS STATUS

- Desorption in progress

Navajo Nation Minerals Dept./USGS Coal Branch - A-4 Well — Site HAC

FIELD ACTIVITIES

October 19 - Completed drilling at site PNW-4, logged hole and found coalbeds too thin for testing, moved to PNW-3 which was previously logged and had several thick coalbeds. Driller discovered the diamond core bit was missing and postponed coring.

October 20 - Moved rig to PNW-2 for drilling and logging, coalbeds too shallow for testing.

October 21 - Moved rig to site A-3, drilled to 460' when caving forced relocation to new site one mile north.

October 22 - Drilling at site A-4 proceeds smoothly, core bit arrives, hole is logged and decision made to core three coalbeds.

October 23 - Rig is moved 15' to twin the core hole, drilled to core point at 680'.

October 24 - Coring begins at 680 feet; four runs made to a depth of 756 feet (interval between A and B was drilled). Two samples taken from Bed A, one sample taken from Bed B, and one sample from Bed C.

October 25 - Coring of Bed C is completed, a second sample of Bed C taken for desorption. Rigged down and left site.

ANALYSIS ACTIVITIES

Coalbed	Sample Depth
Bed A	683.9 - 687.1
	697.2 - 699.5
Bed B	712.4 - 716.4
Bed C	748.5 - 750.35
	750.8 - 752.2
	758.0 - 760.0

RESULTS

POWDER RIVER BASIN

POWDER RIVER BASIN
POWDER RIVER COUNTY, MONTANA

Site IAA

STATUS

Field operations complete

July 1980

CO OPERATING COMPANY

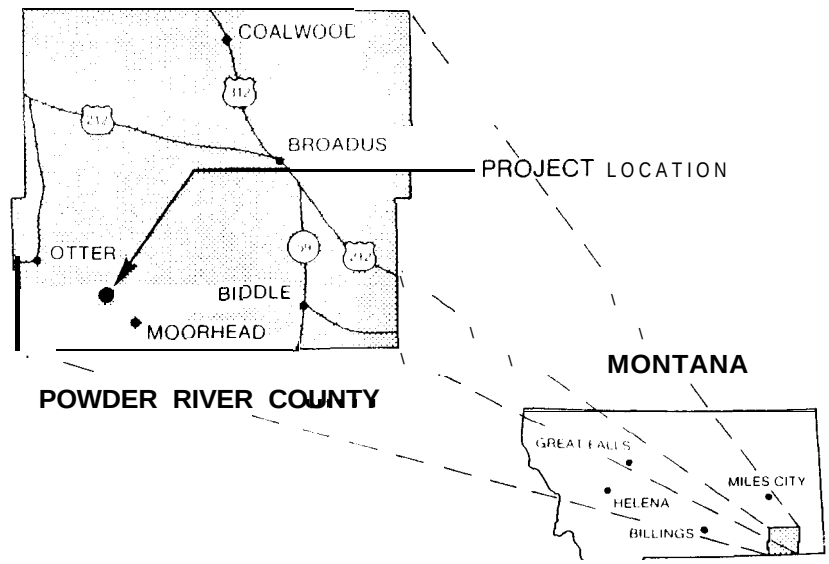
U.S. Geological Survey
Coal Branch
Denver, Colorado

CONTRACT(S)

FIELD TEST PERIOD(S)

28-31 August 1979

Location: USGS Well 79-BR-6, 1400' FSL, 2900' FSL
Ser. 22, T8S, R47E



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

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:

Seam	Depth (ft)
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

Desorption data from conventional cores:

Sample Depth (ft)	Lithology	Sample Weight (gm)	Desorbed Gas (cc/gm)	Residual Gas (cc/gm)	Lost Gas (cc/gm)	Total Gas (cc/gm)	Per Unit (cf/ton)
248	Coal	1600	0.06	-	0.0	0.06	2
266	Coal	1652	0.05	0.0	0.0	0.05	2
291	Coal	1710	0.03	0.0	0.0	0.03	1
378	Coal	1603	0.10	0.0	0.0	0.10	3
385	Coal	1710	0.04	0.0	0.0	0.04	1
401	Coal	1637	0.10	0.0	0.0	0.10	3

POWDER RIVER BASIN
BIG HORN COUNTY, MONTANA

Site IAB

STATUS

Field Operations Complete

July 1980

CO-OPERATING COMPANY

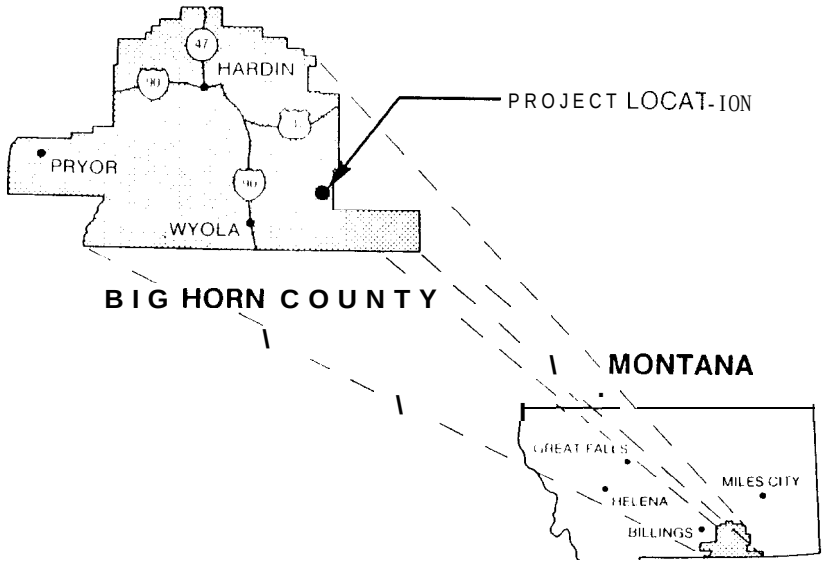
Montana Bureau of Mines
and Geology
Butte, Montana

CONTRACT(S)

FIELD TEST PERIOD(S)

6-9 September 1979

Location: Site I: Well No. US-7735, Section 5, T7S, R40E, 60 ft FNL, 1700 ft FEL



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

- Testing was performed during the original drilling at 4100 feet:

Tests Performed	
Conventional Coring	• 114.6 feet of core. Coal at 121 - 145.5, 347 - 352.5, 390.3 - 402.8, 620 - 673.5 feet
Logging	• Gamma-gamma density, SP, resistivity log, gamma-ray
Drill Stem Testing	• Plugged tool, limited results, formation pressure is 51 psig

OTHER TESTING

- Desorption of coal samples
- Physical properties analysis of overburden, interburden, and underburden

ANALYSIS STATUS

- Desorption complete

FIELD ACTIVITIES

September 6 - Began coring at 115 feet, recovered 45.2 ft. of coal from eight coring runs, stopped coring at 403 feet

September 7 - Coring continued, recovered 48.5 feet of coal, total of six cores, stopped coring at 658.5 feet

September 8 - Coring completed, depth of 676.5 feet, recovered 5.0 feet of coal from one core

September 9 - Drill stem test of the Wall bed, plugged tool, limited results, formation pressure 51 psig

ANALYSIS ACTIVITIES

- Coal desorption complete
- Laboratory analysis of coal, overburden, interburden, and underburden complete

RESULTS

Desorption data from conventional cores:

Sample Depth (ft)	Lithology	Sample Weight (gm)	Desorbed Gas (cc/gm)	Residual Gas (cc/gm)	Lost Gas (cc/gm)	Total Gas Per Unit (cc/gm)	(cf/ton)
121	Coal	1310	0.1	0.0	0.0	0.1	3
134	Coal	1349	0.1	0.0	0.1	0.2	3
144	Coal	857	0.1	0.0	0.1	0.2	6
348	Coal	913	0.04	0.0	0.0	0.04	1
390	Coal	886	0.03	0.0	0.0	0.03	1
401	Coal	1091	0.03	0.0	0.0	0.03	1
621	Coal	1208	0.04	0.0	---	0.04	1
631	Coal	852	0.1	0.0	0.1	0.2	6
657	Coal	963	0.1	0.0	0.1	0.2	6
672	Coal	1004	0.1	0.0	0.2	0.3	10

POWDER RIVER BASIN
BIG HORN COUNTY, MONTANA — Site IAC

STATUS

Field Operations Complete — July 1980

CO-OPERATING COMPANY

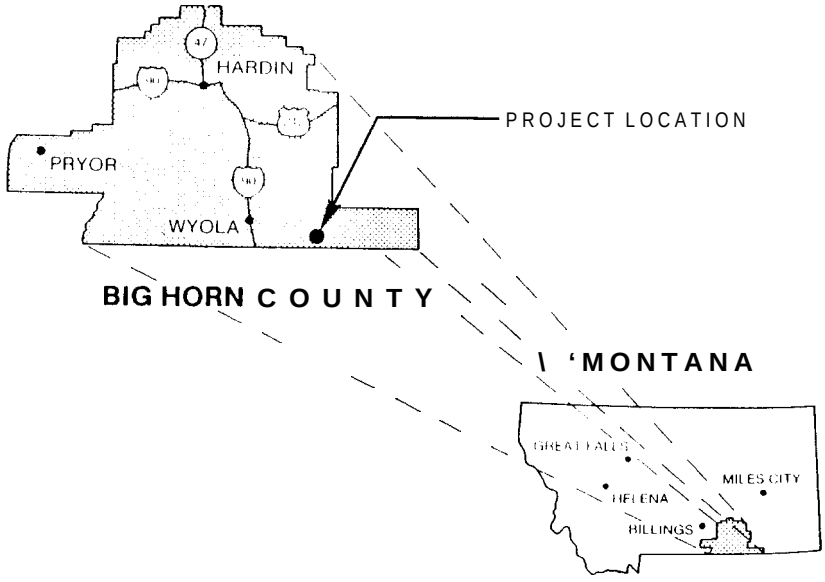
Montana Bureau of
Mines & Geology
Butte, Montana

CONTRACTIS;

FIELD TEST PERIOD(S)

10-12 September 1979

Location: Site II: Well No. US-7746, Section 7, T9S, R40E, 290 ft FNL, 1800 ft FWL



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.

FIELD ACTIVITY PROGRESS

- Testing was performed during the original drilling at 3896 feet:
- Tests Performed

Conventional Coring	• 157 feet of core. Coal at 154.7-169.4, 171.1-172.7, 172.9-173.3, 173.5-174.5, 424.0-503.4, 538.8-603.0, 742.7-762.2, 762.5-769.7
Logging	• Gamma-gamma density, SP, resistivity log, gamma-ray

OTHER TESTING

- Desorption of coal samples
- Physical properties analysis of overburden, interburden, and underburden

ANALYSIS STATUS

- Desorption in progress
- Analysis complete

FIELD ACTIVITIES

September 10 - Coring began at 154.5 ft, recovered 19.8 ft of coal

September 11 - Coring continued, recovered 79.4 ft of coal

September 12 - Coring completed, recovered 41.7 ft of coal with shale parting
Coring stopped at a depth of 772.5 feet

ANALYSIS ACTIVITIES

- Coal desorption in progress
- Laboratory analysis of coal, overburden, interburden, and underburden complete

RESULTS

Desorption data from conventional cores:

Sample Depth (ft)	Lithology	Sample Weight (gm)	Desorbed Gas (cc/gm)	Residual Gas (cc/gm)	Lost Gas (cc/gm)	Total Gas (cc/gm)	Per Unit (cf/ton)
168	Coal	1016	0.04	0.0	-	0.04	1
173	Shale + Coal	877	0.05	0.0	-	0.05	2
448	Coal	861	0.10	0.0	0.0	0.10	3
456	Coal	1032	0.07	0.0	0.08	0.10	3
479	Coal	872	0.07	0.0	0.07	0.15	5
491	Coal	943	0.04	0.0	-	0.04	1
502	Coal	1234	.0.02	0.0	-	0.02	1
602	Coal	1051	0.20	0.0	0.02	0.20	7
755	Coal	1094	0.25	0.0	-	0.25	8
769	Coal	1159	0.41	0.0	-	0.4	13

POWDER RIVER BASIN
CAMPBELL COUNTY, WYOMING — Site IAD

STATUS

Field Operations Complete — September 1980

CO-OPERATING COMPANY

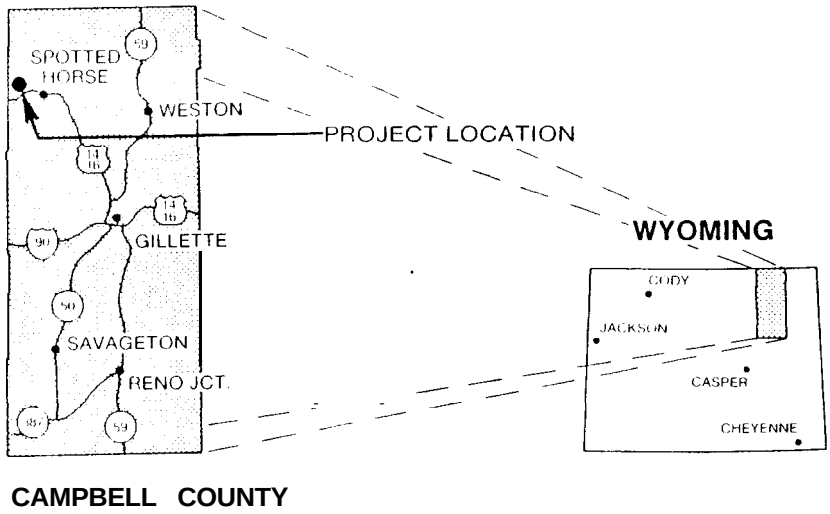
U.S. Geological Survey
Coal Branch
Denver, Colorado

CONTRACT(S)

FIELD TEST PERIOD(S)

15-22 July 1980

Location: USGS Well 80-AU-14, Sec. 20, T55N, R75W



OBJECTIVE

To determine the quantity and quality of the coal, the methane content of the coal, and some reservoir properties of the coal seams of the Fort Union Formation in the Powder River Basin.

FIELD ACTIVITY PROGRESS

- Testing was performed during the twin hole drilling at 4100 feet.
- Tests Performed

Conventional Coring	• 126.2 feet cored, recovered 113.7 feet Coalbeds cored: Smith bed at 294.8-329.3 feet Anderson/Canyon bed at 680.6-755.0 feet
Logging	• Borehole geophysical logs (gamma-ray, density, resistivity, and caliper)

OTHER TESTING

- Desorption of coal samples
- Proximate and ultimate analyses of coal samples

ANALYSIS STATUS

- Desorption in progress

FIELD ACTIVITIES

July 15 - Spudded twin hole 80-AU-14 and drilled to top of Smith bed. Cored the Smith bed from 285.0 to 324.0. Collected two samples of the Smith bed for desorption.

July 16 - Continued coring the Smith bed from 324.0-334.2. Drilled to 675.0 and cored the Anderson bed from 675 to 711.0. Four samples of the Anderson/Canyon bed were collected for desorption. Methane flowing from the well.

July 17 - Continued coring the Anderson/Canyon bed to 752 feet. Methane detector continues to monitor CH_4 flowing from the well.

July 18 - About 180 feet of hole caved in during the previous night; tried to drill out the hole when the hydraulic pump broke down.

July 19 - Repaired hydraulics, abandoned hole, and moved rig 100 feet south to drill a new hole for logging.

July 20 - Drilled to 1,000 feet and logged the hole, moved rig to 80-AU-13 for drilling and logging. Planned to complete hole on 7/21 and move to second core hole at 80-AU-16 on 7/21.

July 21 - Air compressor broken, water truck breaks down, having trouble obtaining water.

July 22 - Drilling with mud since air compressor is broken, 80 feet of hole caved in, USGS decides *to* end the drilling cycle and core at 80-AU-16 during the next drilling cycle.

ANALYSIS ACTIVITIES

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

RESULTS

Preliminary desorption data from conventional cores:

Sample Depth C(ft)l	Lithology/ Horizon	Sample Weight (gm)	Desorbed Gas (cc/gm)	Residual Gas (cc/gm)	Lost Gas (cc/gm)	Total Gas Per Unit* (cc/gm)	(cf/ton)
685	Coal/Anderson-Canyon	1416	0.7		0.0	0.7	21
724	Coal/Anderson-Canyon	1334	0.8		0.1	0.9	30
738	Coal/Anderson-Canyon	852	0.5		0.1	0.6	18
742	Coal/Anderson-Canyon	1273	0.7		0.1	0.8	26

*Does not include residual gas

POWDER RIVER BASIN
SHERIDAN COUNTY, WYOMING

Site IAE

STATUS

Field Operations Complete

September 1980

CO-OPERATING COMPANY

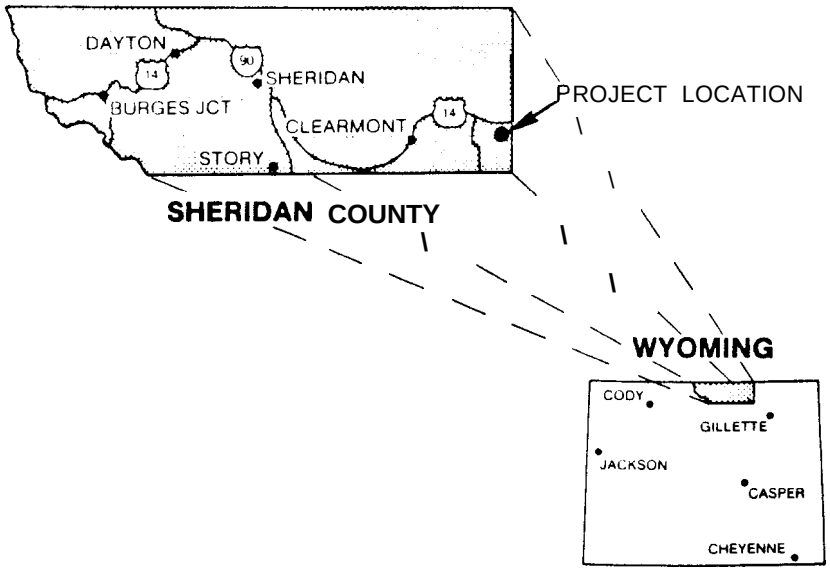
U.S. Geological Survey
Coal Branch
Denver, Colorado

CONTRACT(S)

FIELD TEST PERIOD(S)

29 July - 2 August 1980

Location: USGS Well 80-AU-16, Sec. 5, T54N, R76W



OBJECTIVE

To determine the quantity and quality of the coal and the methane content of the coal in the Powder River Basin.

FIELD ACTIVITY PROGRESS

- Tests Performed

Conventional Coring	• Arvada, Smith, and Anderson seams
Geophysical logging	• Gamma, density, resistivity, and caliper

OTHER TESTING

- Desorption of coal samples
- Proximate and ultimate analyses of coal samples

ANALYSIS STATUS

- Desorption in progress

FIELD ACTIVITIES

July 29 - Twin well was spud in using native mud, and drilling proceeded to 60 feet. Two cores were taken from the Arvada (60'-77.5'). Drilling proceeded to 260 feet, and 4 cores were taken from the Smith (260'-319'). Three desorption samples were taken (cansiters 96, 116, and 101).

July 30 - Drilling continued to 585 feet, and 3 cores were taken from the Anderson (585'-630'). Two desorption samples were taken (canisters 117 and 51).

July 31 - Coring continued through the Anderson (642 feet), and one sample was taken for desorption (canister 103). Drilling proceeded to TD of 1000 feet. Gamma-ray, bulk density, resistivity, and caliper logs were run.

ANALYSIS ACTIVITIES

RESULTS

Preliminary desorption data from conventional cores (as of 20 Sept. 1980):

Sample Depth (ft)	Lithology/ Coal Horizon	Sample Weight (gm)	Desorbed Gas (cc)	Residual Gas (cc/gm)	Lost Gas (cc)	Total Gas (cc/gm)	Per Unit* (cf/ton)
73	Coal/Arvada	1597	0.01		**	0.01	0.3
271	Coal/Smith	1212	0.09		**	0.09	3
312	Coal/Smith	1366	0.10		**	0.10	3
619	Coal/Anderson	1115	0.88		0.01	0.89	28
625	Coal/Anderson	1434	0.57		0.05	0.62	20
635	Coal/Anderson	1254	0.76		0.06	0.82	26

*Does not include residual gas
**Unable to calculate lost gas

POWDER RIVER BASIN
SHERIDAN COUNTY, WYOMING

Site IAF

STATUS

Field Operations Complete

September 1980

CO OPERATING COMPANY

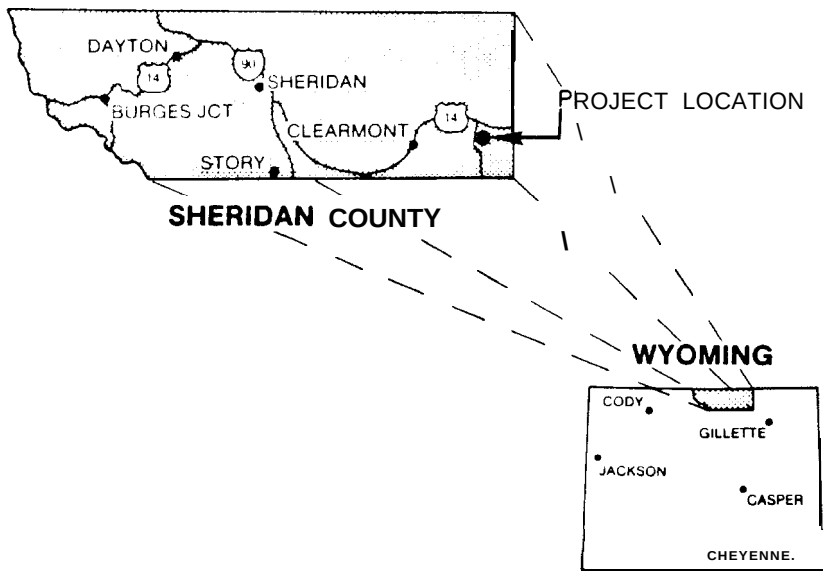
U.S. Geological Survey
Coal Branch
Denver, Colorado

CONTRACT(S)

FIELD TEST PERIOD(S)

29 July - 2 August 1980

Location: USGS Well 80-AU-7, Sec. 3, T54N, R77W



OBJECTIVE

To determine the quantity, quality, and the methane content of coal in the Powder River Basin.

FIELD ACTIVITY PROGRESS

- Tests Performed

Conventional Coring	• Smith and Anderson seams
Geophysical logging	• Gamma, density, resistivity, and caliper

OTHER TESTING

- Desorption of coal samples
- Proximate and ultimate analyses of coal samples

ANALYSIS STATUS

- Desorption in progress

FIELD ACTIVITIES

August 1 - Pilot hole 80-AU-7 was spud in and drilled to approximately 850 feet. A suite of logs (gamma, density, resistivity, and caliper) were run for the entire hole, and the rig was moved six feet to the west and twin hole was spud in.

August 2 - Water and gas were flowing from the pilot hole. Cores were taken from the Smith (200'-215' and 296'-311') and the Anderson (585'-613') before coring was halted due to a plugged bit. Four desorption samples were taken (canisters 7, 138, 140, 136).

ANALYSIS ACTIVITIES

RESULTS

Preliminary desorption data from conventional cores (as of 20 September 1980):

Sample Depth (ft)	Lithology/ Coal Horizon	Sample Weight (gm)	Desorbed Gas (cc/gm)	Residual Gas (cc/gm)	Lost Gas (cc)	Total Gas Per Unit (cc/gm)	(cf/ton)
206	Coal/Smith	1597	0.18		0.02	0.20	6
300	Coal/Smith	1474	0.21		0.03	0.24	8
594	Coal/Anderson	1502	0.40		0.01	0.41	13
604	Coal/Anderson	2384	0.03		0.01	0.04	1

POWDER RIVER BASIN
JOHNSON COUNTY, WYOMING

Site IAG

STATUS

Field Operations Complete

October 1980

CO-OPERATING COMPANY

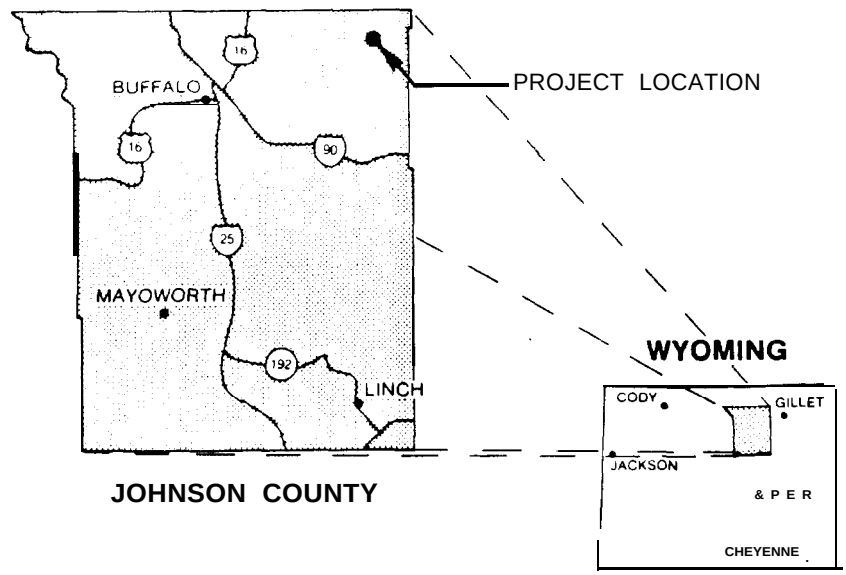
Bass Enterprises
Denver, Colorado

CONTRACT(S)

FIELD TEST PERIOD(S)

1-5 October 1980

Location: J. H. Enochs Ranch #7-11, Sec. 7, T52N, R77W



OBJECTIVE

To determine methane content of coalbeds in deeper parts of Powder River Basin.

FIELD ACTIVITY PROGRESS

Tests Performed

- Drill chip collection from penetrated coal intervals
- Mud Logging
- Geophysical Logging - induction electric, formation compensated density, neutron

OTHER TESTING

- Desorption of coal chips
- Lab analyses of coal

ANALYSIS STATUS

FIELD ACTIVITIES

ANALYSIS ACTIVITIES

RESULTS

POWDER RIVER BASIN
JOHNSON COUNTY, WYOMING

Site IAH

STATUS

Field Operations Complete

October 1980

CO-CPERATING COMPANY

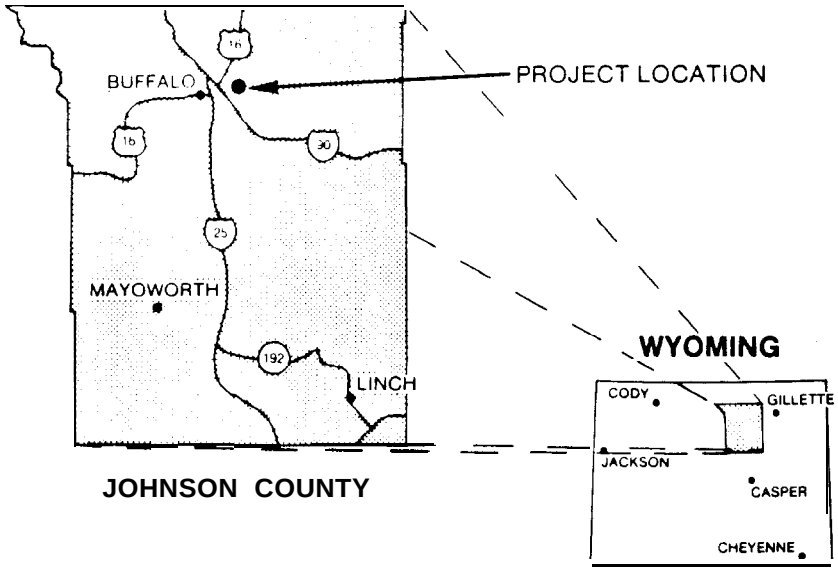
Anschutz Corporation
Denver, Colorado

CONTRACT(S)

FIELD TEST PERIOD(S)

24-26 October 1980

Location: 10-20 State 2945 well, NW/4, SE/4, Sec. 20, T51N, R81W



OBJECTIVE

To determine methane content and reservoir characteristics of Fort Union coals in the axial part of the Powder River Basin.

FIELD ACTIVITY PROGRESS

Tests Performed

- Conventional core up to 150 feet
- Conduct up to 2 drill stem tests
- Conduct Borehole Geophysical Logging over shallow part of hole

Because of difficulties with rig scheduling only mud-logging, chip desorption, and borehole geophysical logging was permitted.

OTHER TESTING

ANALYSIS STATUS

FIELD ACTIVITIES

ANALYSIS ACTIVITIES

RESULTS

WESTERN WASHINGTON

WESTERN WASHINGTON
THURSTON COUNTY, WASHINGTON

Site LAA

STATUS

Field operations complete/analyses in progress

July 1980

CO-OPERATING COMPANY

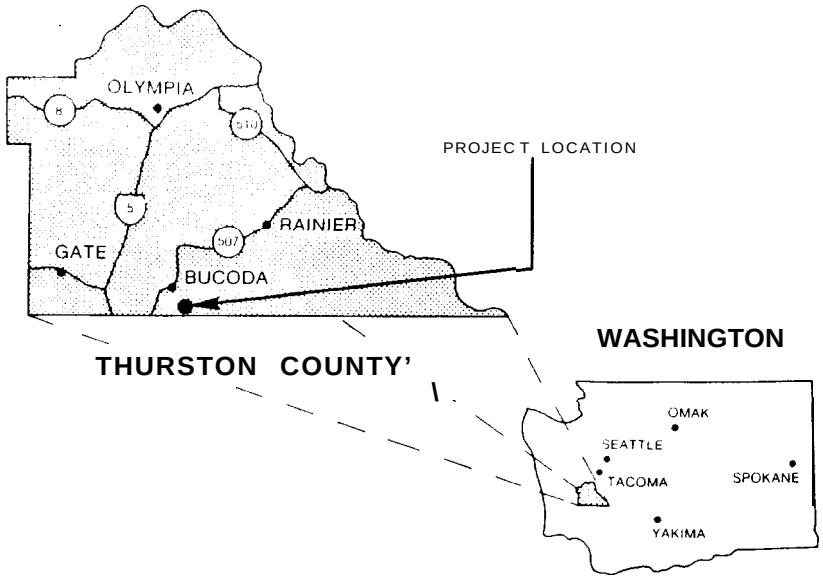
Sandia/Lawrence Livermore Labs
Albuquerque, New Mexico

CONTRACT(S)

FIELD TEST PERIOD(S)

29 Oct. - 7 Nov. 1979

Location: Sec. 21, T15N, R1W
Thurston County, Washington



OBJECTIVE

To provide gas content and desorption data on coal from the "Big Dirty," coalbed, Thurston County, Washington

FIELD ACTIVITY PROGRESS

- Field operations complete
- Desorption samples were taken from the "Big Dirty" Coalbed at the intervals listed below:

Sample #	Depth (ft)
1	602.8 - 603.8
2	610.0 - 611.0
3	617.9 - 618.9
4	623.2 - 623.9

OTHER TESTING

- Rock property testing of roof and floor rock samples
- Proximate/ultimate analyses of coal samples upon completion of desorption.

ANALYSIS STATUS

- Desorption in progress

FIELD ACTIVITIES

October 29 - Coring initiated at 403 feet

November 6 - "Big Dirty" coalbed intercepted at 601.9 feet; desorption samples 1-3 taken

November 7 - Continued coring of "Big Dirty" coalbed zone; desorption sample 4 taken

ANALYSIS ACTIVITIES

- Coal core desorption in progress

RESULTS

Desorption data from conventional cores:

Sample Depth (ft)	Lithology	Sample Weight (gm)	Desorbed Gas (cc/gm)	Residual Gas (cc/gm)	Lost Gas (cc/gm)	Total Gas (cc/gm)	Per Unit* (cf/ton)
603	Coal	629	2.5	?	0.2	2.7	86
610	Coal	741	2.4	?	0.0	2.4	77
618	Coal	842	1.0	?	0.0	1.0	32
623	Coal	639	0.9	?	0.1	1.0	32

*Does not include residual gas

WIND RIVER BASIN

WIND RIVER BASIN
FREMONT COUNTY, WYOMING

Site NAA

STATUS

Field Operations Complete

October 1980

CO-OPERATING COMPANY

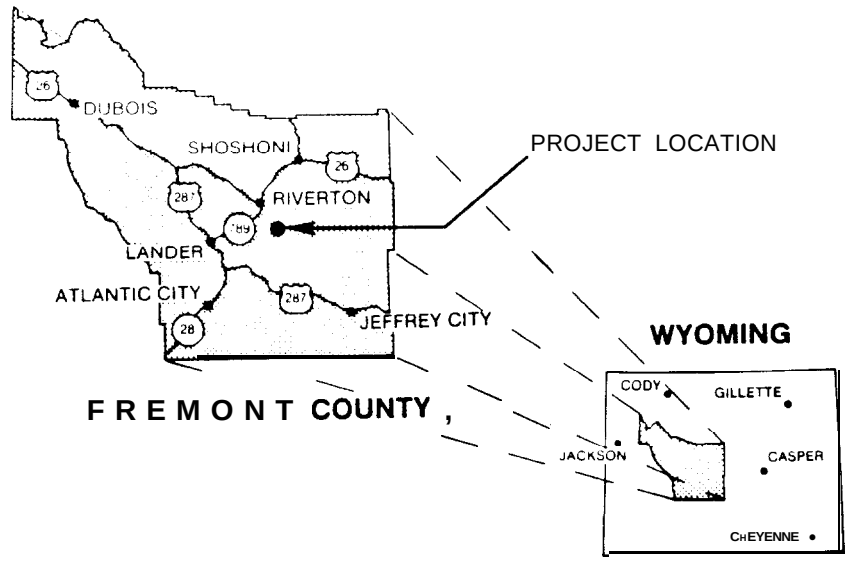
USGS/Coal Branch
Denver, Colorado

CONTRACT(S)

FIELD TEST PERIOD(S)

Early October 1980

Location: 80-WR-27, SE/4, SW/4, Sec. 10, T1S, R6E



OBJECTIVE

To determine gas content of Mesaverde coals in the sparsely drilled Wind River Basin.

FIELD ACTIVITY PROGRESS

Tests Performed

- Conventional Coring
- Geophysical Logging

OTHER TESTING

- Desorption of coal samples
- Lab analyses of coal

ANALYSIS STATUS

FIELD ACTIVITIES

October 9 - Initiate drilling activities

October 9-15 - Drill pilot hole

October 15-19 - Drilling break

October 19-25 - Redrill pilot hole, core possible 5 feet coal with no recovery.

ANALYSIS ACTIVITIES

RESULTS