

Collected Studies

**COAL**

**SEAM**

**NATURAL**

**GAS**

Also Known as “Coalbed Methane”

NEWLY-UPDATED EDITION



**IOGCC**

A Publication of the Interstate Oil and Gas Compact Commission

The Interstate Oil and Gas Compact Commission gratefully acknowledges the dedication and efforts of IOGCC Federal Projects Manager Keith Thomas in compiling this collection of studies.

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Winter 2002-2003

# Foreword

This publication represents the second compilation of studies directly addressing natural gas from coal seams - often called coalbed methane by industry and government officials. This source of natural gas has been recognized as a source of energy since ancient times. Capturing it for beneficial use has been the tough part. The world has lost untold quantities of natural gas. In countries other than the United States and Canada, it continues to be vented and flared in wasteful volumes. Colorless, odorless natural gas dissipates quickly into the atmosphere when freed from the rock in which it is trapped. Thirty years ago, the United States made a national policy decision to capture natural gas from what were then considered “more difficult” rocks, including coal.

Since the underground mining of coal began, humans have been aware that gas trapped in coal is freed when the coal is broken open. In traditional underground mining operations, a prime safety consideration for miners is venting gas from the mine.

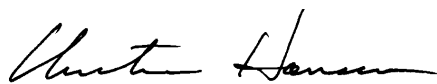
Though the resource was identified, developing it as commercial natural gas was considered so difficult at the time that a federal tax credit to develop “coalbed methane” was put in place. Many believed the credit was a hollow incentive to the industry. However, this federal policy decision proved to be important for the development of this natural gas.

Extensive research has shown that gas from coal is our nation’s most abundant new source of natural gas. It remained a novel concept to those accustomed to natural gas coming from more traditional rocks such as sandstone and limestone.

Natural gas whose source is coal now accounts for 7 percent of total production in the United States. Twenty years ago the figure was virtually zero.

Because public policy supports development of natural gas from coal, extensive research has been conducted to learn how to harness this resource for beneficial human use. These studies have never before been published in a single volume. The most significant early work comes from the Gas Research Institute, which paved the way for current production practices. States, universities, companies and other research institutions have added to this volume of work. Even today more research is being conducted across the nation as natural gas is sought in different kinds of coal.

Because this is now an important part of the total U.S. energy mix, it is time to move away from using the confusing term “coalbed methane.” The resource is simply natural gas, which the public understands and uses virtually every day. That is why we are calling this resource “natural gas” and identifying its source rock as coal seams.



Christine Hansen  
Executive Director



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# Introduction

One of our country's most valuable caches of natural gas comes from a source once seen as a nuisance to the coal mining industry. Coal seam natural gas (CSNG) must now be seen as having great potential as a fossil fuel resource. There is a voluminous amount of information on this issue. Valuable studies dating back 50 years or more have been produced. The many sides of this issue have been considered for years. What is not disputed is that the United States has very large coalbeds that cover vast areas of the country. See Figure 1. The question is what to do with the natural gas present in those coalbeds.

**Figure 1**



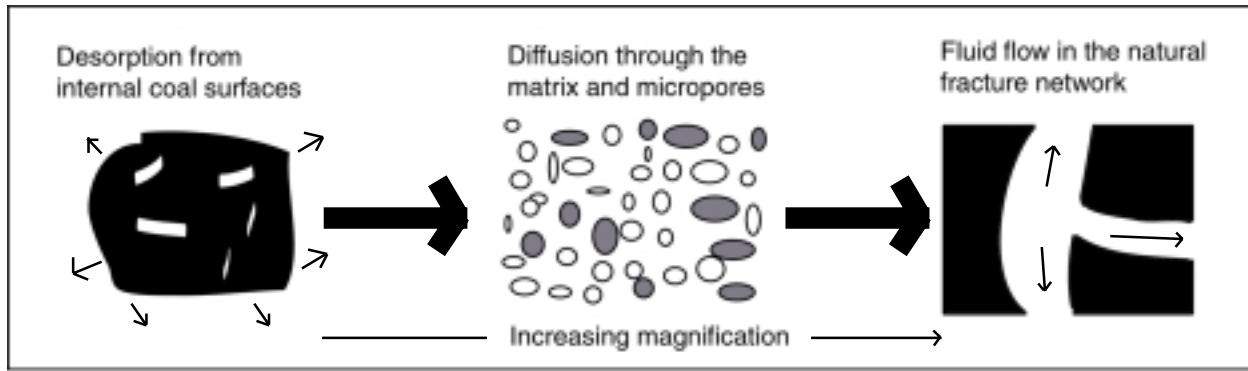
Source: U.S. Geological Survey  
Energy Resource Surveys Program

The coal industry has long recognized the removal of the methane-rich gas in the coalbeds as a dangerous part of the mining process. To safely mine the coal, the gas must be removed. In the past, CSNG had to be vented to allow for coal development. Such degasification wasted this valuable resource because economical methods for utilization had not been developed.

A great amount of research has been conducted on these coalbeds and the natural gas they contain. The CSNG occurs within the coal in two ways. CSNG is usually stored on the internal surfaces of the coal (sorbed gas), but can also exist in the cleats (natural fractures) as free gas in the coalbeds. To produce the more commonly found sorbed gas, it must be “desorbed” from the internal surfaces of the coal and allowed to migrate out of the matrix into natural fractures where it can be extracted.<sup>1</sup> See Figure 2.

<sup>1</sup> U. S. Geological Survey, *Coalbed Methane – An Untapped Energy Resource and an Environmental Concern*, 1997, USGS Fact Sheet FS-019-97.

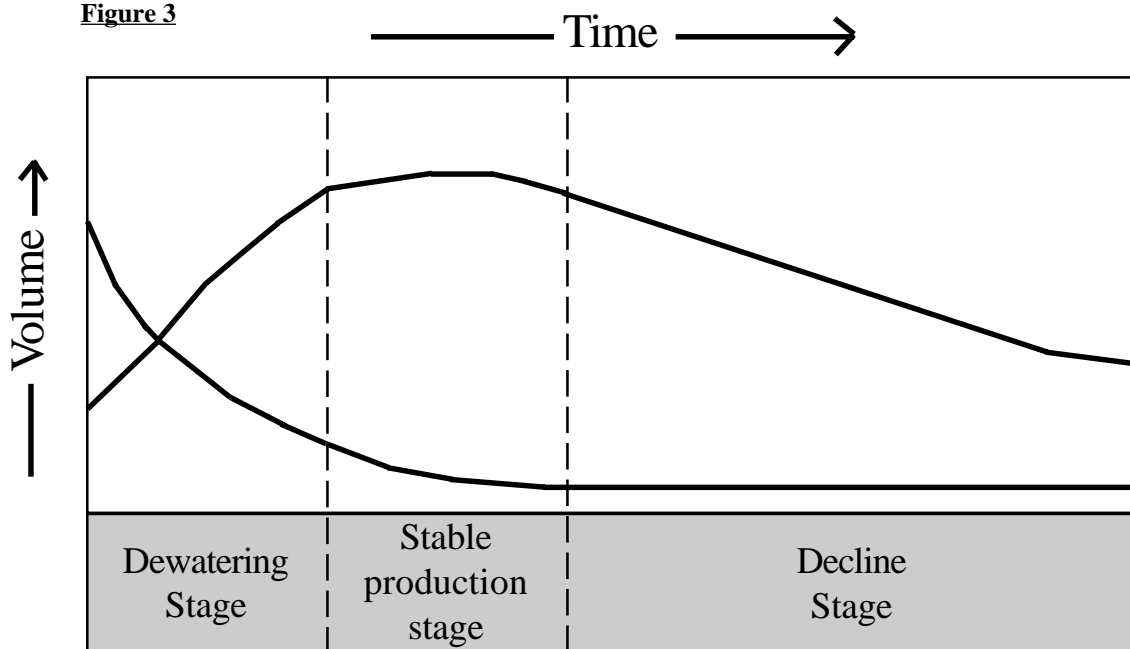
**Figure 2**



Source: U.S. Geological Survey Energy Resource Surveys Program

The cleats found in coalbeds are usually filled with water. This water can be saline. To produce CSNG from a coalbed, the water must be removed. Removal of the water allows the gas to enter these fractures and then be extracted through a wellbore. In the early stages of CSNG production the volume of water can be great, which creates a problem for the operator, the landowner and the state. Following the completion of a CSNG well, the amount of water produced decreases with time and the volume of CSNG increases. In the later stages of production from a CSNG well, the volume of gas decreases while the amount of water produced will usually stay at the decreased level.<sup>2</sup> See Figure 3. The water discharge must be done in an economical and environmentally responsible manner.

**Figure 3**



Source: U.S. Geological Survey Energy Resource Surveys Program

<sup>2</sup> Id.



Much has been written on CSNG. A wealth of information exists about the potential for exploration and production of this resource. Studies on CSNG are not confined to the coalbeds in a limited area, but rather have been conducted in many of the coal basins throughout the country. These studies have been conducted by the federal government, the geological surveys of many of the states, and by private industry. There have been in-depth studies into such issues as the environmental impact of production of natural gas from coal seams, the most economical ways to produce CSNG, and the relationship between CSNG production and coal mining interests.

In keeping with its long history of helping states to stay informed on issues pertaining to the efficient production of oil and gas, the Interstate Oil and Gas Compact Commission (IOGCC) will maintain a list of documents discussing development of CSNG. This bibliography of scientific papers, reports, articles and studies addresses pertinent issues many IOGCC member states face. The sources of these documents are the states, the United States Geological Survey, the Gas Technology Institute and other organizations. It is the desire of the IOGCC that by sharing the information available, the burden of addressing issues related to the production of natural gas from coal seams will be lessened. States have a wealth of information on this topic and must now use it to their benefit.

This compilation of CSNG information does not include all relevant documents on this issue, but rather illustrates the quality and quantity of information on the topic. This bibliography represents only a small amount of the information. These documents contain information that will help the states understand many aspects of CSNG development. The IOGCC will collect as many of the pertinent documents as possible. Papers, reports, articles and studies dealing with issues important only to those engaged in the exploration of CSNG are not included. Many of the documents can be reproduced and supplied upon request by the IOGCC or retrieved online. However, many of the documents listed in this publication can be obtained only from the organizations listed with that document.

The IOGCC gratefully acknowledges the cooperation of many of the state oil and gas regulatory agencies and the state geological surveys. With the help of its member states, the IOGCC will continue to update and expand this list.



# Acronyms

The following is a list of acronyms used in this publication.

<b>AAPG</b>	.....	American Association of Petroleum Geologists
<b>ACS</b>	.....	American Chemical Society
<b>AGS</b>	.....	Alaska Geological Survey
<b>AGU</b>	.....	American Geophysical Union
<b>BIA</b>	.....	Bureau of Indian Affairs, U.S. Department of the Interior
<b>BLM</b>	.....	Bureau of Land Management, U.S. Department of the Interior
<b>BRI</b>	.....	Basin Research Institute, Louisiana State University
<b>CBM</b>	.....	Coalbed Methane
<b>CGS</b>	.....	Colorado Geological Survey
<b>COGCC</b>	.....	Colorado Oil & Gas Conservation Commission
<b>COMPAS</b>	...	Coalbed Methane Production and Stimulation Database
<b>CSM</b>	.....	Colorado School of Mines
<b>CSNG</b>	.....	Coal Seam Natural Gas
<b>DGGS</b>	.....	Division of Geological and Geophysical Surveys, Alaska Dept. of Natural Resources
<b>DOE</b>	.....	U.S. Department of Energy
<b>EPA</b>	.....	U.S. Environmental Protection Agency
<b>FTE</b>	.....	Freeze-thaw/evaporation
<b>GIS</b>	.....	Global Information System
<b>GRI</b>	.....	Gas Research Institute
<b>GSA</b>	.....	Geological Society of America
<b>GSC</b>	.....	Geological Survey of Canada
<b>GTI</b>	.....	Gas Technology Institute
<b>IOGCC</b>	.....	Interstate Oil and Gas Compact Commission
<b>KGS</b>	.....	Kansas Geological Survey
<b>LLL</b>	.....	Lawrence Livermore Laboratory
<b>MBMG</b>	.....	Montana Bureau of Mines & Geology
<b>MGS</b>	.....	Montana Geological Society
<b>MRCPP</b>	.....	Methane Recovery From Coalbeds Project, U.S. Department of Energy
<b>NDGS</b>	.....	North Dakota Geological Survey
<b>NETL</b>	.....	National Energy Technology Laboratory, U.S. Department of Energy
<b>NMGS</b>	.....	New Mexico Geological Society
<b>NPDES</b>	.....	National Pollutant Discharge Elimination System
<b>OGS</b>	.....	Oklahoma Geological Survey
<b>PGS</b>	.....	Pennsylvania Geological Survey
<b>RMAG</b>	.....	Rocky Mountain Association of Geologists
<b>SEPM</b>	.....	Society of Economic Paleontologists and Mineralogists
<b>SNG</b>	.....	Substitute Natural Gas
<b>SPE</b>	.....	Society of Petroleum Engineers
<b>STR</b>	.....	Salinity / Toxicity Relationship
<b>TSOP</b>	.....	The Society of Organic Petrology
<b>UGMS</b>	.....	Utah Geological and Mineralogical Survey
<b>USBM</b>	.....	United States Bureau of Mines
<b>USGS</b>	.....	United States Geological Survey
<b>WGA</b>	.....	Wyoming Geological Association
<b>WOGCC</b>	.....	Wyoming Oil & Gas Conservation Commission
<b>WSGS</b>	.....	Wyoming State Geological Survey



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59. Barker, C. E.; and Pierce, B. S., 1997, *Burial History and Coal Petrography of the Ferron Coals, Utah as Factors in Their Variable Coal Bed Gas Content*, from the proceedings of the 14th Annual Meeting of the Society of Organic Petrology, 26th Annual Meeting of the Eastern Section, American Association of Petroleum Geologists, Lexington, Kentucky, available as Abstracts with Program, v. 14.

**Summary:** AAPG Conference Document.

60. Barker, C. E.; Scott, A. R.; and Tyler, R., 1997, *The Geology of Coalbed Methane - The Perspective from Basin and Thermal History Studies*, from Geological Society of America Short Course.

**Summary:** GSA Short Course.

61. Barker, Charles E.; Pierce, Brenda S.; Garrison, James R., Jr.; and van den Bergh, T. C. V., 1997, *The Influence of Burial History on the Coalbed Gas Content of Ferron Coals, San Rafael Swell, Utah*, available from the Geological Society of America as Abstract with Programs - Geological Society of America, 29 (6).

**Summary:** GSA Conference Document.

62. Barker, Charles E.; Biewick, Laura R. H.; Warwick, Peter D.; and San Filippo, John R., 2000, *Preliminary Gulf Coast Coalbed Methane Exploration Maps; Depth to Wilcox, Apparent Wilcox Thickness and Vitrinite Reflectance*, available from the United States Geological Survey as OF 00-0113.

**Summary:** USGS Open File Report.

63. Barker, C. E.; Dallegge, T. A.; and Seamount, D. C., 2001, *Ongoing Coalbed Desorption Studies, Cook Inlet Basin, Alaska*, available from the Miscellaneous Publication series of the Division of Geological and Geophysical Surveys of the Alaska Department of Natural Resources.

**Summary:** Alaska DGGs Report.

64. Barker, C. E.; Clough, J. G.; Roberts, S. B.; and Fisk, R., 2002, *Coalbed Methane in Northern Alaska: Potential Resources for Rural Use and Added Supply for the Proposed Trans-Alaska Gas Pipeline*, available from the American Association of Petroleum Geologists in AAPG Bulletin, v. 86.
- Summary:** AAPG Bulletin.
65. Barker, C. E.; Gose, M.; Scott, R. J.; Warwick, P. D.; San Filippo, J. R.; Klein, J. M.; and Hook, R. W., 2002, *The Sacatosa Coalbed Methane Field: A First for Texas*, available from the American Association of Petroleum Geologists.
- Summary:** AAPG Conference Document.
66. Barker, J. F.; and Fritz, P., 1981, *The Occurrence and Origin of Methane in Some Groundwater Flow Systems*, from Canadian Journal of Earth Sciences, v. 18, available from the publisher.
- Summary:** Article.
67. Barr, David T.; Cleary, Michael P.; and Wright, Timothy B., 1993, *Effective Design, Real-Data Analysis and Post-Job Evaluation*, available from the Gas Technology Institute as GRI-93/0362.
- Summary:** This is a final report on the implementation of previously developed physical models of hydraulic fracturing on wells with coalbed methane and tight gas sands.
68. Bartelt, L. A.; Broutman, L. J.; Duvall, D. E.; Edwards, D. B.; Nylander, L. R.; Stellmack-Yonan, M., 1986, *Aging of Plastic Pipe Used for Gas Distribution*, available from the Gas Technology Institute as GRI-86/0027.
- Summary:** This GRI report discusses the tests being conducted on plastic pipe being used by gas utility companies in the U.S. and Canada.
69. Bartholomew, C. H.; Butala, S.J.; Medina, J. C.; Lee, M. L.; Taylor, T. Q.; and Andrus, D. B., 1999, *Mineral-Catalyzed Formation of Natural Gas During Coal Maturation*, available from Kluwer Academic Publishers, Boston.
- Summary:** Paper.
70. Beamish, B. B.; and Crosdale, P. J., 1998, *Instantaneous Outbursts in Underground Coal Mines: An Overview and Association with Coal Type*, from International Journal of Coal Geology, V. 35, available from the publisher.

**Summary:** Article.

71. Beavers, C. D.; Boyer, C. M.; Dobscha, F. X.; Green, C. D.; Lambert, S. W.; Lanier, J. B.; Sheehy, L. D.; Spafford, S. D.; and Stubbs, P. B., 1998, *Rock Creek Methane from Multiple Coal Seams Completion Project*, available from the Gas Technology Institute as GRI-88/0127.

**Summary:** This is a report on the Rock Creek Methane from Multiple Coal Seams Completion Project. This project focused on well drilling and completion, with emphasis on wellbore access and hydraulic stimulation.

72. Beavers, W. M.; Graves, Stanley L.; and Hollingsworth, F. C., 1986, *Field Evaluations of Gas Lift and Progressive Cavity Pumps as Effective Dewatering Methods for Coalbed Methane Wells*, available from the Gas Technology Institute as GRI-86/0025.

**Summary:** Final report discusses the effectiveness of dewatering techniques for coal seam gas wells in the Warrior Coal Field. Contains field evaluations of gas lift and progressive cavity pumps.

73. Beckstrom, J. A.; and Boyer, D. G., 1991, *Aquifer Protection Considerations of Coalbed Methane Development in the San Juan Basin*, paper presented at the 1991 SPE Rocky Mountain Regional Meeting and Low-Permeability Symposium, available from the Society of Petroleum Engineers as SPE paper 21841.

**Summary:** This SPE paper places the environmental issues surrounding coal seam natural gas development in the San Juan Basin into historical perspective. The findings of sampling and testing programs conducted near the New Mexico community of Cedar Hill are discussed.

74. Beims, T.; and Shirley, K., 2000, *Coalbed Methane*, from the American Oil & Gas Reporter, v. 43, no. 3, available from the publisher.

**Summary:** Article.

75. Bell, G. J.; Jones, A. H., and Schraufnagel, R. A., 1987, *COMPAS Database - An Empirical Tool for Analyzing Coalbed Methane Stimulation and Production Characteristics*, from the proceedings of the 1987 Coalbed Methane Symposium, Tuscaloosa, Alabama, available as Paper 8764.

**Summary:** Symposium Document.

76. Bell, G. J.; Jones, Arfon H.; and Morales, R. H., 1987, *Hydraulic Fracture Design Rationale for the Recovery of Methane from Coal Seams*, available from the Gas Technology Institute as GRI-87/0016.



**Summary:** This report discusses the differences in treatment pressure behavior during the hydraulic fracturing operations on coal seams and conventional formations.

77. Bell, Gregory J.; and Jones, Arfon H.; 1988, *Coalbed Methane Production and Stimulation (COMPAS) Database Documentation and User's Manual*, available from the Gas Technology Institute as GRI-88/0028.

**Summary:** This report discusses the COMPAS database, which contains information on 172 hydraulic fracture treatments for 122 wells.

78. Bell, G. J.; Jones, A. H.; Morales, R. H.; and Schraufnagel, Richard A., 1989, *Coal Seam Hydraulic Fracture Propagation on a Laboratory Scale*, available from the publisher, the University of Alabama, School of Mines and Energy Development.

**Summary:** This conference paper reports on the varied pressure responses of coal seams to hydraulic fracture stimulation.

79. Bell, G. J.; and Jones, A. H., 1989, *Variation of Mechanical Strength With Rank of Gassy Coals*, from the proceedings of the 1989 Coalbed Methane Symposium, Tuscaloosa, Alabama, available as Paper 8924.

**Summary:** Symposium Document.

80. Bennett, P. C.; and Martineau, D. T., 1999, *Hydrogeochemistry of the Pine River Coal-Bed Methane Seep*, from the 1999 Annual Meeting of the Geological Society of America, Denver, Colorado, available from the Geological Society of America as Abstract with Programs, v. 31. no. 7.

**Summary:** GSA Conference Document.

81. Bennion, D. B.; Thomas, G. B.; Imer, D.; Ma, T.; and Schulmeister, B., 2001, *Water Quality Considerations that Result in Impaired Well Injectivity of Water Injection and Disposal Wells*, available from the Colorado School of Mines.

**Summary:** CSM Publication.

82. Berggren, L. W.; and Sanderson, G. A., 2001, *Recent Developments in the Application of the § 29 Tax Credit to Coal Seam Gas*, from the proceedings of the International Coalbed Methane Symposium, Tuscaloosa, Alabama, available as Paper 104.

**Summary:** Symposium Paper.

83. Bertard, C.; Bruyet, B.; and Gunther, J., 1970, *Determination of Desorbable Gas Concentration of Coal (Direct Method)*, from International Journal of Rock Mechanics and Mining Science, v. 7, available from the publisher.

**Summary:** Article.

84. Bibler, C.; and Carothers, P., 2000, *Overview of Coal Mine Gas Use Technologies*, from the June 2000 Second International Methane Mitigation Conference, Novosibirsk, Russia, available online at Raven Ridge Web site, [www.ravenridge.com](http://www.ravenridge.com).

**Summary:** Conference Paper.

85. Biddick, M. A., 1999, *An Economic Evaluation of the Hartshorne Coalbed Methane Play in Oklahoma*, from the 1999 AAPG Midcontinent Section Meeting, Wichita, Kansas, available from the American Association of Petroleum Geologists in AAPG Bulletin, v. 83, no. 7.

**Summary:** AAPG Bulletin.

86. Black, B. A., 2000, *Effects of Laramide Compression and Tertiary Extension on Hydrocarbon Exploration in the Rio Grande Rift*, from the 2000 Rocky Mountain Section Meeting of the American Association of Petroleum Geologists, available from the American Association of Petroleum Geologists.

**Summary:** AAPG Conference Document.

87. Black, Herbert T., 1990, *Update on U. S. Coalbed Methane Production*, from Natural Gas Monthly, October 1990, available from the U. S. Department of Energy, Energy Information Administration, Office of Oil and Gas.

**Summary:** EIA Report.

88. Boardman, E. L.; and Rippon, J. H., 1997, *Coalbed Methane Migration in and Around Fault Zones*, available from the Geological Society, London, as Special Publication 125.

**Summary:** Geological Society Report.

89. Bodden, W. R., III; and Ehrlich, R., 1998, *Permeability of Coals and Characteristics of Desorption Tests: Implications for Coalbed Methane Production*, from International Journal of Coal Geology, v. 35, available from the publisher.

**Summary:** Article.

90. Bojan, M. J.; Mitchell, G.; Radovic, L. R.; and Steele, W. A., 1992, *Adsorption and Transport in Coalbed Reservoirs*, available from the Gas Technology Institute as GRI-91/0375.

**Summary:** This report discusses the ability to evaluate the production and reserve potential of coal seam reservoirs.

91. Bojan, M. J.; Danner, R. P.; Menon, V. C.; Mitchell, G.; Radovic, L. R.; and Steele, W. A., 1992, *Adsorption and Transport in Coalbed Reservoirs*, available from the Gas Technology Institute as GRI-92/0502.

**Summary:** This report discusses the ability to evaluate the production and reserve potential of coal seam wells.

92. Bolshinsky, I.; Morev, A.; and Kloisner, S., 1995, *Sudden Methane Rushes Through the Roadway Floor*, from the proceedings of the 1995 International Unconventional Gas Symposium, Tuscaloosa, Alabama, available as Paper 9504.

**Summary:** Symposium Paper.

93. Boreck, D. L.; and Strever, M. T., 1980, *Conservation of Methane from Colorado Mined/Minable Coal Beds: A Feasibility Study*, available from the Colorado Geological Survey as Open-File Report 80-5.

**Summary:** Details factors affecting methane development, drilling and completion methods for degasifying coalbeds. It also contains a detailed case study of a Piceance Basin mine.

94. Boreck, Donna L.; and Weaver, Jean N., 1984, *Coalbed Methane Study of the "Anderson" Coal Deposit, Johnson County, Wyoming; A Preliminary Report*, available from the United States Geological Survey as OF 84-0831.

**Summary:** USGS Open File Report.

95. Boreham, C. J.; Golding, S. D.; and Glikson, M., 2001, *Factors Controlling the Origin of Gas in Australian Bowen Basin Coals; Reply*, from *Organic Geochemistry*, v. 32, available from the publisher.

**Summary:** Article.

96. Bostic, Joy; Brady, Lawrence; Howes, Mary; Burchett, Raymond R.; and Pierce, Brenda S., 1993, *Investigations of the Coal Properties and the Potential for Coal-bed Methane in the Forest City Basin*, available from the United States Geological Survey as OF 93-0576.

**Summary:** USGS Open File Report.

97. Boyer, C. M., II; and Hirko, N. M., 1985, *Rock Creek Methane from Multiple Coal Seams Completion Project. Phase I Test Plan*, available from the Gas Technology Institute as GRI-86/0155.

**Summary:** This report discusses the Rock Creek Methane from Multiple Coal Seams Completion Project.

98. Boyer, C. M., II; Briscoe, F. H.; Camp, B. S.; et al., 1986, *Geologic and Reservoir Characterization for the Multiple Coal Seams Completion Project at Rock Creek*, available from the Gas Technology Institute as GRI-87/0083.1.

**Summary:** GRI Topical Report.

99. Boyer, C. M., II; Briscoe, F. H.; Camp, B. S.; Dobscha, F. X.; Malone, P. G.; Schwerer, F. C.; and Stubbs, P. B., 1986, *Measurement of Static Coalbed Reservoir Conditions for Hydraulic Fracture Design: Volume I*, available from the Gas Technology Institute as GRI-87/0082.1.

**Summary:** Final report on a well that was completed into the Mary Lee and Blue Creek coal seams in the Black Warrior Basin of Alabama. This well completion was used to evaluate the geologic and reservoir parameters which affect the stimulation and production of coal seam natural gas.

100. Boyer, C. M., II; Briscoe, F. H.; Camp, B. S.; Dobscha, F. X.; Malone, P. G.; Schwerer, F. C.; and Stubbs, P. B., 1986, *Measurement of Static Coalbed Reservoir Conditions for Hydraulic Fracture Design: Volume II*, available from the Gas Technology Institute as GRI-87/0082.2.

**Summary:** Final report of findings from a coal seam natural gas well completed into the Mary Lee and Blue Creek coal seams in the Warrior Basin of Alabama. Evaluates the geologic and reservoir parameters that affect the stimulation and production of coalbed methane. Appendixes address such issues as gas and water production, hydraulic fracturing, and a mini-frac analysis.

101. Boyer, C. M., II; Militzer, M. R.; and Schwerer, F. C., 1986, *Preliminary Economic Assessment Potential for Producing Methane for the Multiple Coal Seams Completion Project at Rock Creek*, available from the Gas Technology Institute as GRI-86/0046.

**Summary:** This report discusses the evaluation of the economic potential for commercial production of natural gas from the coal seams at Rock Creek in the Warrior Basin of Alabama.

102. Boyer, C. M., II; Briscoe, F. H.; Camp, B. S.; Dobscha, F. X.; and Malone, P. G., 1986, *Rock Creek Methane from Multiple Coal Seams Completion Project. Demonstrated Drilling and Completion Technology for the Multiple Coal Seams Completion Project*, available from the Gas

Technology Institute as GRI-87/0084.

**Summary:** This report discusses details of drilling, casing and cementing.

103. Boyer, C. M., II; Briscoe, F. H.; Camp, B. S.; Diamond, W. P.; Malone, P. G.; and Militzer, P. G., 1986, *Rock Creek Methane from Multiple Coal Seams Completion Project. Final Geologic Report. Big Indian Creek Site, Volume I*, available from the Gas Technology Institute as GRI-85/0285.

**Summary:** This report gives the data on the methane contents of the natural gas from coal seam wells drilled at the Big Indian Creek site in the Warrior coal basin in Alabama.

104. Boyer, C. M., II; Briscoe, F. H.; Camp, B. S.; Diamond, W. P.; Malone, P. G.; and Militzer, P. G., 1986, *Rock Creek Methane from Multiple Coal Seams Completion Project. Final Geologic Report. Big Indian Creek Site, Volume I*, available from the Gas Technology Institute as GRI-85/0285.1.

**Summary:** This report contains the appendixes to the data in Volume I (GRI-85/0285).

105. Boyer, C. M.; and Kelafant, J. R., 1988, *Geologic Assessment of Natural Gas from Coal Seams in the Central Appalachian Basin*, available from the Gas Technology Institute as GRI-88/0302.

**Summary:** This report gives an analysis of the subsurface geology of six Pennsylvanian age coal seams. This was done to estimate the coal volumes present in the Central Appalachian Basin.

106. Boyer, C. M., II, 1989, *Coalbed Methane Development Faces Technology Gaps*, available from the Gas Technology Institute.

**Summary:** GRI Report.

107. Boyer, C. M., II, 1989, *Coalbed Methane Resources and the Mechanisms of Gas Production*, available from the Gas Technology Institute as GRI-89/0266.

**Summary:** This report explores the potential of the natural gas from coal seams resource and the key mechanisms controlling its production.

108. Boyer, C. M., II; and Reeves, S. R., 1989, *A Strategy for Coalbed Methane Production Development Part III: Production Operations*, from the proceedings of the 1989 Coalbed Methane Symposium, available as Paper 8913.

**Summary:** Symposium Paper.

109. Boyer, C. M., II; Kelefant, J. R.; Kuuskraa, V. A.; and Manger, K. C., 1990, *Methane Emissions from Coal Mining: Issues and Opportunities for Reduction*, from the U.S. Environmental Protection Agency, Air and Radiation as ANR-445, EPA/400/9-90/008, available from the EPA.

**Summary:** EPA Report.

110. Boyer, Charles M., II; Paul, George S.; and Kuuskraa, Vello A., 1993, *Methane from Coal Deposits: Technical Evaluation and Database*, available from the Gas Technology Institute as GRI-92/0473.

**Summary:** This report on GRI-sponsored research discusses the advancements made in the low cost recovery of natural gas from coal seams.

111. Boyer, Charles M., II; Paul, George S.; and Kuuskraa, Vello A., 1994, *Methane from Coal Deposits: Technical Evaluation and Database*, available from the Gas Technology Institute as GRI-94/0182.

**Summary:** This report focuses on three vehicles of GRI's technology transfer.

112. Boyer, C. M., II; and Quingshao, B., 1998, *Methodology of Coalbed Methane Resource Assessment*, from International Journal of Coal Geology, v. 35, available from the publisher.

**Summary:** Article.

113. Bradley, R., 1999, *New Gas Well Produced Water Treatment Protects the Environment and Saves Money*, from the proceedings of the 6th Annual Petroleum Environmental International Conference, Houston, Texas, available as Proceedings no. 10.

**Summary:** Conference Document.

114. Brady, L. L.; and Guy, W. J., 1999, *Coal Resources and Coalbed Methane Potential in the Kansas Portion of the Forest City Basin*, from the 1999 AAPG Mid-Continent Section Meeting, Wichita, Kansas, available from the American Association of Petroleum Geologists in AAPG Bulletin, v. 83, no. 7.

**Summary:** AAPG Bulletin.

115. Brownfield, M. E.; Affolter, Ronald H.; and Stricker, G. D., 1991, *High Chromium Content in Tertiary Coals, Northwestern Washington; A Key to Their Depositional History*, available from the United States Geological Survey as OF 91-0582.

**Summary:** USGS Open File Report.

116. Brownfield, Michael E.; Hettinger, Robert D.; and Johnson, Edward A., 2000, *A Summary of the Stratigraphy, Coal Resources, and Coal-bed Methane Potential of Northwest Colorado*, available from the United States Geological Survey as P 1625-B

**Summary:** USGS Paper.

117. Bruce, R. H.; Middleton, M. F.; Holyland, P.; Loewenthal, D.; and Bruner, I., 1999, *Modeling of Petroleum Formation Associated with Heat Transfer Due to Hydrodynamic Processes*, from Coalbed Methane: Scientific, Environmental and Economic Evaluation, available from Kluwer Academic Publishers.

**Summary:** Paper.

118. Bruner, K. R.; Oldham, A. V.; Repine, T. E., Jr.; Markowski, A. K.; and Harper, J. A., 1995, *Geological Aspects of Coalbed Methane in the Northern Appalachian Coal Basin, Southwestern Pennsylvania and North-Central West Virginia*, available from the Pennsylvania Geological Survey as Open-File Report 98-13.

**Summary:** PGS Open-File Report.

119. Brunner, D. J.; Carothers, P.; Surowka, J.; Surma, A.; and Schultz, K., 1999, *Coalbed Methane Recovery and Electric Power Generation at the Wesola Mine in Myslowice, Poland*, from the proceedings of the 1999 International Coalbed Methane Symposium, Tuscaloosa, Alabama, available from the University of Alabama.

**Summary:** Symposium Document.

120. Brunner, D. J.; and Schultz, K., 1999, *Gob Well Flaring: Design and Impact Analysis Coalbed*, from the proceedings of the 1999 International Coalbed Methane Symposium, Tuscaloosa, Alabama, available from the University of Alabama.

**Summary:** Symposium Document.

121. Brunner, D. J.; and Ponce, J. R., 1999, *Methane Drainage at the Minerals Monclova Mines in the Sabinal Coal Basin, Coahuila, Mexico*, from the proceedings of the 1999 International Coalbed Methane Symposium, Tuscaloosa, Alabama, available from the University of Alabama.

**Summary:** Symposium Document.

122. Brunner, D. J.; Harpalani, S.; and Schultz, K., 2000, *Utilization of Geomechanical Properties of Gob to Enhance Gob Gas Recovery and Purity*, from the proceedings of the 4th North American Rock Mech. Symposium, Seattle, Washington.

**Summary:** Symposium Document.

123. Buck, E.; Maddux, G. C.; and Sullivan, R. L., 1996, *Internal Corrosion Cost Impact Study - United States Natural Gas Exploration and Production Industry*, available from the Gas Technology Institute as GRI-96/0056.

**Summary:** This GRI study discusses the cost impact of internal corrosion on gas production operations.

124. Bumb, A. C.; Koenig, R. A.; McKee, C. R.; Reverand, J. M.; Santoro, D.J.; Ward, W.P.; and Way, S. C., 1985, *Hydrologic Characterization of Coal Seams for Methane Recovery. Activity 2 Topical Report: Hydrologic Constraints and Single-Phase Test Procedures, Volume I*, available from the Gas Technology Institute as GRI-83/0065.1.

**Summary:** This is the final report on a literature search that resulted in a computerized retrieval system for well testing methods and data analysis procedures.

125. Bumb, A. C.; Koenig, R. A.; McKee, C. R.; Reverand, J. M.; and Way, S. C., 1985, *Hydrologic Characterization of Coal Seams for Methane Recovery. Activities 5 and 7 Progress Report: Review of Single-Phase Hydrologic Testing in Coalbeds and Development of Unsaturated-Flow Well Test Procedures*, available from the Gas Technology Institute as GRI-85/0046.

**Summary:** Report discusses the results discovered from data gathered from five coal seam natural gas projects located in the Piceance, San Juan and Warrior basins. The data was used to evaluate single-phase tests for determining hydrological properties.

126. Bumb, A. C.; Koenig, R. A.; McKee, C. R.; Reverand, J. M.; and Way, S. C., 1987, *Review of Hydrologic Testing in Coalbeds*, available from the Gas Technology Institute as GRI-87/0017.

**Summary:** This is a report on the evaluation of hydrologic testing of coalbeds.

127. Bumb, A. C.; Koenig, R. A.; McKee, C. R.; Murphy, C.L.; Ramesh, M.S.; Reverand, J. M.; and Way, S. C., 1989, *Application of Hydrology to Evaluation of Coalbed Methane Reservoirs*, available from the Gas Technology Institute as GRI-89/0031.

**Summary:** This is a report on the development of hydrologic concepts and well testing techniques. Discusses a test devised to determine permeability and static reservoir pressure of a coal seam as well as the condition of the wellbore.



128. Bureau of Land Management, 1975, *Trace Elements, in Hanna Basin Study Site (Carbon County, Wyoming) Resource and Potential Reclamation*, available from the BLM.

**Summary:** BLM Report.

129. Bureau of Land Management, 1994, *Oil and Gas Resource Management Plan / EIS Amendment Record of Decision*, available from the BLM.

**Summary:** BLM Report.

130. Bureau of Land Management, Solid Minerals Group, 1995, *Geologic and Hydrologic Assessment of Natural Gas from Coal: Greater Green River, Piceance, Powder River, and Raton Basins, Western United States*, available from the BLM.

**Summary:** BLM Report.

131. Bureau of Land Management, 1996, *BLM Evaluates Coalbed Methane, Coal & Synfuels Technology*, available from the BLM.

**Summary:** BLM Report.

132. Bureau of Land Management, Buffalo Resource Area, 1997, *Gillette South Coal Bed Methane Project (Microform): Final Environmental Impact Statement*, available from the BLM.

**Summary:** BLM Report.

133. Bureau of Land Management, Colorado State Office, 1998, *Glenwood Spring Resource Area: Oil & Gas Leasing Development, Draft Supplemental Environmental Impact Statement*, available from the BLM.

**Summary:** BLM Report.

134. Bureau of Land Management, 1999, *Coalbed Methane Development in the Northern San Juan Basin of Colorado*, available from the BLM.

**Summary:** BLM Report.

135. Bureau of Land Management, 1999, *Lower Prairie Dog Creek Coal Bed Methane Project Environmental Assessment*, available from the BLM.

**Summary:** BLM Report.

136. Bureau of Land Management, 1999, *Pennaco Energy Deer Creek Exploratory Coalbed Methane Project Environmental Assessment*, available from the BLM.

**Summary:** BLM Report.

137. Bureau of Land Management, 1999, *Wyodak Coal Bed Methane Project Draft Environmental Impact Statement*, available from the BLM.

**Summary:** BLM Report.

138. Bureau of Land Management, 1999, *Wyodak Coal Bed Methane Project Final Environmental Impact Statement*, available from the BLM.

**Summary:** BLM Report.

139. Bureau of Land Management, Wyoming State Office, 2000, *Record of Decision, Environmental Impact Statement, South Baggs Area, Natural Gas Development Project, Carbon County, Wyoming*, available from the BLM.

**Summary:** BLM Report.

140. Bureau of Land Management, Buffalo Field Office, 2000, *Decision Record Wyodak Coal Bed Methane Environmental Assessment*, available from the BLM.

**Summary:** BLM Report.

141. Bureau of Land Management, Bureau of Indian Affairs, and Southern Ute Indian Tribe, 2000, *Draft Environmental Impact Statement, Oil and Gas Development on the Southern Ute Indian Reservation*, available from the BLM.

**Summary:** BLM Report.

142. Bureau of Land Management, Buffalo Field Office, 2000, *Wyodak Drainage Coal Bed Methane Environmental Assessment*, available from the BLM.

**Summary:** BLM Report.

143. Bureau of Land Management; Holsan, Gary, *Draft Environmental Assessment, Pannaco Energy Deer Creek Exploratory Coalbed Methane Project*, available from the BLM.

**Summary:** BLM Report.

144. Burns, T. D.; and Lamarre, R. A., 1997, *Drunkards Wash Project: Coalbed Methane Production from Ferron Coals in East-Central Utah*, from the proceedings of the 1997 International Coalbed Methane Symposium, Tuscaloosa, Alabama, available as Paper 9709.

**Summary:** Symposium Paper.

145. Bustin, R. M.; and Clarkson, C. R., 1997, *Generation and Expulsion of Petroleum and Gas from Almond Formation Coal, Greater Green River Basin, Wyoming*, available from the American Association of Petroleum Geologists.

**Summary:** AAPG Report.

146. Bustin, R. M.; and Clarkson, C. R., 1998, *Geological Controls on Coalbed Methane Reservoir Capacity and Gas Content*, from International Journal of Coal Geology, v. 38, available from the publisher.

**Summary:** Article.

147. Bustin, R. M.; and Clarkson, C. R., 1999, *Free Gas Storage in Matrix Porosity: A Potentially Significant Resource in Low Rank Coals*, from the proceedings of the 1999 International Coalbed Methane Symposium, Tuscaloosa, Alabama, available from the University of Alabama.

**Summary:** Symposium Paper.

148. Bustin, R. M., 1999, *Variation in Pore Size with Coal Rank and Composition: Potential for Substantial Resources of Free Gas in Matrix Porosity in Low Rank Coals*, from the proceedings of the 1999 Annual Meeting of the Geological Society of America, Denver, Colorado, available from the Geological Society of America as Abstract with Programs, v. 31, no. 7.

**Summary:** GSA Meeting Document.

149. Bustin, R. M., 2000, *Hydrogen Sulphide Sorption on Coal With Comparisons to Methane, Carbon Dioxide, Nitrogen and Hydrogen Sorption: Implications for Acid Gas Sequestering and Co-production of Methane*, available from TSOP as Abstracts and Program, v. 17.

**Summary:** Report.

150. Bustin, R. M., 2001, *Hydrogen Sulphide Sorption on Coal With Comparisons to Methane, Carbon Dioxide, Nitrogen and Hydrogen Sorption: Implications for Acid Gas Sequestering and Co-production of Methane*, from proceedings of the International Coalbed Methane Symposium, Tuscaloosa, Alabama, available as Paper 112.

**Summary:** Symposium Paper.

151. Butala, Steven J. M.; Medina, Juan Carlos; Bowerbank, Christopher R.; Lee, Milton L.; Felt, Scott A.; Taylor, Terrence Q.; Andrus, Dallan B.; Bartholomew, Calvin H.; Yin, Pequi; and Surdam, Ronald C., 1997, *Catalytic Effects of Mineral Matter on Natural Gas Formation During Coal Maturation*, available from the Gas Technology Institute as GRI-97/0213.

**Summary:** This report discusses a study conducted to determine if mineral catalysts affect gas formation during coal maturation.

152. Butala, S. J., 1999, *Analysis of Hydrocarbons Generated in Coalbeds*, Doctoral Dissertation, available from the Brigham Young University, Provo, Utah.

**Summary:** Doctoral Dissertation.

153. Butts, R. C.; and Hall, J. M., 2000, *Technology Clearing Way to Coalbed, Coal Mine Methane*, from American Oil & Gas Reporter, v. 43, no. 3, available from the publisher.

**Summary:** Article.

154. Bybee, Karen, 2002, *Multiseam Coal Stimulation by Coiled-Tubing Fracturing*, from Journal of Petroleum Technology, v. 54, no. 7, available from the publisher.

**Summary:** Article.

155. Byrer, C. W.; Mroz, T. H.; and Covatch, G. L., 1987, *Coalbed Methane Production Potential in U.S. Basins*, from Journal of Petroleum Technology, v. 39, no. 7, available from the publisher.

**Summary:** Article.

156. Byrer, C. W.; Layne, A. W.; and Guthrie, H. D., 1995, *Development and Utilization Strategies for Recovery and Utilization of Coal Mine Methane*, from proceedings of the 1995 International Unconventional Gas Symposium, Tuscaloosa, Alabama, available as Paper 9551.

**Summary:** Symposium Paper.

157. Byrer, C. W.; and Guthrie, H. D., 1999, *Appalachian Coals: Potential Reservoirs for Sequestering Carbon Dioxide Emissions from Power Plants While Enhancing CBM (Coalbed Methane) Production*, from proceedings of the 1999 International Coalbed Methane Symposium, Tuscaloosa, Alabama, available from the University of Alabama.

**Summary:** Symposium Paper.

158. Byrer, C. W.; and Guthrie, H. D., 1999, *Carbon Dioxide Sequestration Potential in Coal Deposit*, from proceedings of the 1999 AAPG-DEG-DPA-EMD-SEPM Convention, San Antonio, Texas, available from the American Association of Petroleum Geologists.

**Summary:** AAPG Convention Document.

159. Camp, Bret S.; Kidd, Jack T.; Lottman-Craig, Linda K.; Osborne, Terry E.; Saulsberry, Jerrald L.; Smith, Jeffrey L.; Steidl, Peter F.; and Stubbs, Paul B., 1992, *1.1.4 Coalbed Methane Multiple Coal Seam Project 305. Geologic Manual for the Evaluation and Development of Coalbed Methane*, available from the Gas Technology Institute as GRI-91/0110.

**Summary:** This report discusses the geologic parameters and the methodology used in the identification, confirmation, and development of coalbed methane resources.

160. Campbell, F. W.; Hoffman, G. K.; Kottlowski, F. E.; and Arkell, B. W., 1991, *Geology and Coal Resources of New Mexico's Small Coalfields*, available from the United States Geological Survey as B 1972.

**Summary:** USGS Bulletin.

161. Campen, Betsy; and Campen, Ted, 1989, *Coalbed Methane in Montana*, available from the Montana Geological Society.

**Summary:** MGS Report.

162. Campen, Elizabeth B., 1991, *Coal-bed Methane Potential in Montana*, available from the American Association of Petroleum Geologists.

**Summary:** AAPG Report.

163. Campen, E. B.; and Campen, E. B., 2002, *Basic Log Analysis in Coalbed Methane Exploration*, available from the Rocky Mountain Association of Geologists, in *Coalbed Methane of North America, II*.

**Summary:** RMAG Report.

164. Campen, T.; and Campen, B., 1999, *Basic Log Analysis in Coalbed Methane Exploration*, from the 1999 AAPG Rocky Mountain Section Meeting, Bozeman, Montana, available from the American Association of Petroleum Geologists in AAPG Bulletin, v. 83, no. 7.

**Summary:** AAPG Meeting Document.

165. Cao, Y. D.; and Glick, D. C., 2001, *Coal and Gas Outbursts in Footwalls of Reverse Faults*, from International Journal of Coal Geology, v. 48, available from the publisher.

**Summary:** Article.

166. Cardott, B. J.; Hemish, LeRoy A.; Johnson, Charles R.; and Luza, Kenneth W., 1986, *The Relationship Between Coal Rank and Present Geothermal Gradient in the Arkoma Basin*, available from the Oklahoma Geological Survey as Special Publication 86-4.

**Summary:** OGS Publication.

167. Cardott, B. J., 1999, *Coalbed Methane Activity in Oklahoma*, available from the Oklahoma Geological Survey as OF 6-99.

**Summary:** OGS Open File Report.

168. Cardott, B. J., 2000, *Oklahoma Coalbed Methane: From Mine Explosion to Gas Resource*, from the 1999 AAPG Mid-Continent Section Meeting, Wichita, Kansas, available from the American Association of Petroleum Geologists in AAPG Bulletin, v. 83, no. 7.

**Summary:** AAPG Meeting Document.

169. Cardott, B. J., 2000, *Coalbed Methane Activity in Oklahoma*, available from the Oklahoma Geological Survey as OF 2-2000.

**Summary:** OGS Open File Report.

170. Cardott, B. J., 2001, *Coalbed Methane Activity in Oklahoma*, available from the Oklahoma Geological Survey as Open File Report 2-2001.

**Summary:** OGS Open File Report.

171. Cardott, B. J., 2001, *Introduction to Coal as Gas Resource Rock and Reservoir*, available from the Oklahoma Geological Survey as Open File Report 2-2001.

**Summary:** OGS Open File Report.

172. Cardott, B. J., 2001, *Oklahoma Coalbed-Methane Completions, 1988 to 1996*, available from the Oklahoma Geological Survey as Circular 104.

**Summary:** OGS Circular.

173. Cardott, B. J., 2002, *Coalbed Methane Development in Oklahoma*, available from the Rocky Mountain Association of Geologists in Coalbed Methane of North America, II.

**Summary:** RMAG Report.

174. Cardott, B. J., 2002, *Fourth Annual Oklahoma Coalbed-Methane Workshop*, available from the Oklahoma Geological Survey as OF 9-2002.

**Summary:** OGS Open File Report.

175. Carey, M. A.; Roberts, S. B.; and Clark, A. C., 1988, *Chemical Analyses for Nine Coal Samples from the Sagwon Member (Tertiary) of the Sagavanirktok Formation, North Slope, Alaska*, available from the United States Geological Survey as OF 88-0678.

**Summary:** USGS Open File Report.

176. Carlton, D.; and Cornelius, C., 2000, *Macro Geologic Controls on Coalbed Methane Resource Development, Raton Basin, SE. Colorado, USA*, from the 2000 AAPG International Conference, Bali, Indonesia, available from the American Association of Petroleum Geologists in AAPG Bulletin, v. 84, no. 9.

**Summary:** AAPG Conference Document.

177. Carrol, R. E.; Pashin, J. C.; and Kugler, R. L., 1993, *Burial History and Source Rock Characteristics of Mississippian and Pennsylvanian Strata, Black Warrior Basin, Alabama*, from Alabama Geological Society Guidebook, available from the Alabama Geological Society.

**Summary:** Alabama Geological Society Document.

178. Carroll, C. J., 1999, *Correlation of Fruitland Formation Coals and Coalbed Methane Leakage*

*on the West Side of the Southern Ute Reservation, La Plata County, Colorado*, available from the Colorado Geological Survey in an Open-File Report.

**Summary:** CGS Open-File Report.

179. Carroll, C. J., 1999, *Correlation of Producing Fruitland Formation Coals and Coalbed Methane Leakage on the Southern Ute Reservation*, available from the Colorado Geological Survey as Open-File Report 99-10.

**Summary:** Contains production database, seven cross sections, five structure and production isopach maps, production bubble map, cross sections index map and two new surface maps of the Fruitland Formation coal zones located on the Southern Ute Reservation. This 1999 report contains descriptions of suspected seep locations, fracture data, and coal correlation with the western outcrop region.

180. Carter, L.M.H., ed., 1995, *Energy and the Environment; Application of Geosciences to Decision Making*, from Tenth V.E. McKelvey Forum on Mineral and Energy Resources, available from the United States Geological Survey as Circular 1108.

**Summary:** USGS Circular.

181. Carter, Russell A., *Underground Developments in Methane Recovery*.

**Summary:** Article.

182. Carter, R. H.; Holditch, S. A.; Hinkel, J.; and Jeffrey, R., 1989, *Enhanced Gas Production Through Hydraulic Fracturing of Coal Seams*, available from the Gas Technology Institute as GRI-90/0061.

**Summary:** This is a final report on research conducted to identify mechanisms that influence the propagation of hydraulic fractures in coal seams and the surrounding strata, correlate the production of methane with identifiable fracture characteristics, and to specify the most effective fracture treatment designs.

183. Carter, R. H.; Holditch, S. A.; Ely, J. W.; Hinkel, J.; and Jeffrey, R., 1989, *Physical and Chemical Fluid Interaction Associated with Hydraulic Fracturing of Coal Seams*, available from the Gas Technology Institute as GRI-90/0060.

**Summary:** This report discusses laboratory tests and computer simulations conducted to investigate the mechanical, physical and chemical phenomena associated with the hydraulic fracturing of coal seams.



184. Case, James C.; Edgar, Thomas V.; and De Bruin, Rodney H., 2000, *Subsidence Potential Related to Water Withdrawal in the Powder River Basin*, available from the Wyoming State Geological Survey.

**Summary:** Discusses the differences between the Powder River Basin and various other documented cases where subsurface fluids have been withdrawn. The authors of this report also compare coal seam natural gas production and water production from sandstones in the same area.

185. Cates, L. M.; and Groshong, R. H., Jr., 1999, *Regional Thin-Skinned Extension in a Foreland Basin; Prediction from Balanced Cross Sections, Confirmation by Field Mapping*, from the 1999 Annual Meeting of the Geological Society of America, available from the Geological Society of America.

**Summary:** GSA Meeting Document.

186. Cervik, J., 1969, *Behavior of Coal-Gas Reservoirs*, U. S. Bureau of Mines Technical Progress Report, available from the National Technical Information Service.

**Summary:** USBM Report.

187. Cervik, J.; Fields, H. H.; and Aul, G. N., 1975, *Rotary Drilling Holes in Coalbeds for Degasification*, U. S. Bureau of Mines Report of Investigations 8097, available from the National Technical Information Service.

**Summary:** USBM Report.

188. Chaianansutcharit, Thotsaphon; Chen, Her-Yuan; and Teufel, Lawrence W., 2001, *Impacts of Permeability Anisotropy and Pressure Interference on Coalbed Methane (CBM) Production*, from the proceedings of the 2001 SPE Rocky Mountain Petroleum Conference, Keystone, Colorado, available from the Society of Petroleum Engineers as SPE-71069.

**Summary:** SPE Conference Document.

189. Chandler, R.V.; Epsman, M.L.; Hamilton, R.P.; Pashin, J.C.; Rheams, L.J.; Richter, K.E.; Tolson, J.S.; Ward, W.E., II; Wilson, G.V.; and Winston, R.B., 1988, *Geologic Evaluation of Critical Production Parameters for Coalbed Methane Resources: Part II – Black Warrior Basin*, available from the Gas Technology Institute as GRI-88/0332.2.

**Summary:** This is an annual report on data used to evaluate the geologic and production parameters for coal seam natural gas in the Brookwood and Oak Grove coal degasification fields in the Black Warrior Basin of Alabama.

190. Charpentier, Ronald R.; and Law, Ben E., 1993, *Estimation of Coalbed Methane Contents from Geologic Data*, available from the American Association of Petroleum Geologists.

**Summary:** AAPG Report.

191. Charpentier, Ronald R., 1995, *Cherokee Platform Province*, available from the United States Geological Survey in National Assessment of United States Oil and Gas Resources.

**Summary:** USGS Publication.

192. Chen, W.; Duan, Y.; and Xie, J., 2000, *Transient Pressure Analysis of Finite-Conductivity Fractured Well for Coalbed Methane*, from Journal Southwest Petroleum Institute, v. 22, no. 1, available from the publisher.

**Summary:** Article.

193. Chesnut, D. R., Jr.; Nuttall, B. C.; Hower, J. C.; Greb, S. F.; Eble, C. F.; Hiatt, J. K.; and Williams, D. A., 1997, *Coalbed Methane in Kentucky*, from a paper presented to the 1997 International Coalbed Methane Symposium, Tuscaloosa, Alabama, available online at <http://www.uky.edu/KGS/coal/webcoal/pages/cbm.html>.

**Summary:** This symposium paper details the coalbeds in Kentucky and the potential for natural gas from coal seams as a resource.

194. Chi, W.; and Yang, L., 2000, *A Feasibility Discussion on Exploitation Coalbed Methane Through Horizontal Network Drilling in China*, from the proceedings of the 2000 SPE Oil & Gas International Conference, Beijing, China, available from the Society of Petroleum Engineers as SPE-64709.

**Summary:** SPE Conference Document.

195. Choate, R.; and Johnson, C. A., 1979, *Geologic Overview, Coalbed Description and Potential for Methane Recovery from Coalbeds, Powder River Basin, Wyoming-Montana*, by the TRW Energy Systems Group for the U. S. Department of Energy.

**Summary:** Report prepared for DOE.

196. Choate, R.; Johnson, C. A.; and McCord, J. P., 1980, *Geologic Overview, Coal and Coalbed Methane Resources of the Western Washington Coal Region, Lakewood Colorado*, by the TRW Energy Systems Group for the U. S. Department of Energy, Morgantown Energy Technology Center under Contract DE-AC21-78MC08089.

**Summary:** TRW Report prepared for DOE.

197. Choate, R.; and Johnson, C. A., 1980, *Powder River Basin Report: A Study of Early Tertiary Geology, Coal and the Potential for Methane Recovery from Coalbeds in Montana and Wyoming*, from a report of the Methane Recovery from Coalbeds Project of the U. S. Department of Energy, available from the Department of Energy.

**Summary:** MRCP Report.

198. Choate, R.; Jurich, D.; and Saulnier, G. L., Jr., 1981, *Geologic Overview, Coal Deposits, and the Potential for Methane Recovery from Coalbeds, Piceance Basin, Colorado*, from a TRW Energy Engineering Division Report, available from the U. S. Department of Energy.

**Summary:** Report prepared for DOE.

199. Choate, R.; and Rightmire, C. T., 1982, *Influence of the San Juan Mountain Geothermal Anomaly and other Tertiary Igneous Events on the Coalbed Methane Potential in the Piceance, San Juan, and Raton Basins, Colorado and New Mexico*, from the proceedings of the 1982 SPE/DOE Unconventional Gas Recovery Symposium, available from the Society of Petroleum Engineers.

**Summary:** SPE Symposium Document.

200. Choate, R.; Lent, J.; and Rightmire, C. T., 1982, *San Juan Basin Report – Upper Cretaceous Geology, Coal and the Potential for Methane Recovery from Coalbeds in Colorado and New Mexico*, from a TRW Energy Engineering Division Report, available from the U. S. Department of Energy.

**Summary:** Report prepared for DOE.

201. Choate, Raoul, 1984, *Evaluation of Coalbed Methane Resource in Western United States*, available from the American Association of Petroleum Geologists.

**Summary:** AAPG Report.

202. Choate, R.; McCord, J. P.; and Rightmire, C. T., 1986, *Assessment of Natural Gas from Coalbeds by Geologic Characterization and Production Evaluation*, available from the American Association of Petroleum Geologists in AAPG Studies in Geology, 21.

**Summary:** AAPG Report.

203. Choate, R.; Lent, T.; and Rightmire, C. T., 1993, *Upper Cretaceous Geology, Coal, and the Potential for Methane Recovery From Coalbeds in the San Juan Basin - Colorado and New Mexico*, available from the American Association of Petroleum Geologists in AAPG Studies in Geology, 38.

**Summary:** AAPG Report.

204. Choi, S. K.; and Wold, M. B., 2001, *Advances in Simulation of Gas Outburst Conditions in Underground Coal Mines*, from the proceedings of the International Coalbed Methane Symposium, Tuscaloosa, Alabama, available as Paper 126.

**Summary:** Symposium Paper.

205. Clark, W. F.; and Helmer, T., 1988, *Completing, Equipping, and Operating Fruitland Formation Coal-bed Methane Wells in the San Juan Basin, New Mexico and Colorado*, available from the Rocky Mountain Association of Geologists in Rocky Mountain Association of Geologists Guidebook.

**Summary:** RMAG Report.

206. Clarkson, C. R.; Lamberson, M. N.; and Bustin, R. M., 1993, *Variation in Surface Area and Micropore Size Distribution with Composition of Medium Volatile Bituminous Coal of the Gates Formation, Northeastern British Columbia: Implications for Coalbed Methane Potential*, available from the Geological Survey of Canada as Paper 93-1.

**Summary:** GSC Paper.

207. Clarkson, C. R.; and Bustin, R. M., 1996, *Variation in Micropore Capacity and Size Distribution with Composition in Bituminous Coal of the Western Canadian Sedimentary Basin*, from Fuel, v. 75, available from the publisher.

**Summary:** Article.

208. Clarkson, C. R.; and Bustin, R. M., 1997, *The Effect of Pore Structure and Gas Pressure Upon the Transport Properties of Coal: A Laboratory and Modelling Study*, from the proceedings of the 1997 International Coalbed Methane Symposium, Tuscaloosa, Alabama, available as Paper 9719.

**Summary:** Symposium Paper.

209. Clarkson, C. R.; and Bustin, R. M., 1997, *Variation in Permeability with Lithotype and Maceral Composition of Cretaceous Coals of the Canadian Cordillera*, from International Journal of Coal Geology, v. 33, available from the publisher.

**Summary:** Article.

210. Clarkson, C. R.; and Bustin, R. M., 1999, *Binary Gas Adsorption/Desorption Isotherms: Effect of Moisture and Coal Composition Upon Component Selectivity*, from the proceedings of the 1999 International Coalbed Methane Symposium, Tuscaloosa, Alabama, available from the University of Alabama.

**Summary:** Symposium Paper.

211. Clarkson, C. R.; and Bustin, R. M., 1999, *The Effect of Pore Structure and Gas Pressure Upon the Transport Properties of Coal: A Laboratory and Modelling Study*, from Fuel, v. 78, available from the publisher.

**Summary:** Article.

212. Clarkson, C. R.; and McGovern, J. M., 2001, *Study of the Potential of Matrix Free Gas Storage Upon Coalbed Gas Reserves and Production Using a New Material Balance Equation*, from the proceedings of the 2001 International Coalbed Methane Symposium, Tuscaloosa, Alabama, available as Paper 0113.

**Summary:** Symposium Paper.

213. Clayton, J. L.; Rice, D. D.; and Stanton, R. W., 1992, *Geochemical and Geological Controls on Generation and Accumulation of Oil and Gas from Coalbeds, Western United States*, available from the American Association of Petroleum Geologists.

**Summary:** Conference Document.

214. Clayton, J. L.; Leventhal, J. S.; and Rice, D. D., 1995, *Atmospheric Methane Flux from Coals*, available from the United States Geological Survey as C 1108.

**Summary:** USGS Circular.

215. Clayton, J.; Rice, D. D.; Leventhal, J. S.; and Kotarba, M., 1998, *Atmospheric Methane Flux from Coals Related to Mining and Natural Geologic Processes*, from the 1998 annual meeting of the Geological Society of America, available from the GSA in Abstracts with Programs - Geological Society of America, 30 970.

**Summary:** GSA Conference Document.

216. Clayton, Jerry L., 1998, *Geochemistry of Coalbed Gas; a Review*, from International Journal of Coal Geology, available from the publisher, Elsevier.

**Summary:** Presents a review of the main aspects of coalbed gas geochemistry and advances in research.

217. Cleary, Michael P.; Barr, David T.; Wright, Timothy B., 1997, *Technology Transfer for Hydraulic Fracturing*, available from the Gas Technology Institute as GRI-98/0216.

**Summary:** This final report presents a listing of a technology transfer effort to implement stimulation concepts developed for the Gas Research Institute. Discusses the improvement of hydraulic fracturing operations, the development of computer-based monitoring systems and provides a detailed account of data from a large number of wells.

218. Close, J. C.; and Erwin, T. M., 1989, *Significance and Determination of Gas Content Data as Related to Coalbed Methane Reservoir Evaluation and Production Implications*, from the proceedings of the 1989 Coalbed Methane Symposium, Tuscaloosa, Alabama, available as Paper 8922.

**Summary:** Symposium Document.

219. Close, J. C.; Mavor, M. J.; and McBane, R. A., 1990, *Importance, Genesis and Recognition of Fracture Permeability in Fruitland Coalbed Methane Reservoirs of the Northern San Juan Basin, Colorado and New Mexico*, paper presented at the 1990 SPE/CIM International Technical Meeting, available from the Society of Petroleum Engineers as SPE paper 21593.

**Summary:** This SPE paper discusses the fracture permeability of the Fruitland Formation coalbed methane reservoirs in the San Juan Basin.

220. Close, J. C.; and Dutcher, R. R., 1990, *Prediction of Permeability Trends and Origins of Coalbed Methane Reservoirs of the Raton Basin, Colorado and New Mexico*, from the 41st Annual Field Conference of the New Mexico Geological Society, available from the New Mexico Geological Society.

**Summary:** NMGS Guidebook.

221. Close, J. C.; and Dutcher, R. R., 1990, *Update on Coalbed Methane Potential of Raton Basin, Colorado and New Mexico*, paper presented at the 1990 SPE Annual Technical Conference and Exhibition, available from the Society of Petroleum Engineers as SPE paper 20667.

**Summary:** This SPE paper provides an updated overview on coal seam natural gas potential in the Raton Basin.

222. Close, J. C.; and Mavor, M. J., 1991, *Influence of Coal and Rank on Fracture Development in Fruitland Coal Gas Reservoirs of San Juan Basin*, available from the Rocky Mountain Association of Geologists in Coalbed Methane of Western North America.

**Summary:** RMAG Report.

223. Close, J. C., 1992, *Western Cretaceous Coal Seam Project*, Quarterly Review of Methane from Coal Seams Technology, v. 10, no. 1, available from the publisher.

**Summary:** Report.

224. Close, J. C., 1993, *Natural Fractures in Coal*, available from the American Association of Petroleum Geologists in AAPG Studies in Geology, 38.

**Summary:** AAPG Report.

225. Close, J. C.; and Dutcher, R. R., 1993, *Process and Timing of Thermal Maturation in the Raton Basin, Colorado and New Mexico*, from the proceedings of the 1993 International Coalbed Methane Symposium, Birmingham, Alabama, available as Paper 9308.

**Summary:** Symposium Paper.

226. Close, J.; Woolverton, S.; and Swainson, K., 1997, *Non-Fairway, Underpressured Fruitland Coal Resource Characterization Study, Southern San Juan Basin, New Mexico*, from the proceedings of the 1997 International Coalbed Methane Symposium, Tuscaloosa, Alabama, available as Paper 9727.

**Summary:** Symposium Paper.

227. Close, J. C.; and Dutcher, R. R., 2002, *Geomorphology of Drainage Patterns: Clues to Coal Gas Natural Fracture Timing, Orientation and Location, Raton Basin, Colorado - New Mexico*, available from the Rocky Mountain Association of Geologists in Coalbed Methane of North America, II.

**Summary:** RMAG Report.

228. Clough, J. G., 2001, *Coalbed Methane - Potential Energy Source for Rural Alaska*, available from State of Alaska Division of Geological and Geophysical Surveys in Alaska GeoSurvey News, v. 5, no. 2.

**Summary:** Alaska DGGGS Publication.

229. Clough, J. G.; Barker, Charles E.; and Scott, A. R., 2001, *Opportunities for Coalbed Gas Exploration in Alaska*, available from the American Association of Petroleum Geologists.

**Summary:** This AAPG conference document presents facts and figures on the potential for production of Alaskan coal seam natural gas.

230. Coates, D. A., 1980, *Formation of Clinker by Natural Burning of Coal Beds in the Powder River Basin, Wyoming and Montana*, available from the Colorado Geological Survey.

**Summary:** CGS Report.

231. Coates, D. A.; Stricker, G. D.; and Landis, E. R., 1990, *Coal Geology, Coal Quality, and Coal Resources in Permian Rocks of the Beacon Supergroup, Transantarctic Mountains, Antarctica*, available from the publisher, American Geophysical Union, in Antarctic Research Series, 51.

**Summary:** AGU Report.

232. Cole, G. A.; Daniel, J. A.; Heald, B. P.; et al, 1981, *Oil and Gas Drilling and Coal Production Summary for Montana*, available from the Montana Bureau of Mines and Geology.

**Summary:** MBMG Publication.

233. Collett, Timothy S., 1999, *Composition and Source of the Gas Associated with Coalbed Gas Production from Coals in Eastern Utah*, available from the Geological Society of America.

**Summary:** Conference paper, which reports the findings of a USGS study of the geologic and engineering controls on gas production from coalbeds. These coalbeds are found in the Ferron Sandstone member of the Mancos Shale of eastern Utah. Presented at the 1999 annual meeting of the Geological Society of America.

234. Collins, Lesley, 1999, *Sheridan Area Coal Bed Methane Decision Record Available*, available from the Bureau of Land Management.

**Summary:** BLM Report.

235. Collins, Lesley, 1999, *Wyodak Area Coal Bed Methane Record of Decision Available*, available from the Bureau of Land Management.

**Summary:** BLM Report.



236. Colorado Geological Survey, 1980, *Evaluation of the Methane Potential of Unmined-Unminable Coalbeds in Colorado, Review of Coal Methane Resource for Western Basins*, from the U. S. Department of Energy.

**Summary:** DOE Report.

237. Colorado Geological Survey, 2000, *Coalbed Methane - Colorado's World Class Commodity*, from Rock Talk, v. 3, no. 3, available from the Colorado Geological Survey.

**Summary:** CGS Report.

238. Colorado Geological Survey, 2001, *Coal and Coalbed Methane in Colorado*, available from the Colorado Geological Survey as SP 51.

**Summary:** CGS Publication.

239. Colorado Geological Survey, 2001, *Coalbed Methane Potential in the Upper Cretaceous to Early Tertiary Laramie and Denver Formations, Denver Basin, Colorado*, available from the Colorado Geological Survey as OF 01-17.

**Summary:** CGS Publication.

240. Colorado Oil and Gas Conservation Commission, 2000, *Summary Report of Bradenhead Testing, Gas Well Remediation, and Ground Water Investigations; San Juan Basin, La Plata County, Colorado*, available online from the Colorado Oil and Gas Conservation Commission.

**Summary:** This report, prepared by the COGCC staff, summarizes the findings of an investigation into changes in the levels of methane in water from water wells in La Plata County, Colorado. The report compares methane levels in ground water prior to coalbed methane development with those after the beginning of development.

241. Combes, J. M.; Chaback, J. J.; Prasad, K. V. K.; and Seidle, J. P., *The Southern Boundary of the San Juan Basin Coalbed Methane High-Production Fairway, New Mexico, USA*, from the proceedings of the 1997 International Coalbed Methane Symposium, Tuscaloosa, Alabama, available as Paper 9772.

**Summary:** Symposium Paper.

242. Condon, S. M., 1999, *Fracture Patterns in the Ferron Sandstone Member of the Mancos Shale, Western San Rafael Swell and Eastern Wasatch Plateau, East-Central Utah*, from the proceedings of the 1999 Annual Meeting of the Geological Society of America, available from the Geological

Society of America.

**Summary:** GSA Meeting Document.

243. Conway, Michael W., 1994, *Is it Time to Put the Final Nail in the Fracking Coffin?*, from Quarterly Review of Methane from Coal Seams Technology, v. 11, no. 3, available from the publisher.

**Summary:** Article.

244. Conway, M. W.; and Schraufnagel, R. A., 1995, *The Effect of Fracturing Fluid Damage on Production from Hydraulically Fractured Wells*, from the proceedings of the 1995 International Unconventional Gas Symposium, Tuscaloosa, Alabama, available as Paper 9539.

**Summary:** Symposium Paper.

245. Conway, M. W.; Barree, R. D.; Hollingshead, C. Willis; and Farrens, M., 1997, *Characterization and Performance of Coalbed Methane Wells in Drunkards Wash, Carbon County, Utah*, from the proceedings of the 1997 International Coalbed Methane Symposium, Tuscaloosa, Alabama, available as Paper 9736.

**Summary:** Symposium Paper.

246. Cook, L., 2000, *Minerals Update: Overview and General Comments*, from Wyoming Geo-Notes, v. 67, available from the Wyoming State Geological Survey.

**Summary:** Report.

247. Cooper, J. D.; Decker, A. D.; Logan, T. L.; Schwoebel, J. J.; and Secombe, J. C., 1986, *Development and Evaluation of Technology for Methane Production from a Deep Coal Seam in the Piceance Basin*, available from the Gas Technology Institute as GRI-86/0069.

**Summary:** Reports on the findings of a six year multi-well project that sought to develop, improve, evaluate and communicate the technology required to produce natural gas from deep coal seams in the Piceance Basin.

248. Cooper, J. D.; Decker, A. D.; Logan, T. L.; and Schwoebel, Jeffrey J., 1996, *Development and Evaluation of Technology for Methane Production from a Deep Coal Seam in the Piceance Basin*, available from the Gas Technology Institute as GRI-86/0242.

**Summary:** Reports on the findings of a study on the effects of hydraulic fracturing on deep coal seams in the Piceance Basin.

249. Copard, Y.; Disnar, J. R.; and Becq-Giraudon, J. F., 2002, *Erroneous Maturity Assessment Given by Tmax and HI Rock-Eval Parameters on Highly Mature Weathered Coals*, from International Journal of Coal Geology, v. 49, no. 1, available from the publisher.

**Summary:** Article.

250. Counsil, J.; Decker, A. D.; Jeu, S. J.; and Logan, T. L., 1988, *Development and Evaluation of Technology for Methane Production from a Deep Coal Seam in the Piceance Basin*, available from the Gas Technology Institute as GRI-88/00235.

**Summary:** Reports on the findings of the GRI Deep Coal Seam Project. Data given on drilling, reservoir testing, core analysis, logging and stimulation of low permeability coal reservoirs in the Piceance Basin.

251. Counts, Richard A., 1989, *Legal Aspects of Coalbed Methane*, from the proceedings of the 1989 Coalbed Methane Symposium, Tuscaloosa, Alabama, available as Paper 8914.

**Summary:** Symposium Paper.

252. Cox, D. O.; Decker, A. D.; and Stevens, S. H., 1993, *Analysis of Fruitland Water Production, Treatment and Disposal, San Juan Basin*, available from the Gas Technology Institute as GRI-93/0288.

**Summary:** Report on study that investigated future water production in the San Juan Basin. The study identified alternative water treatment technologies, which might be competitive with underground disposal.

253. Cox, David O., 1993, *Coal-Seam Water Production and Disposal, San Juan Basin*, from Quarterly Review of Methane from Coal Seams Technology, v. 11, no. 2, available from the publisher.

**Summary:** Article.

254. Cox, D. O.; Stevens, S. H.; Hill, D. G.; and McBane, R. A., 1993, *Water Disposal from Coalbed Methane Wells in the San Juan Basin*, paper presented at the 1993 SPE Annual Technical Conference and Exhibition, available from the Society of Petroleum Engineers as SPE Paper 26384.

**Summary:** This SPE paper discusses the use of alternate treatment technologies for coal seam natural gas produced water in the San Juan Basin to make the water suitable for surface discharge.

255. Cox, D. O.; and Young, G. B. C., 1995, *Well Testing in Coalbed Methane (CBM) Wells: An Environmental Remediation Case History*, paper presented at the 1995 SPE Annual Technical

Conference and Exhibition, available from the Society of Petroleum Engineers as SPE Paper 30578.

**Summary:** This SPE paper discusses water contamination caused by methane seepage from coal seam natural gas wells in the San Juan Basin.

256. Cox, M. H.; and Groshong, R. H., 2000, *Relationship Between Fractures and the Structure in Coalbed-Methane Fields of Eastern Black Warrior Basin, Alabama*, from the proceedings of the 2000 Annual AAPG-SEPM Convention, New Orleans, Louisiana, available from the American Association of Petroleum Geologists.

**Summary:** AAPG Convention Document.

257. Cramer, D. G., 1992, *The Unique Aspects of Fracturing Western U.S. Coalbeds*, from Journal of Petroleum Technology, October 1992, available from the publisher.

**Summary:** Article.

258. Crist, T. E.; Kelso, B. S.; and Boyer, C. M., 1990, *Geologic Assessment of Natural Gas from Coal Seams in the Menefee Formation, San Juan Basin*, available from the Gas Technology Institute as GRI-88/0303.

**Summary:** This report presents the results of a regional geologic assessment of the Menefee formation in the San Juan basin.

259. Crosdale, P. J.; Beamish, B. B.; and Valix, M., 1998, *Coalbed Methane Sorption Related to Coal Composition*, from International Journal of Coal Geology, v. 35, available from the publisher.

**Summary:** Article.

260. Crosdale, P. J., 1999, *Mixed Methane/Carbon Dioxide Sorption by Coal: New Evidence in Support of Pore-Filling Models*, from the proceedings of the 1999 International Coalbed Methane Symposium, Tuscaloosa, Alabama, available from the University of Alabama.

**Summary:** Symposium Document.

261. Crovelli, Robert A.; Schmoker, James W.; and Balay, Richard H., 1995, *Fractal Lognormal Percentage Assessment of Technically Recoverable Natural Gas Resources in Continuous-type and Coalbed (Unconventional) Plays, Onshore and State Waters of the United States*, available from the United States Geological Survey as OF 95-0647.

**Summary:** USGS Open File Report.

262. Crovelli, Robert A.; Nuccio, Vito F., 1997, *Estimates of Technically Recoverable Natural Gas Resources for Continuous Type (Unconventional) Plays in Coal Beds on Federal Lands of the Conterminous United States*, available from the United States Geological Survey as OF 97-0491.

**Summary:** USGS Open File Report.

263. Crovelli, Robert A.; Schmoker, James A.; and Balay, Richard H., 1997, *U. S. Department of the Interior U.S. Geological Survey; Fractal Lognormal Percentage Analysis of the U.S. Geological Survey's 1995 National Assessment of Conventional Oil and Gas Reservoirs*, from Nonrenewable Resources, 6 (1), available from the publisher, Oxford University Press for the International Association for Mathematical Geology, New York.

**Summary:** Article.

264. Crovelli, Robert A.; Nuccio, Vito F., 1999, *USGS Resource Assessment Methodology for Technically Recoverable Coalbed Methane Applied to the Ferron Sandstone Trend*, from the GSA 1999 annual meeting, available from the Geological Society of America.

**Summary:** This conference report gives a description and application of a new method for resource assessment of recoverable coal seam natural gas.

265. Crowley, S. S.; Stanton, R. W.; Triplehorn, D. M.; and Ruppert, Leslie F., 1990, *Origin and Distribution of Inorganic Elements in the Wyodak-Anderson Coal Bed, Powder River Basin, Wyoming*, available from the United States Geological Survey as C 1060.

**Summary:** USGS Circular.

266. Crowley, S. S.; and Stanton, R. W., 1994, *Distribution of Environmentally Sensitive Trace Elements in the Coal Beds of the Powder River Basin, Wyoming and Montana*, available from the Society of Organic Petrology.

**Summary:** Society of Organic Petrology Report.

267. Culbertson, W. C.; Hatch, J. R.; and Affolter, R. H., 1978, *Geology and Coal Resources of the Hanging Woman Creek EMRIA Site, Big Horn and Powder River Counties, Montana*, available from the United States Geological Survey as OF 78-506.

**Summary:** USGS Open File Report.

268. Culbertson, W. C.; and Robinson, L. N., 1978, *Coal Resource Occurrence and Coal Development Potential Maps of the Quietus Quadrangle, Big Horn and Powder River Counties*,

*Montana*, available from the United States Geological Survey as OF 78-654.

**Summary:** USGS Open File Report.

269. Curl, S. J., 1978, *Methane Prediction in Coal Mines*, available from IEA Coal Research as Report no. ICTIS/TR 4.

**Summary:** IEA Coal Research Report.

270. Dabbous, M. K.; Reznik, A. A.; Taber, J. J.; and Fulton, P. F., 1992, *The Permeability of Coal to Gas and Water*, available from the Society of Petroleum Engineers in Reprint Series 35.

**Summary:** SPE Report.

271. Dallegge, T. A., 2000, *Coalbed Methane Assessment Using High-Resolution Chronostratigraphy, Vitrinite Reflectance and Burial History Modeling, Cook Inlet, Alaska*, from AAPG Foundation Grants-In-Aid Recipients for 2000, available from the American Association of Petroleum Geologists.

**Summary:** AAPG Publication.

272. Dallegge, Todd A.; and Barker, Charles E., 2000, *Coal-bed Methane Gas-In-Place Resource Estimates Using Sorption Isotherms and Burial History Reconstruction; An Example from Ferron Sandstone Member of the Mancos Shale*, available from the United States Geological Survey as P 1625-B.

**Summary:** USGS Professional Paper.

273. Dallegge, T. A.; and Barker, C. E., 2002, *Implications to Conventional Gas Reserve Growth of Coalbed Methane Desorption Analysis from the Beaver Creek and Kenai Gas Fields, Kenai Peninsula, Alaska*, available from the American Association of Petroleum Geologists in AAPG Bulletin, v. 86.

**Summary:** AAPG Bulletin.

274. Daly, D. J.; and Mesing, G., 1993, *Gas Industry-Related Produced-Water Demographics*, from Quarterly Review of Methane from Coal Seams Technology, v. 11, no. 2, available from the publisher.

**Summary:** Report.

275. Daly, Daniel J.; Stoa, Rodney S.; Bassingthwaite, Scott A.; Sorenson, James A.; Charlton, David S.; Mesing, George; and Evans, James M., 1995, *Gas Industry-Related Exploration and Production Waste "Demographics" Utilizing GIS*, available from the Society of Petroleum Engineers as Reprint 95-0007; SPE 29720.

**Summary:** This conference paper is an assessment of how natural gas produced waters were handled in the U. S. in 1990.

276. Damberger, H. H.; and Demir, I., 1999, *Coalbed and Coal Mine Methane in the Illinois Basin: Occurrence, Composition and Origin, and Current Activities*, from the proceedings of the 1999 American Chemical Society National Meeting, Anaheim, California.

**Summary:** American Chemical Society Meeting Document.

277. D'Amico, J. S., 2000, *Processing Key to CBM Economics*, from American Oil & Gas Reporter, v. 43, no. 8, available from the publisher.

**Summary:** Article.

278. Danell, R. E.; Kallstrand, A.; Nunn, J.; and Heed, B., 2001, *Reduction of Methane Emissions from Underground Coal Mining: Demonstration of Abatement and Utilization in Mine Ventilation Exhaust Air*, from the proceedings of the International Coalbed Methane Symposium, Tuscaloosa, Alabama.

**Summary:** Symposium Document.

279. Das, B. M.; Nikols, D. J.; Das, Z. U.; and Hucka, V. J., 1991, *Factors Affecting Rate and Total Volume of Methane Desorption from Coalbeds*, available from the Rocky Mountain Association of Geologists in Coalbed Methane of Western North America.

**Summary:** RMAG Report.

280. David, C., 1999, *This Land is Your Land, This Land is My Land: But Who Owns The Coal Gas?*

**Summary:** Paper.

281. Davidson, R. M.; Sloss, L. L.; and Clark, L. B., 1995, *Coalbed Methane Extraction*, from IEA Coal Research, available from the publisher as document IEACR/76.

**Summary:** Report.

282. Davies, A. W.; Isaac, A. K.; and Cook, P. M., 2000, *Investigation of a Coal-Mine Explosion and Relevance of Risk Assessment*, from International Mining and Minerals, v. 3, available from the publisher.

**Summary:** Article.

283. Davis, Hal A., 1993, *Coalbed Methane Produced Water Management Guide. Treatment and Discharge to Surface Water: Black Warrior Basin, Alabama*, available from the Gas Technology Institute as GRI-93/0116.

**Summary:** Report on a guidance manual for the management of water produced from wells in the Black Warrior Basin of Alabama.

284. Dawson, F. M., 1995, *Coalbed Methane: A Comparison Between Canada and the United States*, available from the Geological Survey of Canada as Bulletin 489.

**Summary:** GSC Bulletin.

285. Dawson, F. M., 1999, *Coalbed Methane Exploration in Structurally Complex Terrain*, available from Kluwer Academic Publishers, Boston.

**Summary:** Report.

286. Dawson, F. M.; Marchioni, D. L.; Anderson, T. C.; and McDougall, W. J., 2000, *An Assessment of Coalbed Methane Exploration in Canada*, available from the Geological Survey of Canada as Bulletin 549.

**Summary:** GSC Bulletin.

287. Dawson, F. M.; McDougall, W. J.; Anderson, T. C.; Pearson, D. E.; and Molnar, T. M., 2000, *National Coalbed Methane Database*, available as an Open-File Report from the Geological Survey of Canada.

**Summary:** GSC Open-File Report.

288. Dawson, M.; and Kalkreuth, W., 1994, *Coal Rank and Coalbed Methane Potential of Cretaceous/Tertiary Coals in the Canadian Rocky Mountain Foothills and Adjacent Foreland*, from Bulletin of Canadian Petroleum Geology, v. 42, available from the publisher.

**Summary:** Report.



289. DeBruin, Rodney H.; and Boyd, C. S., 1990, *Oil and Gas Fields of the Powder River Basin, Wyoming*, available from the Wyoming State Geological Survey.
- Summary:** WSGS Publication.
290. DeBruin, R. H.; Lyman, R. M.; and Hallberg, L. L., 1999, *Coalbed Methane Activity in the Eastern Powder River Basin, Campbell and Converse Counties, Wyoming*, available from the Wyoming State Geological Survey.
- Summary:** WSGS Publication.
291. DeBruin, R. H., 1999, *Oil and Gas Field Map of the Powder River Basin*, available from the Wyoming State Geological Survey.
- Summary:** WSGS Publication.
292. DeBruin, R. H.; Lyman, R. M.; and Hallberg, L. L., 2000, *Coalbed Methane Activity in the Eastern Powder River Basin, Campbell and Converse Counties, Wyoming*, available from the Wyoming State Geological Survey.
- Summary:** WSGS Publication.
293. DeBruin, R. H.; Lyman, R. M.; Hallberg, L. L.; and Harrison, M. M., 2000, *Coalbed Methane Activity in the Western Powder River Basin, Campbell, Converse, Johnson, Natrona, and Sheridan Counties, Wyoming*, available from the Wyoming State Geological Survey.
- Summary:** WSGS Publication.
294. DeBruin, R. H., 2000, *Oil and Gas Field Maps of Southeastern Wyoming Basins*, available from the Wyoming State Geological Survey.
- Summary:** WSGS Publication.
295. DeBruin, R. H.; Lyman, R. M.; Jones, R. W.; and Cook, L. W., 2001, *Coalbed Methane in Wyoming*, available from the Wyoming State Geological Survey as Information Pamphlet 7.
- Summary:** WSGS pamphlet that details the development of coal seam natural gas in the state of Wyoming.
296. DeBruin, R., 2002, *Oil and Gas Map of Central and Northwestern Wyoming Basins, Wyoming*,

available from the Wyoming State Geological Survey as MS-53.

**Summary:** WSGS Publication.

297. DeBruin, R., 2002, *Oil and Gas Map of the Greater Green River Basin and Overthrust Belt, Wyoming*, available from the Wyoming State Geological Survey as MS-52.

**Summary:** WSGS Publication.

298. DeBruin, R., 2002, *Oil and Gas Map of the Powder River Basin, Wyoming*, available from the Wyoming State Geological Survey as MS-51.

**Summary:** WSGS Publication.

299. DeBruin, R., 2002, *Oil and Gas Map of the Southwestern Wyoming Basins, Wyoming*, available from the Wyoming State Geological Survey as MS-54.

**Summary:** WSGS Publication.

300. Dea, P. A., 1999, *Barrett Realizes Powder River Potential*, from American Oil & Gas Reporter, v. 42, no. 12, available from the publisher.

**Summary:** Article.

301. Decker, A. D.; Logan, T. L.; Seccombe, J. C.; and Wilman, S. K., 1984, *Development and Evaluation of Technology for Methane Production from a Deep Coal Seam in the Piceance Basin*, available from the Gas Technology Institute as GRI-85/0076.

**Summary:** This GRI report discusses the findings of a six year multi-well project that sought to develop, improve, evaluate and communicate the technology required to produce natural gas from deep coal seams in the Piceance Basin.

302. Decker, A. D.; and Seccombe, J. C., 1986, *Geologic and Reservoir Characteristics of the Red Mountain Coalbed Methane Test Site in the Piceance Basin*, available from the Gas Technology Institute as GRI-86/0109.

**Summary:** This GRI topical report discusses the data from a six year multi-well project that focuses on the technology required to produce gas from deeply buried coal in the Piceance Basin.

303. Decker, David, 1987, *Coal Bed Methane; Dynamic New Segment of Petroleum Industry*,

available from the American Association of Petroleum Geologists.

**Summary:** AAPG Report.

304. Decker, A. D.; Klusman, R.; and Horner, D. M., 1987, *Geochemical Techniques Applied to the Identification and Disposal of Connate Coal Water*, from the proceedings of the 1987 Coalbed Methane Symposium, Tuscaloosa, Alabama, available as Paper 8746.

**Summary:** Symposium Paper.

305. Decker, A. D.; and Horner, D. M., 1987, *Origin and Production Implications of Abnormal Coal Reservoir Pressure*, from the proceedings of the International Coalbed Methane Symposium, Tuscaloosa, Alabama, available as Paper 8714.

**Summary:** Symposium Paper.

306. Decker, A. David; Kelso, B.S.; Kuuskraa, V.A.; and Wicks, D.E., 1988, *Geologic Assessment of Natural Gas from Coal Seams in the Fruitland Formation, San Juan Basin*, available from the Gas Technology Institute as GRI-87/0341.

**Summary:** This report discusses the gas-in-place in the Fruitland Formation coals in the San Juan Basin. Discusses the geology of the coal formation to provide a foundation for evaluating the coal seam natural gas in place.

307. Decker, D.; Jeu, S. J.; Cooper, J. D.; and Wicks, D. E., 1988, *Geology, Geochemistry, Reservoir Engineering, and Completion Methods at the Cedar Hill Field, San Juan County, New Mexico: A Field Study of Classic Coal Degasification Behavior*, available from the Rocky Mountain Association of Geologists in Rocky Mountain Association of Geologists Guidebook.

**Summary:** RMAG Report.

308. Decker, A. D.; Close, J.; and McBane, Richard A., 1989, *Use of Remote Sensing, Curvature Analysis, and Coal Petrology as Indicators of Higher Coal Reservoir Permeability*, available from the publisher, University of Alabama, School of Mines and Energy Development.

**Summary:** This conference paper evaluates techniques that can be used to predict the orientation and the location of areas with a greater natural gas from coal seams reservoir permeability prior to drilling. From data collected from the Fruitland formation in the Cedar Hill Field, northern San Juan Basin, New Mexico.

309. Decker, A. D.; Kuuskraa, V. A.; and Klawitter, A. L., 1995, *Structurally Controlled and Aligned*

*Tight Gas Reservoir Compartmentalization in the San Juan and Piceance Basins*, from the proceedings of the 1995 International Unconventional Gas Symposium, Tuscaloosa, Alabama, available as Paper 9564.

**Summary:** Symposium Paper.

310. Deeley, G. M.; and Canter, L. W., 1986, *Distribution of Heavy Metals in Waste Drilling Fluids Under Conditions of Changing pH*, from Journal of Environmental Quality, available from the publisher.

**Summary:** Article.

311. Deul, M.; and Kim, A. G., 1975, *Degasification of Coalbeds - A Commercial Source of Pipeline Gas*, presented at the Institute of Gas Technology Symposium on Clean Fuels from Coal II, available from the publisher.

**Summary:** Symposium Paper.

312. Deul, M.; and Kim, A. G., 1988, *Methane Control Research: Summary of Results, 1964-80*, U. S. Bureau of Mines Bulletin 687, available from the National Technical Information Service.

**Summary:** USBM Bulletin.

313. Diamond, W. P.; McCulloch, C. M.; and Bench, B. M., 1976, *Use of Surface Joint and Photolinear Data for Predicting Subsurface Coal Cleat Orientation*, U.S. Bureau of Mines Report of Investigations 8120, available from the National Technical Information Service.

**Summary:** USBM Report.

314. Diamond, W. P., 1979, *Evaluation of the Methane Gas Content of Coalbeds: Part of a Complete Coal Exploration Program for Health and Safety and Resource Evaluation*, from the proceedings of the Second International Coal Exploration Symposium.

**Summary:** Symposium Paper.

315. Diamond, W. P.; and Levine, J. R., 1981, *Direct Method Determinations of the Gas Content of Coal, Procedures and Results*, U. S. Bureau of Mines Report of Investigations 8515, available from the National Technical Information Service.

**Summary:** USBM Report.

316. Diamond, W. P., 1982, *Site-Specific and Regional Geologic Considerations for Coalbed Gas Drainage*, U.S. Bureau of Mines Information Circular 8898, available from the National Technical Information Service.
- Summary:** USBM Circular.
317. Diamond, W. P.; and Oyler, D. C., 1986, *Effects of Stimulation Treatments on Coalbeds and Surrounding Strata*, U. S. Bureau of Mines Report of Investigations 9083, available from the National Technical Information Service.
- Summary:** USBM Report.
318. Diamond, W. P.; LaScola, J. C.; and Hyman, D. M., 1986, *Results of Direct-Method Determination of the Gas Content of U.S. Coalbeds*, U.S. Bureau of Mines Information Circular 9067, available from the National Technical Information Service.
- Summary:** USBM Circular.
319. Diamond, W. P., 1987, *Characteristics of Fracture Geometry and Roof Penetrations Associated with Stimulation Treatments in Coalbeds*, from the proceedings of the 1987 Coalbed Methane Symposium, Tuscaloosa, Alabama, available as Paper 8752.
- Summary:** Symposium Paper.
320. Diamond, W. P., 1987, *Underground Observations of Mined-Through Stimulation Treatments of Coalbeds*, from the Quarterly Review of Methane from Coal Seams Technology, v. 4, no. 4, available from the publisher.
- Summary:** Article.
321. Diamond, W. P.; Elder, C. H.; and Jeran, P. W., 1988, *Influence of Geology on Methane Emission from Coal*, U.S. Bureau of Mines Bulletin 687, available from the National Technical Information Service.
- Summary:** USBM Bulletin.
322. Diamond, W. P.; Iannacchione, A. T.; Puglio, D. G.; and Steidl, P. F., 1988, *Geologic Studies of Gassy Coalbeds*, U.S. Bureau of Mines Bulletin 687, available from the National Technical Information Service.
- Summary:** USBM Bulletin.

323. Diamond, W. P.; Bodden W. R.; Zuber, M. D.; and Schraufnagel, R. A., 1989, *Measuring the Extent of Coalbed Gas Drainage After 10 Years of Production at the Oak Creek Pattern, Alabama*, from the proceedings of the 1989 Coalbed Methane Symposium, Tuscaloosa, Alabama, available as Paper 8961.

**Summary:** Symposium Paper.

324. Diamond, W. P.; Ulery, J. P.; and Raab, D. F., 1991, *Evaluation of the Source and Migration of Longwall Gob Gas - Lower Kittanning Coalbed, Cambria County, Pennsylvania*, from the proceedings of the 1991 Coalbed Methane Symposium, Tuscaloosa, Alabama, available as Paper 9111.

**Summary:** Symposium Paper.

325. Diamond, W. P.; Jeran, P. W.; and Trevits, M. A., 1993, *An Analysis of Production Trends and the Potential for Increasing Gas Flow from Longwall Gob Gas Vent Holes*, from the proceedings of the 1993 International Coalbed Methane Symposium, Birmingham, Alabama, available as Paper 9313.

**Summary:** Symposium Paper.

326. Diamond, W. P., 1993, *Methane Control for Underground Coal Mines*, available from the American Association of Petroleum Geologists in *AAPG Studies in Geology*, 38.

**Summary:** AAPG Report.

327. Diamond, W. P., 1994, *Methane Control for Underground Coal Mines*, U.S. Bureau of Mines Information Circular 9395, available from the National Technical Information Service.

**Summary:** USBM Circular.

328. Diamond, W. P.; Garcia, F.; Aul, G. N.; and Ray, R. E., 1997, *Influence of Mine Design on Longwall Methane Emissions and Gas Production from Methane-Drainage Boreholes*, from the proceedings of the 1997 International Coalbed Methane Symposium, Tuscaloosa, Alabama, available as Paper 9724.

**Summary:** Symposium Paper.

329. Diamond, W. P.; and Schatzel, S. J., 1998, *Measuring the Gas Content of Coal: A Review*, from *International Journal of Coal Geology*, v. 35, available from the publisher.

**Summary:** Article.

330. Diamond, W. P.; Schatzel, S. J.; Garcia, F.; and Ulery, J. P., 2001, *The Modified Direct Method: A Solution for Obtaining Accurate Coal Desorption Measurements*, from the proceedings of the International Coalbed Methane Symposium, Tuscaloosa, Alabama, available as Paper 128.

**Summary:** Symposium Paper.

331. Diessel, Claus, 1998, *Sequence Stratigraphy Applied to Coal Seams; Two Case Histories*, available from the Society of Sedimentary Geology.

**Summary:** Society of Sedimentary Geology Report.

332. Dighton, P. F., 2000, *Coal Seam Methane - Meeting the Requirements of Buyers, Financiers and Regulators*, from the proceedings of the 2000 Australian Petroleum Prod. Explor. Association Conference, Brisbane, Australia.

**Summary:** Conference Technical Paper.

333. Dixon, C. A., 1987, *Coalbed Methane - A Miner's Viewpoint*, from the proceedings of the 1987 Coalbed Methane Symposium, Tuscaloosa, Alabama, available as Paper 8704.

**Summary:** Symposium Paper.

334. Dobscha, F. X.; Headley, A. L.; Lambert, S. W.; Lanier, J. B.; Robb, J. C.; Saulsberry, J. L.; Spafford, S. D.; Steidl, P. F.; and Stubbs, P. B., 1990, *Rock Creek Methane from Multiple Coal Seams Completion Project: Rock Creek Coalbed Methane Data Summary*, available from the Gas Technology Institute as GRI-90/0091.

**Summary:** This GRI report discusses the geologic and reservoir characterization conducted at Rock Creek Multiple Coal Seam Completion Project.

335. Doelling, H. H.; Smith, A. D.; and Davis, F. D., 1979, *Methane Content of Utah Coals*, available from the Utah Geological and Mineralogical Survey as Special Studies 49.

**Summary:** UGMS Study.

336. Doll, T. E., 1999, *Coalbed Methane Well Drilling and Production Operations in the Powder River Basin, Wyoming*, from the proceedings of the 1999 International Coalbed Methane Symposium, Tuscaloosa, Alabama, available from the University of Alabama.

**Summary:** Symposium Paper.

337. Donovan, W. S., 2000, *Mudlogging Method Calculates Coalbed Gas Content*, from Oil & Gas Journal, v. 98, no. 7, available from the publisher.

**Summary:** Article.

338. Doscher, T. M.; Kuuskraa, V. A.; and Hammerschaib, E., 1981, *The Controlling Production Mechanism of Methane Gas from Coalbeds*, from Energy Sources, v. 5, available from the publisher.

**Summary:** Article.

339. Draffin, C. W.; et al, 1979, *Underground Coal Conversion - Program Description*, available from the U.S. Department of Energy as ET-0100.

**Summary:** DOE Paper.

340. Drottar, K. R.; Mount, D. R.; and Patti, S. J., 1989, *Biomonitoring of Coalbed Methane Produced Water from the Cedar Cove Degasification Field, Alabama*, available from the publisher, University of Alabama, School of Mines and Energy Development.

**Summary:** Conference paper from the 1989 Coalbed Methane Symposium.

341. Duigon, Mark T.; and Smigaj, Michael J., 1985, *First Report on the Hydrologic Effects of Underground Coal Mining in Southern Garrett County, Maryland*, available from the United States Geological Survey as Report of Investigations 41.

**Summary:** USGS Report.

342. Durucan, S.; Daltaban, T. S.; Shi, J. Q.; and Foley, L., 1993, *Permeability Characterization for Modelling Methane Flow in Coal Seams*, from the proceedings of the 1993 International Coalbed Methane Symposium, Birmingham, Alabama, available as Paper 9315.

**Summary:** Symposium Paper.

343. Durucan, S.; Daltaban, T. S.; Shi, J. Q.; and Wang, J. M., 1995, *Numerical Modelling and Verification of Stress and Pore Pressure Dependent Dynamic Permeability Behaviour of Coal Seams Around Wellbores*, from the proceedings of the 1995 International Unconventional Gas Symposium, Tuscaloosa, Alabama, available as Paper 9528.

**Summary:** Symposium Paper.



344. Echols, J. B., 2000, *Coalbed Methane: Louisiana's Unexplored Energy Resource*, available from Louisiana State University as Basin Research Institute Bulletin, v. 9.

**Summary:** BRI Bulletin.

345. Eddy, G.; Gillies, Alex; Lewis, K.; Lindeman, R. A.; and Snygg, Arnold, 1983, *Testing Requirements for Field Based Coalbed Methane Projects*, available from the Gas Technology Institute as GRI-83/0015.

**Summary:** This report discusses the planning materials relevant to defining the natural gas from coal seams.

346. Edgar, Thomas V.; and Case, James C., 2000, *Preliminary Hazards Report PHR 00-1; Pumping Induced Settlement of Aquifers*, available online from the Wyoming State Geological Survey.

**Summary:** Sets the theoretical and mathematical basis for the conclusions reached in *Subsidence Potential Related to Water Withdrawal in the Powder River Basin*, by Case, James C.; Edgar, Thomas V.; and De Bruin, Rodney H. (Listed above).

347. Elder, C. H.; and Duel, M., 1974, *Degasification of the Mary Lee Coalbed Near Oak Grove, Jefferson County, Alabama, By Vertical Borehole in Advance of Mining*, U. S. Bureau of Mines Report of Investigations 7968, available from the National Technical Information Service.

**Summary:** USBM Report.

348. Elder, C. H., 1977, *Effects of Hydraulic Stimulation on Coalbeds and Associated Strata*, U. S. Bureau of Mines Report of Investigations 8260, available from the National Technical Information Service.

**Summary:** USBM Report.

349. Ellard, J. S.; Roark, R. P.; and Ayers, W. B., 1992, *Geologic Controls on Coalbed Methane Production: An Example from the Pottsville Formation, Black Warrior Basin, Alabama, USA*, from the proceedings of the 1992 Symposium on Coalbed Methane Research and Development, available from James Cook University.

**Summary:** Symposium Paper.

350. Ellard, J. S.; Moffett, T. B.; and Litzinger, L. A., 1997, *Production-Related Causes of Scaling in Wells in the Cedar Cove and Oak Grove Coalbed Methane Fields of Central Alabama*, from the proceedings of the 1997 International Coalbed Methane Symposium, Tuscaloosa, Alabama, available

as Paper 9769.

**Summary:** Symposium Paper.

351. Ellis, M. S., 1989, *Geologic Map of the Powder River Basin and Surrounding Area, Wyoming, Montana, South Dakota*, available from the United States Geological Survey as MF-2095.

**Summary:** USGS Map.

352. Ellis, M. S.; and Colton, R. B., 1994, *Geologic Map of the Powder River Basin and Surrounding Area, Wyoming, Montana, South Dakota, North Dakota, and Nebraska*, available from the United States Geological Survey as I-2298.

**Summary:** USGS Map.

353. Ellis, M. S.; Keighin, C. W.; Gunther, G. L.; Flores, R. M.; Stricker, G. D.; Roberts, S. B.; Ochs, A. M.; and Bader, L. R., 1997, *Constraints on Coal Resource Estimation; A Depositional Perspective*, available from the publisher, Geological Society of America.

**Summary:** Conference document from the 1997 Annual Meeting of the GSA.

354. Ellis, Margaret S.; Gunther, Gregory L.; Flores, Romeo M.; Stricker, Gary D.; Ochs, Allan M.; and Schuenemeyer, John H., 1998, *Preliminary Report on Methodology for Calculating Coal Resources of the Wyodak-Anderson Coal Zone, Powder River Basin, Wyoming and Montana*, available from the United States Geological Survey as OF 98-0789-B.

**Summary:** USGS Open File Report.

355. Ellis, M. S.; Gunther, G. L.; Ochs, A. M.; Schuenemeyer, J. H.; Power, H. C.; Stricker, G. D.; and Blake, Dorsey, 1999, *Coal Resources, Greater Green River Basin, 1999 Resource Assessment of Selected Tertiary Coal Beds and Zones in the Northern Rocky Mountains and Great Plains Region*, available from the United States Geological Survey as P 1625-A.

**Summary:** USGS Paper.

356. Ellis, M. S.; Gunther, G. L.; Ochs, A. M.; Cararoc, V. V.; Schuenemeyer, J. H.; Power, H. C.; Stricker, G. D.; and Blake, Dorsey, 1999, *Coal Resources of the Hanna and Carbon Basins, 1999 Resource Assessment of Selected Tertiary Coal Beds and Zones in the Northern Rocky Mountains and Great Plains Region*, available from the United States Geological Survey as P 1625-A.

**Summary:** USGS Paper.

357. Ellis, M. S.; Gunther, G. L.; Ochs, A. M.; Roberts, S. B.; Wilde, Edith M.; Schuenemeyer, J. H.; Power, H. C.; Stricker, G. D.; and Blake, Dorsey, 1999, *Coal Resources, Powder River Basin, 1999 Resource Assessment of Selected Tertiary Coal Beds and Zones in the Northern Rocky Mountains and Great Plains Region*, available from the United States Geological Survey as P 1625-A.

**Summary:** USGS Paper.

358. Ellis, M. S.; Gunther, G. L.; Ochs, A. M.; Keighin, C. W.; Goven, G. E.; Schuenemeyer, J. H.; Power, H. C.; Stricker, G. D.; and Blake, Dorsey, 1999, *Coal Resources, Williston Basin, 1999 Resource Assessment of Selected Tertiary Coal Beds and Zones in the Northern Rocky Mountains and Great Plains Region*, available from the United States Geological Survey as P 1625-A.

**Summary:** USGS Paper.

359. Ellis, M. S.; Flores, R. M.; Ochs, A. M.; Stricker, G. D.; Gunther, G. L.; Rossi, G. S.; Bader, L. R.; Schuenemeyer, J. H.; and Power, H. C., 1999, *Gillette Coalfield, Powder River Basin; Geology, Coal Quality, Coal Resources, 1999 Resource Assessment of Selected Tertiary Coal Beds and Zones in the Northern Rocky Mountains and Great Plains Region*, available from the United States Geological Survey as P 1625-A.

**Summary:** USGS Paper.

360. Ellis, M. S.; Flores, R. M.; Ochs, A. M.; Stricker, G. D.; Gunther, G. L.; Rossi, G. S.; Bader, L. R.; Schuenemeyer, J. H.; and Power, H. C., 1999, *Sheridan Coalfield, Powder River Basin; Geology, Coal Quality, Coal Resources, 1999 Resource Assessment of Selected Tertiary Coal Beds and Zones in the Northern Rocky Mountains and Great Plains Region*, available from the United States Geological Survey as P 1625-A.

**Summary:** USGS Paper.

361. Ely, J.; Holditch, S. A.; and Carter, R. H., 1988, *Improved Hydraulic Fracturing Strategy for Fruitland Formation Coal-bed Methane Recovery, San Juan Basin, New Mexico and Colorado*, available from the publisher, Rocky Mountain Association of Geologists in Rocky Mountain Association of Geologists Guidebook.

**Summary:** RMAG Publication.

362. Ely, J. W.; and Holditch, S. A., 1990, *Fracturing Techniques Depend on Coal Seam Characteristics*, from Oil & Gas Journal, v. 88, no. 30, available from the publisher.

**Summary:** Article.

363. Ely, J. W.; Zbitowski, R. I.; and Zuber, M. D., 1990, *How to Develop a Coalbed Methane Prospect: A Case Study of an Exploratory Five-Spot Well Pattern in the Warrior Basin, Alabama*, from the proceedings of the 1990 SPE Annual Technical Conference, New Orleans, Louisiana, available from the Society of Petroleum Engineers as SPE Paper 20666.

**Summary:** SPE Conference Paper.

364. Ely, K. W.; and Bethard, R. C., 1989, *Controlling Underground Coal Mine Methane Gas Safety Hazards Through Horizontal & Vertical Degasification Operations*, from the proceedings of the 1989 Coalbed Methane Symposium, Tuscaloosa, Alabama, available as Paper 8941.

**Summary:** Symposium Paper.

365. Emerson, D. O.; Ganow, H. C.; Qualheim, B. J.; Snoeberger, D. F.; Stone, R., 1976, *Underground Coal Gasification in the Powder River Basin*, available from the publisher, the Wyoming Geological Association.

**Summary:** WGA Publication.

366. Enever, J.; and Hennig, A., 1997, *The Relationship Between Permeability and Effective Stress for Australian Coals and Its Implications with Respect to Coalbed Methane Exploration and Reservoir Modelling*, from the proceedings of the 1997 International Coalbed Methane Symposium, Tuscaloosa, Alabama, available as Paper 9722.

**Summary:** Symposium Paper.

367. Enever, J.; Casey, D.; and Bocking, M., 1999, *The Role of In-Situ Stress in Coalbed Methane Exploration*, available from the publisher, Kluwer Academic Publishers, Boston.

**Summary:** Report.

368. Engler, Tom; and Perry, Kent, 2002, *Creating a Roadmap for Unconventional Gas R & D*, from GasTIPS, v. 8, no. 4, available from the Gas Technology Institute.

**Summary:** Article.

369. The Environmental Protection Agency, 1995, *Economic Assessment of the Potential for Profitable Use of Coal Mine Methane: Case Studies of Three Hypothetical U.S. Mines*, available from the U.S. Environmental Protection Agency.

**Summary:** EPA Report.

370. The Environmental Protection Agency, 1996, *A Guide for Methane Mitigation Projects: Gas-to-Energy at Coal Mines*, available from the U.S. Environmental Protection Agency.

**Summary:** EPA Report.

371. The Environmental Protection Agency, 1997, *A Guide to Financing Coalbed Methane Projects*, available from the U.S. Environmental Protection Agency.

**Summary:** EPA Report.

372. The Environmental Protection Agency, 1997, *Identifying Opportunities for Coal Mine Methane Recovery at U.S. Coal Mines: Draft Profiles of Selected Gassy Underground Coal Mines*, available from the U.S. Environmental Protection Agency.

**Summary:** EPA Report.

373. The Environmental Protection Agency, 1998, *Legal Issues Related to Coalbed Methane Storage in Abandoned Coal Mines in Virginia, West Virginia, Pennsylvania, Utah, Colorado, and Alabama*, available from the Coalbed Methane Outreach Program of the U.S. Environmental Protection Agency as Document No. 60933.

**Summary:** EPA Report.

374. The Environmental Protection Agency, 1998, *Preliminary Report on Coal Resources of the Wyodak-Anderson Coal Zone, Powder River Basin, Wyoming and Montana*, available from the U.S. Environmental Protection Agency.

**Summary:** EPA Report.

375. The Environmental Protection Agency, 1999, *Environmental Protection with a Profit*, available from the Coalbed Methane Outreach Program of the U.S. Environmental Protection Agency.

**Summary:** EPA Report.

376. The Environmental Protection Agency, 1999, *Opportunities for Coal Mine Gas Projects Created by Electric Industry Restructuring*, available from the U.S. Environmental Protection Agency.

**Summary:** EPA Report.

377. The Environmental Protection Agency, 1999, *USEPA's Program to Regulate the Placement of*

*Waste Water and Other Fluids Underground*, available from the U.S. Environmental Protection Agency as EPA 810-F-99-019.

**Summary:** EPA Report.

378. The Environmental Protection Agency, 2000, *Technical and Economic Assessment: Mitigation of Methane Emissions from Coal Mine Ventilation Air*, available from the Coalbed Methane Outreach Program of the U.S. Environmental Protection Agency.

**Summary:** EPA Report.

379. The Environmental Protection Agency, 2002, *Draft Evaluation of Impacts to Underground Sources of Drinking Water by Hydraulic Fracturing of Coalbed Methane Reservoirs*, available from the U.S. Environmental Protection Agency, Office of Water, as EPA 816-D-02-006

**Summary:** EPA Report.

380. Ertekin, T.; Hoysan, P. M.; Pavone, A. M.; and Schwerer, F. C., 1983, *Development of Coal Gas Production Simulators and Mathematical Models for Well Test Strategies. (Literature Survey and Computer Models for Unstimulated Vertical Wells and for Stimulated Vertical Wells Connected to an Infinite-Conductivity-Constant Pressure-Vertical Fracture)*, available from the Gas Technology Institute as GRI-81/0160.

**Summary:** This GRI report discusses the WELL 1D computer program that is designed to simulate the nonsteady, one dimensional, simultaneous, two-phase flow of water and methane gas through a coal seam to an unstimulated vertical well or to a hydraulically stimulated vertical well connected to a high conductivity vertical fracture.

381. Ertekin, Turgay.; and King, G. R., 1983, *Development of Coal-Gas Production Simulators and Mathematical Models for Well Test Strategies. Computer Models for Single- or Two-Phase Flow of Methane and Water in Heterogeneous Coal Seams to a Single, Vertical Production Well Connected to a Finite Conductivity Vertical Fracture)*, available from the Gas Technology Institute as GRI-81/0173.

**Summary:** This GRI report discusses a series of computer based models for production of methane from coal seams by vertical wells.

382. Ertekin, Turgay, 1984, *Flow Dynamics of Coal-bed Methane in the Vicinity of Degasification Wells*, available from Pennsylvania State University.

**Summary:** Pennsylvania State University Publication.

383. Ertekin, T.; Sung, W.; and Bilgesu, H. I., 1991, *Structural Properties of Coal that Control Coalbed Methane Production*, from Geology in Coal Resource Utilization, available from the publisher, Techbooks, Fairfax, Virginia.

**Summary:** Report.

384. Esterle, J. S.; Kolastschek, Y.; and O'Brien, G., 2002, *Relationship Between In-Situ Coal Stratigraphy and Particle Size and Composition after Breakage in Bituminous Coals*, from International Journal of Coal Geology, v. 49, no. 2-3, available from the publisher.

**Summary:** Article.

385. Fahy, M. F., 1989, *Warrior Basin Coalbed Fractured Reservoir Characterization*, from the proceedings of the 1989 Coalbed Methane Symposium, Tuscaloosa, Alabama, available as Paper 8982.

**Summary:** Symposium Paper.

386. Farnell, S. K., 1987, *Who Owns the Gas in Coal? - A Legal Update*, from the proceedings of the 1987 Coalbed Methane Symposium, Tuscaloosa, Alabama, available as Paper 8705.

**Summary:** Symposium Paper.

387. Fassett, J. E.; and Hinds, J. S., 1971, *Geology and Fuel Resources of the Fruitland Formation and Kirtland Shale of the San Juan Basin, New Mexico and Colorado*, available from the United States Geological Survey as Professional Paper 676.

**Summary:** USGS Paper.

388. Fassett, J. E., 1987, *Geometry and Depositional Environments of Fruitland Formation Coalbeds, San Juan Basin, New Mexico and Colorado*, from the proceedings of the 1987 International Coalbed Methane Symposium, Tuscaloosa, Alabama, available as Paper 8712.

**Summary:** Symposium Paper.

389. Fassett, J. E. ed., 1988, *Geology and Coal-Bed Methane Resources of the Northern San Juan Basin, Colorado and New Mexico*, available from the Rocky Mountain Association of Geologists.

**Summary:** RMAG Guidebook.

390. Fassett, James E., 1989, *Coal-bed Methane; A Contumacious, Free-spirited Bride; The Geologic*

*Handmaiden of Coal Beds*, from Energy Frontiers in the Rockies, available from the publisher, Sandia National Laboratories, Albuquerque.

**Summary:** Report.

391. Fassett, J. E., 1989, *Coal-Bed Methane Resources and Fruitland Formation Coal-Bed Geology, San Juan Basin, New Mexico and Colorado*, available from the American Association of Petroleum Geologists in AAPG Bulletin, v. 73, no. 9.

**Summary:** AAPG Bulletin.

392. Fassett, James E., 1990, *Once a Menace, Now a Burgeoning Source of Energy; Coalbed Methane in the Warrior and San Juan Basins*, from the Sixth V.E. McKelvey Forum on Mineral and Energy Resources, available from the United States Geological Survey as C 1060.

**Summary:** USGS Conference Paper included in a USGS Circular.

393. Fassett, James E., 1997, *The Mystery of the Escaping Gas; Forensic Geology in the Northern San Juan Basin, La Plata County, Colorado*, available from the publisher, the American Association of Petroleum Geologists in the AAPG Bulletin.

**Summary:** Conference paper that discusses the role production of coalbed methane from wells close to and down dip from seep areas plays in the mobilization of the gas that is migrating up dip, thus increasing the rate of gas seepage from old seeps or creating new seeps.

394. Fassett, James E., 1997, *Subsurface Correlation of Late Cretaceous Fruitland Formation Coal Beds in the Pine River, Florida River, Carbon Junction, and Basin Creek Gas-Seep Areas, La Plata County, Colorado*, available from the United States Geological Survey as OF 97-0059.

**Summary:** USGS Open File Report.

395. Fassett, James E., 2001, *Competing Models for the Fruitland Formation Coal and Coal-bed Methane System of the San Juan Basin, New Mexico and Colorado*, from the 2001 Annual Meeting of the Geological Society of America, available from the GSA in Abstracts with Programs - Geological Society of America, 33 (6).

**Summary:** This GSA conference document discusses the differing models for the Fruitland Formation coal in the San Juan Basin.

396. Ferm, J. C.; Weisenfluh, G. A.; and Smith, G. C., 2002, *A Method for Development of a System of Identification for Appalachian Coal-Bearing Rocks*, from International Journal of Coal Geology,



v. 49, no. 2-3, available from the publisher.

**Summary:** Article.

397. Fender, H. B.; and Murray, D. K., 1978, *Data Accumulation on the Methane Potential of the Coal Beds of Colorado*, available from the Colorado Geological Survey as Open-File Report 78-2.

**Summary:** CGS Open-File Report.

398. Fields, H. H.; et al, 1973, *Degasification of Virgin Pittsburgh Coalbed Through a Large Borehole*, U. S. Bureau of Mines Report of Investigations 7800, available from the National Technical Information Service.

**Summary:** USBM Report.

399. Fields, H. H.; Cervik, J.; and Goodman, T. W., 1976, *Degasification and Production of Natural Gas from an Air Shaft in the Pittsburgh Coalbed*, U. S. Bureau of Mines Report of Investigations 8173, available from the National Technical Information Service.

**Summary:** USBM Report.

400. Fillo, John P.; Hamaker, T.; and O'Neil, Patrick E., 1987, *Coalbed Methane Development in Alabama: Biototoxicity of Produced Water Originating from Coalbed Degasification Wells in the Cedar Cove Field. A Proposed Study Plan*, available from the Gas Technology Institute as GRI-87/0102.

**Summary:** Proposed study plan, which outlines work elements and methodology for conducting field experiments at the Cedar Cove degasification field in Alabama. The proposed study would also include aquatic toxicity testing using a natural gas produced water, which was disposed of in the form of stream discharge.

401. Finch, Steven T., Jr., 1994, *Fracture and Methane-Contamination Study: Animas River Valley from Bondad, Colorado to Cedar Hill, New Mexico*, available from the Gas Technology Institute as GRI-93/0303.

**Summary:** Report on a study that investigated the potential causes of contamination found in the shallow groundwater of the Animas River Valley.

402. Finkelman, R. B., 1992, *Characteristics of Acid-Forming Materials in Coal*, from Montana Reclamation Research Publication.

**Summary:** Report.

403. Fischer, Dennis D., 1985, *Estimated Groundwater Restoration Costs Associated with Commercial Underground Coal Gasification Operations*, available from the Gas Technology Institute as GRI-85/0256.

**Summary:** This GRI report discusses the costs associated with groundwater restoration.

404. Fish and Wildlife Service, 2000, *Endangered and Threatened Wildlife and Plants; 12 Month Finding for a Petition to List the Black-tailed Prairie Dog as Threatened*, available from the U.S. Fish and Wildlife Service of the U.S. Department of the Interior.

**Summary:** U.S. Fish and Wildlife Service Report.

405. Flaherty, K. J., 2000, *Quandry or Quest: Problems of Developing Coalbed Methane as an Energy Resource*, from The Public Land and Resources Law Digest, v. 37, available from the publisher.

**Summary:** Article.

406. Flaim, S. J.; Hemphill, R. C.; and Cohn, J. E., 1987, *Economic Factors Affecting the Rate of Development of Coalbed Methane Resources*, from the proceedings of the 1987 Coalbed Methane Symposium, Tuscaloosa, Alabama, available as Paper 8734.

**Summary:** Symposium Paper.

407. Flores, R. M.; Rice, D. D.; and Gruber, J., 1991, *Coalbed Gas Potential and Reservoir Heterogeneity, Tertiary Fort Union Formation, Powder River Basin, Montana*, available from the American Association of Petroleum Geologists.

**Summary:** AAPG Report.

408. Flores, R. M.; Roberts, S. B.; Perry, W. J., Jr.; and Nichols, D. J., 1991, *Evolution of Paleocene Depositional Systems and Coal Basins in a Tectonic Continuum, Rocky Mountain Region*, from the 1991 meeting of the Geological Society of America, available from the GSA in Abstracts with Programs - Geological Society of America, 23 (4).

**Summary:** GSA Conference Document.

409. Flores, Romeo M., 1993, *Coalbed and Related Depositional Environments in Methane Gas-Producing Sequences*, available from the American Association of Petroleum Geologists in AAPG Studies in Geology, 38.

**Summary:** AAPG Report.

410. Flores, Romeo M., editor, 1998, *Coalbed Methane: From Coal-Mine Outbursts to a Gas Resource*, from International Journal of Coal Geology, available from the publisher, Elsevier.

**Summary:** Non-USGS publication by USGS authors.

411. Flores, Romeo M., 1998, *Coalbed Methane: From Hazard to Resource*, from International Journal of Coal Geology, available from the publisher, Elsevier.

**Summary:** Discusses how coalbed gas has gone from being a mining hazard to a conventional gas resource.

412. Flores, R. M.; Ochs, A. M.; Bader, L. R.; Johnson, R. C.; and Vogler, D., 1999, *Framework Geology of the Fort Union Coal in the Powder River Basin, 1999 Assessment of Selected Tertiary Coal Beds and Zones in the Northern Rocky Mountains and Great Plains Region*, available from the United States Geological Survey as P 1625-A.

**Summary:** USGS Paper.

413. Flores, R. M.; and Bader, L. R., 1999, *A Summary of Tertiary Coal Resources of the Raton Basin, Colorado and New Mexico*, available from the United States Geological Survey.

**Summary:** USGS Paper.

414. Flores, R. M., 2000, *Creation of Digital Databases and Derivative Products for Coal and Coalbed Methane Resource Assessment; A Short Course*, available from the United States Geological Survey as OF 00-0223.

**Summary:** USGS Open File Report.

415. Flores, R. M., 2000, *Geology and Coal Bed Methane Resources of the Fort Union Formation, Powder River Basin, Wyoming*, available from the Society of Economic Paleontologists and Mineralogists.

**Summary:** SEPM Paper.

416. Flores, R. M., 2001, *The Emerging New Coalbed Methane Resource in the Powder River Basin, Wyoming and Montana*, from the proceedings of the May 18, 2000, meeting of the Alaska Geological Society, Anchorage, available from the Alaska Geological Society.

**Summary:** AGS Conference Document.

417. Flores, Romeo M.; Stricker, Gary D.; Meyer, Joseph F.; Doll, Thomas E.; Norton, Pierce H., Jr.; Livingston, Robert J.; and Jennings, M. Craig, 2001, *A Field Conference on Impacts of Coalbed Methane Development in the Powder River Basin, Wyoming*, available online from the United States Geological Survey as Open File Report 01-126.

**Summary:** Report of some of the findings of a BLM-USGS cooperative CBM project. This joint project sought to collect technical data on CBM resources and reservoirs in the Powder River Basin.

418. Flores, Romeo M.; Moore, Timothy A.; Stanton, Ronald W.; and Stricker, Gary D., 2001, *Textural Controls on Coalbed Methane Content in the Subbituminous Coal of the Powder River Basin*, from the 2001 Annual Meeting of the Geological Society of America, Boston, available from the GSA in Abstracts with Programs - Geological Society of America, 33 (6).

**Summary:** This GSA conference document discusses the methane gas content in Powder River Basin coals.

419. Flowerday, C. F.; Kuzelka, R. D.; and Pederson, D. T., 1998, *The Ground Water Atlas of Nebraska*.

**Summary:** Ground water map of Nebraska.

420. Foh, S. E.; Hayden, C. G.; Randolph, P. L.; and Rose, R. E., 1983, *Selection of Drilling Fluids for Minimizing Coalbed Damage*, available from the Gas Technology Institute as GRI-83/0044.

**Summary:** Report of project designed to study the formation damage to coal seams caused by drilling fluids.

421. Forgotson, J. M.; and Friedman, S. A., 1993, *Arkoma Basin (Oklahoma) Coal-bed Methane Resource Base and Development*, from the Official Program of the American Association of Petroleum Geologists Annual Convention, available from the AAPG.

**Summary:** AAPG Conference Document.

422. Foster, James B., 1980, *Fresh and Saline Ground-Water Map of West Virginia*, available from the United States Geological Survey as Map WV-12.

**Summary:** USGS Map.

423. Foulds, G. A.; Rigby, G. R.; Kallstrand, A.; and Heed, B., 1999, *Reduction of Methane Emissions in Underground Coal Mining: The Missing Link - Utilization of the Methane in Mine Ventilation Air*, from the proceedings of the 1999 International Coalbed Methane Symposium, Tuscaloosa, Alabama, available from the University of Alabama.

**Summary:** Symposium Paper.

424. Friedman, S. A., 1974, *Investigation of the Coal Reserves in the Ozarks Section of Oklahoma and Their Potential Uses*, available from the Oklahoma Geological Survey as OGS Special Publication 74-2.

**Summary:** OGS Publication.

425. Friedman, S. A., 1982, *Determination of Reserves of Methane from Coal Beds for Use in Rural Communities in Eastern Oklahoma*, available from the Oklahoma Geological Survey as OGS Special Publication 82-3.

**Summary:** OGS Publication.

426. Friedman, S. A., 1982, *Map of Eastern Oklahoma Showing Locations of Active Coal Mines, 1977-1979*, available from the Oklahoma Geological Survey as Map GM-24.

**Summary:** OGS Map.

427. Friedman, S. A., 1982, *Map Showing Potentially Strippable Coal Beds in Eastern Oklahoma*, available from the Oklahoma Geological Survey as Map GM-23.

**Summary:** OGS Map.

428. Friedman, S. A., 1989, *Coal-bed Methane Resources in Arkoma Basin, Southeastern Oklahoma*, available from the American Association of Petroleum Geologists in [AAPG Bulletin](#), v. 73.

**Summary:** AAPG Bulletin.

429. Friedman, S. A., 1991, *Fracture and Structure of Principal Coal Beds Related To Coal Mining and Coalbed Methane, Arkoma Basin, Eastern Oklahoma*, from the Annual Convention of the American Association of Petroleum Geologists, Dallas, available from the AAPG.

**Summary:** AAPG Convention Document.

430. Friedman, S. A., 1997, *Coal-bed Methane Resources and Reserves of Osage County, Oklahoma*, available from the American Association of Petroleum Geologists in AAPG Bulletin, v. 81.

**Summary:** AAPG Bulletin.

431. Friedman, S. A., 1999, *Coal Geology and Underground-Mine Degasification Applied to Horizontal Drilling for Coalbed Methane*, from the 1999 AAPG Mid-Continent Section Meeting, Wichita, Kansas, available from the American Association of Petroleum Geologists in AAPG Bulletin, v. 83, no. 7.

**Summary:** AAPG Meeting Paper.

432. Friedman, S. A., 1999, *Coalbed Methane Production Shows Wide Range of Variability*, from Oil & Gas Journal, v. 97, no.17, available from the publisher.

**Summary:** Article.

433. FrontBurner, 1991, *Reservoir Modeling / A Bright Light for Coalbed Methane Production*, available from the publisher.

**Summary:** This journal article discusses the COMETPC-3 Reservoir Simulator developed for the Gas Research Institute by ICF Resources.

434. Fulton, P. F.; Parente, C. A.; Rogers, B. A.; Shah, N.; and Reznik, A. A., 1980, *A Laboratory Investigation of Enhanced Recovery of Methane from Coal by Carbon Dioxide Injection*, paper presented at the 1980 SPE/DOE Symposium on Unconventional Gas Recovery, available from the Society of Petroleum Engineers as SPE Paper 8930.

**Summary:** SPE Paper.

435. Gabello, D. P.; Hayoz, F. P.; and McCleary, J. G., 1983, *Dewatering Systems and Techniques*.

**Summary:** Report

436. Gaddy, D. E., 1999, *Coalbed Methane Production Shows Wide Range of Variability*, from Oil & Gas Journal, v. 97, no. 17, available from the publisher.

**Summary:** Article.

437. Gale, J.; and Freund, P., 2000, *Coal Bed Methane Enhancement with CO<sub>2</sub> Sequestration -*

*Worldwide Potential*, from the proceedings of the 2000 AAPG International Conference, Bali, Indonesia, available from the American Association of Petroleum Geologists in AAPG Bulletin, v. 84, no. 9.

**Summary:** AAPG Conference Paper.

438. Gale, J.; and Freund, P., 2000, *Geological Storage of CO<sub>2</sub>*, from the proceedings of the 2000 European Association of Geoscientists and Engineers Conference, Glasgow, Scotland, available as Paper B-17.

**Summary:** European Association of Geoscientists and Engineers Conference Paper.

439. Gamson, P. D.; Beamish, B. B.; and Johnson, D. P., 1993, *Coal Microstructure and Micropermeability and Their Effects on Natural Gas Recovery*, from Fuel, v. 72, available from the publisher.

**Summary:** Article.

440. Gamson, P. D.; Beamish, B. B.; and Johnson, D. P., 1996, *Coal Microstructure and Secondary Mineralization: Their Effect on Methane Recovery*, available from the Geological Society, London, as Special Publication 109.

**Summary:** Geological Society Report.

441. Gan, H. S.; Nandi, S. P.; and Walker, P. L., Jr., 1972, *Nature of Porosity in American Coals*, from Fuel, v. 51, available from the publisher.

**Summary:** Article.

442. Ganow, H. C., 1979, *In Situ Coal Gasification at the Hoe Creek, Wyoming, Field Site - An Overview*, available from the Wyoming Geological Association.

**Summary:** WGA Publication.

443. Garcia-Gonzalez, Mario; MacGowan, Donald B.; and Surdam, Ronald C., 1993, *Coal as a Source Rock of Petroleum and Gas; A Comparison Between Natural and Artificial Maturation of the Almond Formation Coals, Greater Green River Basin in Wyoming*, available from the United States Geological Survey as P 1570.

**Summary:** USGS Conference Document.

444. Garner, K., 1999, *Safety Management of Firedamp in Underground Coal Mines*, from International Mining and Minerals, v. 2, available from the publisher.

**Summary:** Article.

445. Garrison, James R., Jr.; van den Bergh, T. C. V.; Barker, Charles E.; and Tabet, David E., 1997, *Depositional Sequences Stratigraphy and Architecture of the Cretaceous Ferron Sandstone; Implications for Coal and Coalbed Methane Resources; A Field Excursion*, from Geology Studies, 42, Part 2, available from the publisher, Brigham Young University, Department of Geology, Provo, Utah.

**Summary:** Report.

446. Gas Research Institute, 1980, *Survey of Coal Industry Programs for Utilization of Methane from Coal Seams*, available from the Gas Technology Institute.

**Summary:** GRI Report.

447. Gas Research Institute, 1991, *Coalbed Methane Reservoir Simulators*, available from the Gas Technology Institute as GRI-91/0476.

**Summary:** This is a GRI brochure on the COMETPC 3-D Reservoir Simulator.

448. Gas Research Institute, 1991, *Selected Bibliography of Coalbed Methane Technology*, available from the Gas Technology Institute as GRI-91/0430.

**Summary:** List of publications that discuss coal seam natural gas and its technology.

449. Gas Research Institute, 1992, *Arkoma Basin, Oklahoma and Arkansas*, from Quarterly Review of Methane from Coal Seams Technology, v. 9, nos. 3-4, available from the publisher.

**Summary:** GRI Report.

450. Gas Research Institute, 1992, *Cherokee Basin, Kansas and Oklahoma*, from Quarterly Review of Methane from Coal Seams Technology, v. 9, nos. 3-4, available from the publisher.

**Summary:** GRI Report.

451. Gas Research Institute, 1993, *Western Interior Coal Region (Arkoma, Cherokee, and Forest City Basins)*, from Quarterly Review of Methane from Coal Seams Technology, v. 11, no. 1, available from



the publisher.

**Summary:** GRI Report.

452. Gas Research Institute, 1994, *Coalbed Methane: GRI Changes the Way Industry Does Business in Alabama*, available from the Gas Technology Institute as GRI-94/0475.

**Summary:** This brochure discusses GRI's role in transforming natural gas from coal seam production in Alabama.

453. Gas Research Institute, 1994, *Open-hole Cavity Completions, Fracturing, and Restimulation*, from Quarterly Review of Methane from Coal Seams Technology, v. 11, nos. 3-4, available from the publisher.

**Summary:** GRI Report.

454. Gas Research Institute, 1995, *Disposal Technology for Water Produced from Coalbed Methane Wells*, available from the Gas Technology Institute as GRI-95/0480.

**Summary:** Brochure that discusses cost effective handling and the environmentally responsible disposal of the water produced in association with the production of coal seam natural gas.

455. Gas Research Institute, 1996, *Geosciences: Accurately Estimating Coal Seam Reservoir Gas-In-Place*, from GRID, v. 19, no. 2, available from the Gas Technology Institute as GRI-96/0257-0013.

**Summary:** This article from GRID discusses the GRI program to evaluate the accuracy of analyzing and estimating gas-in-place.

456. Gas Research Institute, 1996, *Improved Coal Seam Reservoir Gas-In-Place Analysis Protocol*, available from the Gas Technology Institute as GRI-96/0481.

**Summary:** This GRI Bulletin discusses the development of a gas-in-place analysis protocol.

457. Gas Research Institute, 1999, *GRI Coalbed Methane Guides. Volume 1: Field Operations and Reservoir Engineering*, available from the Gas Technology Institute as GRI-98/0365.1.

**Summary:** This GRI computer file is a republication of GRI's coal seam gas guides. This volume contains "A Guide to Coalbed Methane Field Operations" (originally GRI-92/0234) and "A Guide to Coalbed Methane Reservoir Engineering" (originally GRI-94/0397).

458. Gas Research Institute, 1999, *GRI Coalbed Methane Guides. Volume 2: Determining Gas Content and Gas in Place Analysis*, available from the Gas Technology Institute as GRI-98/0365.2.

**Summary:** This GRI computer file is a republication of GRI's coal seam gas guides. This volume contains "A Guide to Determining Coalbed Gas Content" (originally GRI-94/0396) and "Coalbed Reservoir Gas-in-Place Analysis" (originally GRI-97/0263).

459. Gas Research Institute, 1999, *GRI's Gas Resource Database: Unconventional Natural Gas and Gas Composition Databases*, available from the Gas Technology Institute as GRI-98/0364.3.

**Summary:** This GRI computer file updates GRI's work in natural gas composition assessment and the unconventional gas resources of the U.S.

460. Gas Research Institute, 2000, *Coalbed Methane Potential of the U. S. Rocky Mountain Region*, available from the Gas Technology Institute.

**Summary:** GRI Publication.

461. Gas Research Institute, *Treating Produced Waters in the San Juan Basin With the Freeze-Thaw/Evaporation Process*, available online from the Gas Technology Institute.

**Summary:** This is a report on the development of a freeze-thaw/evaporation (FTE) purification process to treat produced water.

462. Gas Technology Institute, 2002, *Drilling and Production Statistics for Major U. S. Coalbed Methane and Gas Shale Reservoirs*, available from the Gas Technology Institute.

**Summary:** GTI Publication.

463. Gas Technology Institute, 2002, *Selected References: Unconventional Gas Resources*, available from the Gas Technology Institute.

**Summary:** GTI Publication.

464. Gaschnitz, R.; Kroos, B. M.; Littke, R.; Van Bergen, F.; Pagnier, H. J. M.; and David, P., 1999, *Adsorptive Gas Storage Capacity of Carboniferous Coals*, from the proceedings of the CSPG 1999 Carboniferous & Permian International Congress, Calgary, Canada, available from the Canadian Study of Parliament Group

**Summary:** CSPG Conference Paper.

465. Gaschnitz, R.; Kroos, B. M.; Buker, C.; and Littke, R., 2000, *Migration and Accumulation of Gas in OM (Organic Matter) Rich Strata During Basin Evolution: A Model of Dynamic Sorption*, from the proceedings of the 2000 Annual AAPG-SEPM Convention, New Orleans, Louisiana, available from the American Association of Petroleum Geologists as Paper Abstract P A53.

**Summary:** AAPG Convention Paper.

466. Gash, B. W., 1991, *Measurement of "Rock Properties" in Coal for Coalbed Methane Production*, available from the Society of Petroleum Engineers as SPE Paper 22909.

**Summary:** SPE Paper.

467. Gavin, Jeff, 1999, *Emerging Resources Development Guide to Underdeveloped Rocky Mountain Gas Plays*, from GasTIPS, v. 5, no. 3, available from the Gas Technology Institute.

**Summary:** Article.

468. Gayer, R.; and Harris, I., 1996, *Coalbed Methane and Coal Geology*, available from the Geological Society, London, as Special Publication 109.

**Summary:** Geological Society Report.

469. Gentzis, T., 2000, *Subsurface Sequestration of Carbon Dioxide - An Overview from an Alberta (Canada) Perspective*, from International Journal of Coal Geology, v. 43, available from the publisher.

**Summary:** Article.

470. George, J. D. St.; and Barakat, M. A., 2001, *The Change in Effective Stress Associated with Shrinkage from Gas Desorption in Coal*, from International Journal of Coal Geology, v. 45, available from the publisher.

**Summary:** Article.

471. Ghose, A. K.; and Dhar, B. B., 2000, *Mining; Challenges of the 21st Century*, available from A.P.H. Publishing Corporation, New Delhi, India.

**Summary:** Report.

472. Gilles, Alex; and Snygg, Arnold, 1981, *Development of Technology for Coal Bed Methane*

*Recovery Program Planning*, available from the Gas Technology Institute as GRI-81/0008.1.

**Summary:** This is a final report on an assessment of the suitability of production methods in the recovery of natural gas from coal seams. Discusses the fact that the most limiting technology is the stimulation of water and gas flow from deeper gassy coal formations.

473. Gilles, Alex; and Snygg, Arnold, 1981, *Development of Technology for Coalbed Methane Recovery Program Planning, Appendix A, Technology Options*, available from the Gas Technology Institute as GRI-81/0008.2.

**Summary:** Report that discusses the technology available for recovering coal seam natural gas. This report also includes: water quality data for mine drainage in the Appalachian Basin and information on methods for the treatment of coal seam water.

474. Gilman, A.; and Beckie, R., 2000, *Flow of Coal-Bed Methane to a Gallery*, from *Transp. Porous Media*, v. 41, no. 1, available from the publisher.

**Summary:** Article.

475. Giron., A.; Pavone, A. M.; and Schwerer, F. C., 1984, *Mathematical Models for Production of Methane and Water from Coal Seams*, from Quarterly Review of Methane from Coal Seams Technology, v. 1, no. 4, available from the publisher.

**Summary:** Article.

476. Glass, G. B., 1999, *Minerals Update*, from Wyoming Geo-Notes, v. 63, available from the Wyoming State Geological Society.

**Summary:** Article.

477. Glikson, M.; Boreham, C. J.; and Thiede, D. S., 1999, *Coal Composition and Mode of Maturation, a Determining Factor in Quantifying Hydrocarbon Species Generated*, available from the publisher, Kluwer Academic Publishers, Boston.

**Summary:** Report.

478. Gloyn, Robert W.; and Sommer, Steven N., 1993, *Exploration for Coalbed Methane Gains Momentum in Uinta Basin*, from Oil & Gas Journal, available from the publisher.

**Summary:** Article.

479. Gluskoter, Hal, 2001, *Coalbed Sequestration of Carbon Dioxide*, from the proceedings of the 2001 National Conference on Carbon Sequestration, available from the Department of Energy, National Energy Technology Laboratory.

**Summary:** NETL Conference Document.

480. Gognat, T. A., 1999, *Commercial Coal Gas Play Possible in Illinois Basin*, from the Oil & Gas Journal, v. 97, no. 26, available from the publisher.

**Summary:** Article.

481. Goktas, B.; and Ertekin, T., 1999, *A Competitive Analysis of the Production Characteristics of Cavity Completions and Hydraulic Fractures in Coalbed Methane Reservoirs*, from the proceedings of the 1999 SPE Rocky Mountain Regional Meeting, Gillette, Wyoming, available from the Society of Petroleum Engineers as Paper SPE 55600.

**Summary:** SPE Paper.

482. Goktas, B.; and Ertekin, T., 1999, *Development of a Local Grid-Refinement Technique for Accurate Representation of Cavity-Completed Wells in Reservoir Simulators*, from SPE Journal, v. 4, no. 3, available from the Society of Petroleum Engineers.

**Summary:** SPE Article.

483. Golding, S. D.; Baublys, K. A.; Glikson, M.; Uysal, I. T.; and Boreham, C. J., 1999, *Source and Timing of Coal Seam Gas Generation in Bowen Basin Coals*, from Coalbed Methane: Scientific, Environmental and Economic Evaluation, available from the publisher.

**Summary:** Report.

484. Golding, S. D., 2001, *4-D Permeability Characterization of Coal Enhances Exploration and Production of CBM*, from the proceedings of the 2001 International Coalbed Methane Symposium, Tuscaloosa, Alabama, available as Paper 0151.

**Summary:** Symposium Paper.

485. Goldhaber, M. B.; Hatch, J. R.; Pashin, J. C.; Offield, T. W.; and Finkelman, R. B., 1997, *Anomalous Arsenic and Fluorine Concentrations in Carboniferous Coal, Black Warrior Basin, Alabama; Evidence for Fluid Expulsion During Alleghanian Thrusting?*, from the 1997 Annual Meeting of the Geological Society of America, available from the Geological Society of America.

**Summary:** Report on the arsenic and fluorine content of Pennsylvanian age coals from the Warrior Basin of northwestern Alabama.

486. Gong, J.; and Ou, M., 1999, *Open Another Window for Oil and Gas Exploration*, from the 35th Session of the Coordinating Committee for Coastal and Offshore Geoscience Programmes in East and Southeast Asia (CCOP), available from CCOP as Technical Reports , v. 35.

**Summary:** CCOP Meeting Document.

487. Goolsby, Jim E.; Finley, Andrew K., 2000, *Correlation of Fort Union Coals in the Powder River Basin, Wyoming: A Proposed New Concept*, from Wyoming Geological Association 51st Field Conference Guidebook, Classical Wyoming Geology in the New Millennium, Casper, Wyoming, available from the Wyoming Geological Association.

**Summary:** WGA Document.

488. Gorody, Anthony, 1998, *Mineral-catalyzed Formation of Natural Gas During Coal Maturation*, published by the American Association of Petroleum Geologists and the Society of Economic Paleontologists and Mineralogists, available from AAPG.

**Summary:** AAPG / SEPM Report.

489. Gorody, Anthony, 1998, *Using Temporal Changes in Produced Water Geochemistry as a Guide to Assess Reservoir Compartmentation in Coal Bed Methane Reservoirs*, published by the American Association of Petroleum Geologists and the Society of Economic Paleontologists and Mineralogists, available from the AAPG.

**Summary:** AAPG / SEPM Report.

490. Gorody, A. W., 2000, *Observing Fluid Flow Patterns and Compartmentation in Coalbed Methane Reservoirs: Lessons from the San Juan Basin*, from the proceedings of the 2000 Annual AAPG-SEPM Convention, New Orleans, Louisiana, available from the American Association of Petroleum Geologists as Paper Abstract P A 167.

**Summary:** AAPG / SEPM Report.

491. Gossling, J. M., 1994, *Coalbed Methane Potential of the Hartshorne Coals in Parts of Haskell, Latimer, LeFlore, McIntosh, and Pittsburg Counties, Oklahoma*, unpublished M.S. Thesis, University of Oklahoma.

**Summary:** Master' s Thesis.

492. Goto, S.; Nishi, Y.; Nakayma, S.; and Ono, Y., 2001, *Advanced Gas Engine Fuelled by Coal Seams Methane Gas*, from the proceedings of the 2001 International Coalbed Methane Symposium, Tuscaloosa, Alabama, available from the University of Alabama.

**Summary:** Symposium Paper.

493. Grau, R. H., III; and LaScola, J. C., 1984, *Methane Emissions from U. S. Coal Mines in 1980*, U. S. Bureau of Mines Information Circular 8987, available from the National Technical Information Service.

**Summary:** USBM Circular.

494. Grau, R. H., III, 1986, *Results of an Eight Year Methane Drainage Project from Horizontal Holes in the Pittsburgh Coalbed*, from presentation at Pittsburgh Coalbed Methane Forum.

**Summary:** Convention Presentation.

495. Grau, R. H., III; and Baker, E., 1987, *Economic Evaluation of Horizontal Borehole Drilling For Methane Drainage from Coalbeds*, from the proceedings of the 1987 Coalbed Methane Symposium, Tuscaloosa, Alabama, available as Paper 8756.

**Summary:** Symposium Paper.

496. Gray, I., 1987, *Reservoir Engineering in Coal Seams: Part I - The Physical Process of Gas Storage and Movement in Coal Seams*, available from the Society of Petroleum Engineers in SPE Reservoir Engineering, v. 2.

**Summary:** SPE Report.

497. Greb, S. F.; Eble, C. F.; Hower, J. C.; and Andrews, W. M., 2002, *Multiple-Bench Architecture and Interpretations of Original Mire Phase-Examples from the Middle Pennsylvanian of the Central Appalachian Basin, USA*, from International Journal of Coal Geology, v. 49, no. 2-3, available from the publisher.

**Summary:** Article.

498. GRID, 1990, *Gas Supply: Coalbed Methane Research Extends to Appalachian Basin*, from Grid, v. 13, no. 1, available from the publisher, the Gas Technology Institute.

**Summary:** This journal article discusses GRI sponsored research into the development of technology for use in the Appalachian Basin.

499. Griebing, Richard T., 2001, *The Orderly Development of Coalbed Methane Resources from Public Lands - Experience from Coalbed Methane Development in Colorado*, testimony before the Subcommittee on Energy and Mineral Resources of the Committee on Resources of the House of Representatives on September 6, 2001, available online from the Resources Committee of the U. S. House of Representatives.

**Summary:** Mr. Griebing is Director of the Colorado Oil & Gas Conservation Commission. His testimony included: the history and status of CBM development in Colorado; a discussion of methane gas found in the groundwater in the Colorado portion of the San Juan Basin; an explanation of the difference between biogenic and thermogenic methane gas; and discussion of the “3M” Project.

500. Griff, M. T., 1995, *Recent Federal Initiatives to Promote Unconventional Gas: High Octane Delivery or Just Hot Air?*, from the proceedings of the 1995 International Unconventional Gas Symposium, Tuscaloosa, Alabama, available as Paper 9513.

**Summary:** Symposium Paper.

501. Gritsenko, A. I.; Akopova, G. S.; and Amelin, A. V., 2001, *Technical Decisions on Ecological Safety Ensuring at Constructing and Maintaining the Gas Main-Line Russia-Turkey*, from the proceedings of the 2001 International Coalbed Methane Symposium, Tuscaloosa, Alabama, available from the University of Alabama.

**Summary:** Symposium Paper.

502. Grossman, E. L.; Coffman, B. K.; Fritz, S. J.; and Wada, H., 1989, *Bacterial Production of Methane and Its Influence on Ground-Water Chemistry in East Central Texas Aquifers*, from Geology, v. 17, available from the publisher.

**Summary:** Article.

503. Grout, M. A., 1991, *Cleats in Coalbeds of Southern Piceance Basin, Colorado-Correlation with Regional and Local Fracture Sets in Associated Clastic Rocks*, available from the Rocky Mountain Association of Geologists in Coalbed Methane of Western North America.

**Summary:** RMAG Report.

504. Gulley, David D.; Mount, David R.; Hockett, James R.; and Bergman, Harold L., 1992, *Statistical Model to Predict Toxicity of Saline Produced Waters to Freshwater Organisms*, available from the publisher, Plenum Press, New York, N. Y.

**Summary:** This conference paper discusses research conducted on the concentration of salinity in produced water discharged to surface waters, and how these inorganic ions can be toxic to the



freshwater organisms traditionally used for biomonitoring.

505. Gurba, L. W.; and Weber, C. R., 2001, *The Relevance of Coal Petrology to Coalbed Methane Evaluation, Using the Gloucester Basin, Australia as a Model*, from the proceedings of the 2001 International Coalbed Methane Symposium, Tuscaloosa, Alabama, available as Paper 0147.

**Summary:** Symposium Paper.

506. Gurney, J., 2000, *Ample Reserves but Poor Prospects for U.S. Oil and Gas*, from Petroleum Review, v. 54, no. 636, available from the publisher.

**Summary:** Article.

507. Gwynn, J. Wallace, 1998, *Potential Mineral Precipitation and Water Compatibilities Related to the Drunkards Wash Project, Carbon County, Utah*, available from the United States Geological Survey as Report of Investigations 241.

**Summary:** USGS Report.

508. Hallinger, Donald E., 1991, *Coal-bed Methane; An Unconventional But Viable Source of Natural Gas*, available from the American Association of Petroleum Geologists.

**Summary:** AAPG Report.

509. Hamilton, D. S., 1993, *Stratigraphy and Distribution of Coal in the Upper Cretaceous Mesaverde Group, Sand Wash Basin, Colorado and Wyoming*, from the proceedings of the 1993 International Coalbed Methane Symposium, Birmingham, Alabama, available as Paper 9324.

**Summary:** Symposium Paper.

510. Hanshaw, P. M., ed., 1989, *Coal and Hydrocarbon Resources of North America; Volume 1: Coal, Uranium, and Oil and Gas in Mesozoic Rocks of the San Juan Basin; Anatomy of a Giant Energy-Rich Basin, Field Trips for the 28th International Geological Congress*, available from the American Geophysical Union.

**Summary:** Conference Presentation.

511. Hanson, Merle; and Thorson, Lew, 1983, *Hydraulic Fracture Model Development for Application to Design Hydraulic Fracture Treatments for Enhancing Methane Production from Coal*, from Quarterly Review of Methane from Coal Seams Technology, v. 1, no. 3, available from the

publisher.

**Summary:** Article.

512. Hanson, M. E.; Neilsen, P. E.; Sorrels, G. G.; Boyer, C. M.; and Schraufnagel, R. A., 1987, *Design, Execution, and Analysis of a Stimulation to Produce Gas from Thin Multiple Coal Seams*, from the proceedings of the 1987 Annual Technical Conference and Exhibition of the Society of Petroleum Engineers, available as SPE Paper 16860.

**Summary:** SPE Paper.

513. Hanson, M.E.; Mavko, B.B.; and Thorson, L.D., 1985, *Development of Hydraulic Fracturing Models for Application to Coal Seam Methane Drainage*, available from the Gas Technology Institute as GRI-85/0073.

**Summary:** This is the final report on the development of a three-dimensional hydraulic fracturing model for stimulating methane production from coal seams.

514. Hanson, M.E.; Mavko, B.B.; and Nielsen, P.E., 1989, *Three-Dimensional Hydraulic Fracture Model Development for Application to and Understanding of Coal Bed Methane Stimulation Treatments*, available from the Gas Technology Institute as GRI-89/0039.

**Summary:** This is the final report on development of a three-dimensional model that simulates hydraulically driven fracturing as applied to the drainage of methane from coal seams.

515. Harpalani, Satya; and McPherson, Malcolm J., 1985, *Effect of Stress on Permeability of Coal*, from Quarterly Review of Coalbed Methane Coal Seams Technology, v. 3, no. 2, available from the publisher.

**Summary:** Article.

516. Harpalani, S., 1987, *Overview of an Experimental Investigation to Determine Reservoir Characteristics*, from the proceedings of the 1987 Coalbed Methane Symposium, Tuscaloosa, Alabama, available as Paper 8741.

**Summary:** Symposium Paper.

517. Harpalani, S.; and Zhao, X., 1989, *An Investigation of the Effect of Gas Desorption on Coal Permeability*, from the proceedings of the 1989 International Coalbed Methane Symposium, Tuscaloosa, Alabama, available as Paper 8923.

**Summary:** Symposium Paper.

518. Harpalani, Satya, 1989, *Permeability Changes Resulting from Gas Desorption*, available from the Gas Technology Institute as GRI-89/0219.

**Summary:** This GRI report discusses coal permeability and gas desorption.

519. Harpalani, S.; and Schraufnagel, R., 1990, *Shrinkage of Coal Matrix with Release of Gas and Its Impact on Permeability of Coal*, from Fuel, v. 69, available from the publisher.

**Summary:** Article.

520. Harpalani, S.; and Zhao, X., 1991, *Microstructure of Coal and Its Influence on Flow of Gas*, from Energy Sources, v. 13, available from the publisher.

**Summary:** Article.

521. Harpalani, S.; and Chen, G., 1992, *Effect of Gas Production on Porosity and Permeability of Coal*, from the proceedings of the Symposium on Coalbed Methane, Townsville, Australia.

**Summary:** Symposium Paper.

522. Harpalani, S.; Chen, G., 1993, *Gas Slippage and Matrix Shrinkage Effects on Coal Permeability*, from the proceedings of the 1993 International Coalbed Methane Symposium, Tuscaloosa, Alabama, available as Paper 9325.

**Summary:** Symposium Paper.

523. Harpalani, S.; and Chen, G., 1997, *Influence of Gas Production Induced Volumetric Strain on Permeability of Coal*, from Geotechnical Geological Engineering, v. 15, available from the publisher.

**Summary:** Article.

524. Harpalani, S., 1999, *Compressibility of Coal and Its Impact on Gas Production from Coalbed Reservoirs*.

**Summary:** Report.

525. Harpalani, S.; and Ouyang, S., 1999, *A New Laboratory Technique to Estimate Gas Diffusion*

*Characteristics of Coal*, from the proceedings of the 1999 International Coalbed Methane Symposium, Tuscaloosa, Alabama, available from the University of Alabama.

**Summary:** Symposium Paper.

526. Harper, D., 1991, *Coalbed Methane in Indiana*, available from the Indiana Geological Survey as Occasional Paper 56.

**Summary:** Indiana Geological Survey Paper.

527. Harris, Ray E.; DeBruin, Rodney H.; and Jones, Richard W., 1992, *Resources in Sedimentary Rocks of the Powder River Basin and Adjacent Uplifts, Northeastern Wyoming*, available from the United States Geological Survey as B 1917-N.

**Summary:** This USGS report discusses the minerals deposits of the Powder River Basin.

528. Harris, Steven C.; Mettee, Maurice F.; and O'Neil, Patrick E., 1987, *Coalbed Methane Development in Alabama: Biological and Hydrological Conditions of Streams Draining the Cedar Cove Degasification Field*, available from the Gas Technology Institute as GRI-87/0038.

**Summary:** This GTI report discusses the impact of produced water from coal seam gas wells in the Cedar Cove field on streams in the surrounding area.

529. Harrison, M. M., 1999, *Coalbed Methane Activity in the Western Powder River Basin, Campbell, Johnson, and Sheridan Counties, Wyoming*, available from the Wyoming State Geological Survey.

**Summary:** WSGS Publication.

530. Harrison, S. M.; Molson, J. W.; Abercrombie, H. J.; Barker, J. F.; Rudolph, D.; and Aravena, R., 2000, *Hydrogeology of a Coal-Seam Gas Exploration Area, Southeastern British Columbia: Part I. Groundwater Flow Systems*, available from the publisher.

**Summary:** Report.

531. Harrison, S.; and Barker, J. F., 2000, *The Jurassic Cretaceous Mist Formation Coalseam Gas Origin and Reservoir Rock Characteristics*, from the proceedings of the 51st Annual Canadian Institute of Mining, Metallurgy and Petroleum, Petroleum Society Technical Meeting, Calgary, Canada, available as Paper CIM 2000-57.

**Summary:** Canadian Institute of Mining, Metallurgy and Petroleum Meeting Paper.

532. Harvey, P. J., 2000, *Underexplored Petroleum Potential Onshore Nova Scotia - A New Cycle of Exploration Activity*, from the proceedings of the 2000 AAPG East Section Meeting, London, Ontario, Canada, available from the American Association of Petroleum Geologists in AAPG Bulletin, v. 84, no. 9.

**Summary:** AAPG Report.

533. Hatch, J. R., 1992, *Hydrocarbon Source-rock Evaluation of Desmoinesian (Middle Pennsylvanian) Coals from Part of the Western Region of the Interior Coal Province, U.S.A.*, from the 1992 Annual Convention Official Program of the American Association of Petroleum Geologists, available from AAPG.

**Summary:** AAPG Convention Document.

534. Hawkins, W. B.; Groshong, R. H.; and Pashin, J. C., 1999, *Normal Faults Along the Southwestern Margin of the Alabama Promontory; Multiple Episodes of Paleozoic Activity*, from the proceedings of the 1999 GSA Annual Meeting, available from the Geological Society of America in Abstract with Programs, v. 31.

**Summary:** GSA Report.

535. Hayes, Thomas C., *Drillers Find Coalbeds Yield Gas and Profits*, from the New York Times, available from the publisher.

**Summary:** Article.

536. Haynes, C. D.; and Hanby, K. P., 1995, *Evolution of Severance Tax Policy by Litigation: The Coalbed Methane Industry vs. The State of Alabama*, from the proceedings of the 1995 International Unconventional Gas Symposium, Tuscaloosa, Alabama, available as Paper 9552.

**Summary:** Symposium Paper.

537. Haynes, C. D., 1999, *Appraisal of Coalbed Methane Resources in an Underground Mining Environment*, from the proceedings of the 1999 International Coalbed Methane Symposium, Tuscaloosa, Alabama, available from the University of Alabama.

**Summary:** Symposium Paper.

538. Heffern, Edward L.; and Coates, Donald A., 1996, *Burning Coal Beds and Clinker in the Powder River Basin*, from The Contact, 43, (1), Casper, Wyoming, available from the publisher, Wyoming Geological Association.

**Summary:** WGA Report.

539. Heim, R. N.; and Van Kirk, C. W., 1995, *Integrated Three-Dimensional Seismic and Three-Dimensional Reservoir Flow Simulation Exposes the Effects of Faulting on Coal Gas Production at Cedar Hill*, from the proceedings of the 1995 SPE Annual Technical Conference and Exhibition, Dallas, Texas, available from the Society of Petroleum Engineers as SPE Paper 20735.

**Summary:** SPE Paper.

540. Hemborg, H. T., 1998, *Spanish Peak Field, Las Animas County, Colorado: Geologic Setting and Early Development of a Coalbed Methane Reservoir in the Central Raton Basin*, available from the Colorado Geological Survey in Resource Series 33.

**Summary:** CGS Report.

541. Hemish, LeRoy A., 1986, *Coal Geology of Craig County and Eastern Nowata County, Oklahoma*, available from the Oklahoma Geological Survey as Bulletin 140.

**Summary:** OGS Bulletin.

542. Hemish, LeRoy A., 1986, *Coal Resources in Southeastern Pontotoc County, Oklahoma*, available from the Oklahoma Geological Survey in Oklahoma Geology Notes, v. 46, no. 1.

**Summary:** OGS Report.

543. Hemish, LeRoy A., 1986, *Stratigraphy of the Lower Part of the Boggy Formation (DesMoinesian) in Northeastern Muskogee and Southwestern Wagoner Counties, Oklahoma*, available from the Oklahoma Geological Survey in Oklahoma Geology Notes, v. 46, no. 5.

**Summary:** OGS Report.

544. Hemish, LeRoy A., 1987, *Names of Coal Beds in the Northeastern Oklahoma Shelf Area*, available from the Oklahoma Geological Survey in Oklahoma Geology Notes, v. 47, no. 3.

**Summary:** OGS Report.

545. Hemish, LeRoy A., 1988, *Coalescence of the Secor and Secor Rider Coal Beds in the Shady Grove Creek Area, Northeastern McIntosh County, Oklahoma, with Interpretations Concerning Depositional Environments*, available from the Oklahoma Geological Survey in Oklahoma Geology Notes, v. 48, no. 3.

**Summary:** OGS Report.

546. Hemish, LeRoy A., 1988, *Report of Core-Drilling by the Oklahoma Geological Survey in Pennsylvanian Rocks of the Northeastern Oklahoma Coal Belt, 1983-86*, available from the Oklahoma Geological Survey as Special Publication 88-2.

**Summary:** OGS Publication.

547. Hemish, LeRoy A.; and Beyma Kenneth N., 1988, *A Stratigraphic and Structural Study of the Eram Coal and Associated Strata in Eastern Okmulgee County and Western Muskogee County, Oklahoma*, available from the Oklahoma Geological Survey as MAP GM 30.

**Summary:** OGS Map.

548. Hemish, LeRoy A., 1989, *Coal Geology of Rogers County and Western Mayes County, Oklahoma*, available from the Oklahoma Geological Survey as Bulletin 144.

**Summary:** OGS Bulletin.

549. Hemish, LeRoy A., 1990, *Coal Geology of Tulsa, Wagoner, Creek, and Washington Counties, Oklahoma*, available from the Oklahoma Geological Survey as MAP GM-33.

**Summary:** OGS Map.

550. Hemish, LeRoy A., 1990, *Lithostratigraphy and Core-Drilling Upper Atoka Formation Through Lower Senora Formation (Pennsylvanian), Northeastern Oklahoma Shelf Area*, available from the Oklahoma Geological Survey as Special Publication 90-2.

**Summary:** OGS Publication.

551. Hemish, LeRoy A., 1990, *The Secor Coal and Associated Strata in the Beland-Crekola Area, Muskogee County, Oklahoma*, available from the Oklahoma Geological Survey in Oklahoma Geology Notes, v. 50, no. 6.

**Summary:** OGS Report.

552. Hemish, LeRoy A., 1994, *Coal Geology of Okmulgee County and Eastern Okfuskee County, Oklahoma*, available from the Oklahoma Geological Survey as Special Publication 94-3.

**Summary:** OGS Publication.

553. Hemish, LeRoy A., 1994, *Correlation of the Lower Witteville Coal Bed in the Arkoma Basin, Eastern Oklahoma*, available from the Oklahoma Geological Survey in Oklahoma Geology Notes, v. 54, no. 1.

**Summary:** OGS Report.

554. Hemish, LeRoy A., 1995, *Principal Reference Section (Neostratotype) for the Savanna Formation, Pittsburg County, Oklahoma*, available from the Oklahoma Geological Survey in Oklahoma Geology Notes, v. 55, no. 6.

**Summary:** OGS Report.

555. Hemish, LeRoy A., 1997, *Lithologic Descriptions of Pennsylvanian Strata North and East Tulsa, Oklahoma*, available from the Oklahoma Geological Survey as Special Publication 97-2.

**Summary:** OGS Publication.

556. Hemish, LeRoy A., 1998, *Coal Geology of McIntosh County, Oklahoma*, available from the Oklahoma Geological Survey as Special Publication 98-6.

**Summary:** OGS Publication.

557. Hemish, LeRoy A., 1998, *Coal Geology of Muskogee County, Oklahoma*, available from the Oklahoma Geological Survey as Special Publication 98-2.

**Summary:** OGS Publication.

558. Hemish, LeRoy A., 2002, *Surface to Subsurface Correlation of Methane-Producing Coal Beds, Northeast Oklahoma Shelf*, available from the Oklahoma Geological Survey as Special Publication 2002-2.

**Summary:** OGS Publication.

559. Henry, Mitchell E.; and Finn, Thomas M., 1999, *Digital Framework Geologic Data for a Study of Coal-Bed Methane, Wasatch Plateau, Utah*, from the 1999 Annual Meeting of the Geological Society of America, available from the GSA in Abstracts with Programs - Geological Society of America, 31 (7).

**Summary:** This GSA conference document discusses the database used in support of the United States Geological Survey led study of natural gas from coal seams resources of the Wasatch Plateau in Utah.



560. Herring, J. R.; and Dean, W. E., 1987, *Methane Fluxes from Coal Rank Increase and Natural Coal Fires*, from the Spring 1987 National Meeting of the American Chemical Society, available from the ACS.

**Summary:** ACS Conference Document.

561. Herz, W. J.; and Griffin, R. A., 1997, *Inventory of Alabama Greenhouse Gas Emissions and Sinks: 1990*, from the proceedings of the 1997 International Coalbed Methane Symposium, Tuscaloosa, Alabama, available as Paper 9732.

**Summary:** Symposium Paper.

562. Hettinger, R. D.; Biewick, R. R. H.; Bryant, Karen; Ellis, M. S.; Ferderer, D. A.; Kirschbaum, M. A.; Molnia, C. L.; Roberts, L. N. R.; Stricker, G. D.; and Watson, W. D., 1995, *Coal Resource Assessment in the Western United States; Factors for Consideration in the Management of Federal Lands*, available from the United States Geological Survey as C 1108.

**Summary:** USGS Report.

563. Hettinger, R. D.; Roberts, L. N. R.; and Gognat, T. A., 2000, *Investigations of the Distribution and Resources of Coal in the Southern Part of the Piceance Basin, Colorado*, from Geologic Assessment of Coal in the Colorado Plateau: Arizona, Colorado, New Mexico, and Utah, available from the United States Geological Survey.

**Summary:** USGS Report.

564. Hewitt, J. L., 1984, *Geologic Overview, Coal and Coalbed Methane Resources of the Warrior Basin, Alabama and Mississippi; Coalbed Methane Resources of the United States*, available from the American Association of Petroleum Geologists in AAPG Studies in Geology, no 17.

**Summary:** AAPG Report.

565. Higgs, M. D., 1986, *Laboratory Studies into the Generation of Natural Gas from Coal*, from Habitat of Paleozoic Gas in N.W. Europe, available from the Geological Society, London, as Special Publication 23.

**Summary:** Geological Society Report.

566. Higley, Debra K., 1992, *A Method to Estimate the Uncertainty of Coal Resources*, available from the publisher, the United States Geological Survey.

**Summary:** USGS Report.

567. Hildebrand, Ricky T., 1986, *Ground-water Composition as an Indicator of Sodium Content in Coal in the Powder River Basin, Southeastern Montana and Northeastern Wyoming*, available from the United States Geological Survey as C 0974.

**Summary:** USGS Report.

568. Hildebrand, Ricky T., 1995, *Geochemical Studies of the Anderson-Dietz 1 Coal Bed, Powder River Basin; Origin of Inorganic Elements and Environmental Implications*, available from the publisher, the Wyoming State Geological Survey.

**Summary:** WSGS Report.

569. Hill, D. G.; Nelson, C. R.; and Brandenburg, C. F., 2000, *Coalbed Methane "Frontier" Expanding*, from American Oil & Gas Reporter, v. 43, no. 5, available from the publisher.

**Summary:** Article.

570. Hill, D. G., 2000, *New Database Quantifies Impact of Unconventional Gas in U.S.*, from GasTIPS, v. 6, no. 2, available from the Gas Technology Institute.

**Summary:** Article.

571. Hill, David G., 2001, *Contribution of Unconventional Gas to U. S. Supply Continues to Grow*, from GasTIPS, v. 7, no. 3, available from the Gas Technology Institute.

**Summary:** Article.

572. Hill, David G., 2001, *North American Coalbed Methane Resource Map*, available from the Gas Technology Institute as GTI-01/0165.

**Summary:** GTI Map.

573. Hinkel, J. J.; Nimrick, K. H.; England, K.; Norton, J. C.; and Roy, M., 1991, *Design and Evaluation of Stimulation and Workover Treatments in Coal Seam Reservoirs*, from the proceedings of the 1991 Coalbed Methane Symposium, Tuscaloosa, Alabama, available from the University of Alabama.

**Summary:** Symposium Paper.

574. Hoak, T. E.; and Klawitter, A. L., 1995, *Delineation of Piceance Basin Basement Structures Using Multiple Source Data: Implications for Fractured Reservoir Exploration*, from the proceedings of the 1995 International Unconventional Gas Symposium, Tuscaloosa, Alabama, available as Paper 9515.

**Summary:** Symposium Paper.

575. Hoak, T. E.; and Decker, A. D., 1995, *Gas- and Water-Saturated Conditions in the Piceance Basin, Western Colorado: Implications for Fractured Reservoir Detection in a Gas-Centered Coal Basin*, from the proceedings of the 1995 International Unconventional Gas Symposium, Tuscaloosa, Alabama, available as Paper 9516.

**Summary:** Symposium Paper.

576. Hobbs, G. W.; Holland, J. R.; and Winkler, R. O., 1997, *Production and Economic Model for the Cedar Cove Coalbed Methane Field, Black Warrior Basin, Alabama: An Update Five Years after Development*, from the proceedings of the 1997 International Coalbed Methane Symposium, Tuscaloosa, Alabama, available as Paper 9726.

**Summary:** Symposium Paper.

577. Hobbs, G. Warfield, and Winkler, Robert O., *Coalbed Methane Shows Its Potential*, available from Ammonite Resources, New Canaan, Connecticut.

**Summary:** Article.

578. Hobbs, R. G., 1978, *Methane Occurrences, Hazards, and Potential Resources; Recluse Geologic Analysis Area, Northern Campbell County, Wyoming*, available from the United States Geological Survey as OF 78-401.

**Summary:** USGS Open File Report.

579. Holditch, S. A.; Ely, J. W.; and Carter, R. H., 1989, *Development of a Coal Seam Fracture Design Manual*, from the proceedings of the 1989 Coalbed Methane Symposium, Tuscaloosa, Alabama, available as Paper 8976.

**Summary:** Symposium Paper.

580. Holditch, S. A.; Ely, J. W.; Carter, R. H.; and Semmelbeck, M. E., 1990, *Coal Seam Stimulation Manual*, available from the Gas Technology Institute as GRI-90/0140.

**Summary:** This GRI publication provides guidelines to design well completions and hydraulic fracturing treatments in coal seams.

581. Holditch, S. A., 1992, *Completion Methods in Coal Seam Reservoirs*, available from the Society of Petroleum Engineers in Reprint Series, 35.

**Summary:** SPE Report.

582. Holditch, S. A.; Ely, J. W.; Semmelbeck, M. E.; Carter, R. H.; Hinkel, J.; and Jeffrey, R. G., Jr., 1992, *Enhanced Recovery of Coalbed Methane Through Hydraulic Fracturing*, available from the Society of Petroleum Engineers in Reprint Series, 35.

**Summary:** SPE Report.

583. Holland, J. R.; Gunther, W. D.; and Ijaz, Ahmad, 1989, *Projected Economic Impact of Accelerated Coalbed Methane Development, Black Warrior Basin, Alabama*, from the proceedings of the 1989 Coalbed Methane Symposium, Tuscaloosa, Alabama, available as Paper 8915.

**Summary:** Symposium Paper.

584. Holland, J. R.; and Kimmons, J. W., 1995, *Characteristics and Economics of Coalbed Methane Production from the Fort Union Formation, Powder River Basin*, from the proceedings of the 1995 International Unconventional Gas Symposium, Tuscaloosa, Alabama, available as Paper 9549.

**Summary:** Symposium Paper.

585. Hollub, V.A.; and Schafer, P.S., 1992, *A Guide to Coalbed Methane Operations*, Gas Research Institute report no. GRI-92/0234, available from the Society of Petroleum Engineers.

**Summary:** This guide provides information on siting, drilling, completion and production of natural gas from coal seams. Discusses key field operations and guidelines for performing those operations.

586. Hollub, V. A., 1993, *Results of Camera Surveys at Rock Creek*, from the proceedings of the 1993 International Coalbed Methane Symposium, Birmingham, Alabama, available as Paper 9329.

**Summary:** Symposium Paper.

587. Holtberg, P. D., 2000, *A U. S. Lower-48 Gas-Resource Estimate: Why the Gas Resources Will be Adequate to Meet Demand*, from the proceedings of the 2000 AAPG-SEPM Annual Meeting, New Orleans, Louisiana, available from the American Association of Petroleum Geologists.

**Summary:** AAPG Meeting Paper.

588. Hook, R. W.; Pedlow, G. W., III; and Moore, T. A., 2002, *Bibliography of John C. Ferm*, from International Journal of Coal Geology, v. 49, no. 2-3, available from the publisher.

**Summary:** Article.

589. Hopkins, Herbert T., 1966, *Fresh-Saline Water Interface Map of Kentucky, U.S.*, available from the Kentucky Geological Survey in Series X.

**Summary:** Kentucky Geological Survey Map.

590. Hotchkiss, W. R., 1975, *Sulfur and Trace Elements in the Rosebud and McKay Coal Seams, Colstrip Field, Montana*, available from the publisher, the Montana Geological Society.

**Summary:** MGS Report.

591. Howard, Jeanne G.; and Irvin, Marcia S., 1992, *Coalbed Methane: Hazard of the Past, Energy for the Future*, available from Sage Publications, Inc.

**Summary:** Report.

592. Hower, James C.; et al, 1998, *Generation and Expulsion of Petroleum and Gas from Almond Formation Coal, Greater Green River Basin, Wyoming; Discussions and Reply*, available from the American Association of Petroleum Geologists.

**Summary:** AAPG Report.

593. Hoyer, D. L., 1993, *Evaluation and Confirmation of Coal Seam Fractures from Dual-Laterolog*, from the proceedings of the 1993 International Coalbed Methane Symposium, Birmingham, Alabama, available as Paper 9356.

**Summary:** Symposium Paper.

594. Hubbard, T. E.; Miller, R. R.; Hower, J. C.; Ferm, J. C.; and Helfrich, C. T., 2002, *The Upper Hance Coal Bed in Southeastern Kentucky: Palynologic, Geochemical, and Petrographic Evidence for Environmental Succession*, from International Journal of Coal Geology, v. 49, no. 2-3, available from the publisher.

**Summary:** Article.

595. Huffman, Claude, Jr.; and Swanson, Vernon E., 1994, *Geologic and Hydrologic Controls on Coalbed Methane: Sand Wash Basin, Colorado and Wyoming*.

**Summary:** Report.

596. Hughes, J. D.; Dawson, F. M.; Duggan, J.; Hallas, D. F.; Khitrova, G.; Marchioni, D. L.; Richardson, R.; and Wynne, D., 1999, *Regional Analysis of the Ardley Coal Zone, Alberta, for Coalbed Methane Production and CO<sub>2</sub> Sequestration*, available from the Geological Survey of Canada as an Open-File Report.

**Summary:** GSC Open-File Report.

597. Humphrey, H. B., 1959, *Historical Summary of Coal-mine Explosions in the United States*, from U.S. Bureau of Mines Information Circular 7900, available from the National Technical Information Service.

**Summary:** USBM Circular.

598. Hunt, A. M.; and Steele, Derek J., 1991, *Coalbed Methane Development in the Appalachian Basin*, from Quarterly Review of Methane From Coal Seams Technology, v. 8, no. 4, available from the publisher.

**Summary:** Article.

599. Hunt, A. M.; and Steele, D. J., 1991, *Coalbed Methane Development in the Northern and Central Appalachian Basins - Past, Present and Future*, from proceedings of the 1991 Coalbed Methane Symposium, Tuscaloosa, Alabama, available from the University of Alabama.

**Summary:** Symposium Paper.

600. Hunt, A.M.; and Steele, Derek J., 1991, *Coalbed Methane Technology Development in the Appalachian Basin*, available from the Gas Technology Institute as GRI-90/0288.

**Summary:** This GRI report discusses research conducted to determine the applicability of existing coal seam gas technology to development of coal seam natural gas reservoirs in the Appalachian Basin.

601. Hunt, A.M.; and Steele, Derek J., 1992, *Coalbed Methane Technology Development in the Appalachian Basin*, available from the Gas Technology Institute as GRI-92/0138.

**Summary:** This final report discusses research conducted to determine the applicability of current

technology to development of coal seam natural gas reservoirs in Appalachia.

602. Hunt, C. W., 1999, *Anhydride Theory; A new Theory of Petroleum and Coal Generation*, from Coalbed Methane; Scientific, Environmental and Economic Evaluation, available from the publisher.

**Summary:** Article.

603. Hupp, K.; Bibler, C.; and Pitcher, R. C., 1999, *Old Mine Presents Golden Opportunity*, from American Oil & Gas Reporter, v. 42, no. 5, available from the publisher.

**Summary:** Article.

604. Hupp, K.; Bibler, C.; and Pitcher, R. C., 1999, *Recovery of Methane from the Abandoned Golden Eagle Mine Property*, from the proceedings of the 1999 International Coalbed Methane Symposium, Tuscaloosa, Alabama, available from the University of Alabama.

**Summary:** Symposium Paper.

605. Hurtt, W. C., 1997, *Produced Water Evaporation Enhancement Project for the Drunkards Wash Field, Carbon County, Utah*, from the proceedings of the 1997 International Coalbed Methane Symposium, Tuscaloosa, Alabama, available as Paper 9729.

**Summary:** Symposium Paper.

606. Hyman, Laura A.; Brugler, Mercer; Deneshjou, Dane; and Henry, A., 1991, *Improved Evaluation of Coal Reservoirs Through Specialized Core Analysis*, available from the Gas Technology Institute as GRI-91/0201.

**Summary:** This GRI report discusses the methodologies employed to determine the relative permeability characteristics on several coal samples.

607. Hyman, L. A.; Ohen, H. A.; Amaefule, J. O.; and Daneshjou, D., 1991, *Simultaneous Determination of Capillary Pressure and Relative Permeability in Coalbed Methane Reservoirs*, from the proceedings of the 3rd Coalbed Methane Symposium, available from the publisher, the University of Alabama, College of Continuing Studies.

**Summary:** This conference paper discusses the development of a modified porous plate experiment and mathematical model used to improve the measurement and evaluation of gas and water relative permeability, capillary pressure, and pore volume in coal samples.

608. Hyman, L. A.; Brugler, M. L.; Daneshjou, D. H.; and Ohen, H. A., 1992, *Advances in Laboratory Measurement Techniques of Relative Permeability and Capillary Pressure for Coal Seams*, from Quarterly Review of Methane from Coal Seams Technology, v. 9, no. 2, available from the publisher.

**Summary:** Report.

609. ICF Resources, Inc., 1990, *The United States Coalbed Methane Resource*, from Quarterly Review of Methane from Coal Seams Technology, v. 7, no. 3, available from the publisher.

**Summary:** Report.

610. ICF Resources, Inc., 1991, *Coalbed Methane Workshop Sponsored by the Gas Research Institute (at the) 1991 SPE Rocky Mountain Regional/Low Permeability Reservoirs Symposium, April 14, 1991*, available from the Gas Technology Institute as GRI-91/0423.

**Summary:** Contains workshop presentations and papers presented at an SPE conference. The materials mainly cover the characterization of reservoir properties favorable to coal seam gas production.

611. Iannacchione, A. T.; and Puglio, D. G., 1979, *Geological Association of Coalbed Gas and Natural Gas from the Hartshorne Formation in Haskell and LeFlore Counties, Oklahoma*, from the IX International Congress of Carbon Stratigraphy and Geology.

**Summary:** Convention Report.

612. Iannacchione, A. T.; and Puglio, D. G., 1979, *Geology of the Lower Kittanning Coalbed and Related Mining and Methane Emission Problems in Cambria County, Pennsylvania*, from U.S. Bureau of Mines Report of Investigations 8354, available from the National Technical Information Service.

**Summary:** USBM Report.

613. Iannacchione, A. T.; and Puglio, D. G., 1979, *Methane Content and Geology of the Hartshorne Coalbed in Haskell and Le Flore Counties, Oklahoma*, from U.S. Bureau of Mines Report of Investigations 8407, available from the National Technical Information Service.

**Summary:** USBM Report.

614. Iannacchione, A. T.; Kertis, C. A.; Houseknecht, D. W.; and Perry, J. H., 1983, *Problems Facing Coal Mining and Gas Production in the Hartshorne Coalbeds of the Western Arkoma Basin, OK*, from U.S. Bureau of Mines Report of Investigations 8795, available from the National Technical



Information Service.

**Summary:** USBM Report.

615. Irani, M. C.; et al, 1972, *Methane Emissions from U. S. Coal Mines, A Survey*, U. S. Bureau of Mines Information Circular 8558, available from the National Technical Information Service.

**Summary:** USBM Circular.

616. Irani, M. C.; Jeran, P. W.; and Deul, M., 1974, *Methane Emissions from U. S. Coal Mines in 1973, A Survey – Supplement to Information Circular 8558*, U. S. Bureau of Mines Information Circular 8659, available from the National Technical Information Service.

**Summary:** USBM Circular.

617. Irani, M. C.; et al, 1977, *Methane Emissions from U. S. Coal Mines in 1975, A Survey*, U. S. Bureau of Mines Information Circular 8733, available from the National Technical Information Service.

**Summary:** USBM Circular.

618. Jansen, G. J., 1987, *Petrography Studies Can Aid in Coal Mine Planning and in Estimating Methane Yields in Coal Beds*, from Mining Engineering, v. 39, no. 9, available from the publisher.

**Summary:** Article.

619. Jeffery, R. G.; Vandamme, L.; and Hinkel, J. J., 1987, *Propagation of Fractures in Coal: Equivalent Modulus and Parallel Fracture Effects*, from the proceedings of the 1987 Coalbed Methane Symposium, Tuscaloosa, Alabama, available as Paper 8726.

**Summary:** Symposium Paper.

620. Jeffery, R. G.; Hinkel, J. J.; Nimerick, K. H.; and McLennan, J., 1989, *Hydraulic Fractures to Enhance Production of Methane from Coal Seams*, from the proceedings of the 1989 Coalbed Methane Symposium, Tuscaloosa, Alabama, available as Paper 8992.

**Summary:** Symposium Paper.

621. Jeffery, R. G.; Meaney, K. T. A.; and Doyle, R. P., 1999, *History Matching of Hydraulic Fracture and Production Data from a Vertical CO<sub>2</sub> and CH<sub>4</sub> Gas Drainage Test Well*, from the proceedings

of the 1999 International Coalbed Methane Symposium, Tuscaloosa, Alabama, available from the University of Alabama.

**Summary:** Symposium Paper.

622. Jenden, Peter D.; and Kaplan, Isaac R., 1989, *Analysis of Gases in the Earth's Crust*, available from the Gas Technology Institute as GRI-88/0262.

**Summary:** This report summarizes the types of natural gas sources found at various locations in the lower 48 states of the U.S. and several non-U.S. reservoirs.

623. Jenkins, C. D.; Boyer, C. M., II; Fisher, R. D.; Gobran, B. D.; Sheng, J. B.; and Zhang, S., 1999, *Appraisal Drilling Focuses on Ordos Basin Coal Seams*, from *Oil & Gas Journal*, v. 97, no. 17, available from the publisher.

**Summary:** Article.

624. Jennings, G. L.; Greaves, K. H.; and Bereskin, S. R., 1997, *Natural Gas Resources Potential of the Lewis Shale, San Juan Basin, New Mexico and Colorado*, from the proceedings of the 1997 International Coalbed Methane Symposium, Tuscaloosa, Alabama, available as Paper 9766.

**Summary:** Symposium Paper.

625. Jensen, D.; and Smith, L. K., 1997, *A Practical Approach to Coalbed Methane Reserve Prediction Using a Modified Material Balance Technique*, from the proceedings of the 1997 International Coalbed Methane Symposium, Tuscaloosa, Alabama, available as Paper 9765.

**Summary:** Symposium Paper.

626. Jeran, P. W.; Lawhead, D. H.; and Irani, M. C., 1976, *Methane Emissions from an Advancing Coal Mine Section in the Pittsburgh Coalbed*, U. S. Bureau of Mines Report of Investigations 8132, available from the National Technical Information Service.

**Summary:** USBM Report.

627. Jeu, S. J.; Logan, T. L.; and McBane, R. A., 1988, *Exploitation of Deeply Buried Coalbed Methane Using Different Hydraulic Fracturing Techniques*, from the proceedings of the 1988 SPE Annual Technical Conference, Houston, Texas, available as SPE Paper 18253.

**Summary:** SPE Conference Paper.

628. Jochen, V. A.; and Lee, W. J., 1993, *Reservoir Characterization of an Openhole Cavity Completion Using Production and Well Test Data Analysis*, from the proceedings of the 1993 SPE Eastern Regional Conference and Exhibition, Pittsburgh, Pennsylvania, available from the Society of Petroleum Engineers as SPE Paper 26917.

**Summary:** This SPE paper discusses the development of coal seam gas reservoir description from the analysis of production and pressure transient data for a producing openhole cavity well and two observation wells. These San Juan basin wells were completed in the Fruitland Formation.

629. Johnson, D. J.; and Scholes, P. L., 1991, *Predicting Cleat in Coal Seams from Mineral and Maceral Composition with Wireline Logs*, available from the Rocky Mountain Association of Geologists in Coalbed Methane of Western North America.

**Summary:** RMAG Report.

630. Johnson, Kenneth S.; Ferguson, Charles A.; Hemish, LeRoy A.; Suneson, Neil H.; Visher, Glenn S.; and Wylie, W. David, 1988, *Shelf-to-Basin Geology and Resources of Pennsylvanian Strata in the Arkoma Basin and Frontal Ouachita Mountains of Oklahoma*, available from the Oklahoma Geological Survey as Guidebook 25.

**Summary:** OGS Guidebook.

631. Johnson, R. C., 1989, *Geologic History and Hydrocarbon Potential of Late Cretaceous-age, Low-Permeability Reservoirs, Piceance Basin Western Colorado*, available from the United States Geological Survey as Bulletin 1787-E.

**Summary:** USGS Bulletin.

632. Johnson, Ronald C.; Barker, Charles E.; Pawlewicz, Mark J.; Crysedale, Bonnie L.; Clark, Arthur C.; and Rice, Dudley D., 1991, *Preliminary Results of a Coalbed Methane Assessment of the Wind River Indian Reservation, Wyoming*, available from the Rocky Mountain Association of Geologists.

**Summary:** Report presented at a 1991 meeting of the Rocky Mountain Association of Geologists.

633. Johnson, R. C.; and Szmajter, R. J., 1992, *Description of Upper Cretaceous Mesaverde Formation from the 1991 U.S. Geological Survey Coalbed Methane Coring Program, Wind River Reservation, Wyoming*, available from the United States Geological Survey.

**Summary:** USGS Report.

634. Johnson, R. C.; and Flores, R. M., 1993, *Coalbed Methane Potential of the Upper Cretaceous*

*Lance and Paleocene Fort Union Formation, Wind River Reservation, Wyoming*, available from the publisher, the Wyoming Geological Association.

**Summary:** WGA Report.

635. Johnson, Ronald C.; Clark, Arthur C.; Barker, Charles E.; Crysdale, Bonnie L.; Higley, Debra K.; Szmajter, Richard J.; and Finn, Thomas M., 1993, *Coalbed Methane Potential of the Upper Cretaceous Mesaverde and Meeteetse Formations, Wind River Reservation, Wyoming*, available from the publisher, the Wyoming Geological Association.

**Summary:** WGA Conference Document.

636. Johnson, R. C.; and Rice, D. D., 1993, *Composition and Origins of Shallow (<1,000 ft) Coalbed Gasses, Wind River Reservation, Wyoming*.

**Summary:** Report.

637. Johnson, R. C.; and Flores, R. M., 1993, *Stratigraphy, Areal Distribution, and Paleodepositional Environments of Fort Union Formation Coal Beds, Wind River Reservation, Wyoming; Implications for Coalbed Methane Development*, available from the publisher, the Wyoming Geological Association.

**Summary:** WGA Conference Document.

638. Johnson, Ronald C.; and Rice, Dudley D., 1993, *Variations in Composition and Origins of Gases from Coal Bed and Conventional Reservoirs, Wind River Basin, Wyoming*, available from the Wyoming Geological Association.

**Summary:** Report presented at a 1993 meeting of the Wyoming Geological Association.

639. Johnson, Ronald C.; and Flores, Romeo M., 1998, *Developmental Geology of Coalbed Methane from Shallow to Deep in Rocky Mountain Basins and in Cook Inlet-Matanuska Basins, Alaska, USA and Canada*, from *International Journal of Coal Geology*, available from the publisher, Elsevier.

**Summary:** Report on natural gas from coal seams in the different basins of the Rocky Mountains. Discusses the geology of the basins and problems associated with production.

640. Johnson, R. C.; and Finn, T. M., 2001, *Potential for a Basin-Centered Gas Accumulation in the Raton Basin, Colorado and New Mexico*, available from the United States Geological Survey.

**Summary:** USGS Bulletin.

641. Johnson, R. L., Jr.; Hopkins, C. W.; and Zuber, M. D., 2000, *Technical Challenges in the Development of Unconventional Gas Resources in Australia*, from the proceedings of the 2000 Australian Petroleum Prod. Explor. Association Conference, Brisbane, Australia.

**Summary:** Conference Paper.

642. Johnson, V. L.; Graham, D. L.; and Reidel, S. P., 1993, *Methane in Columbia River Basalt Aquifers: Isotopic and Geohydrologic Evidence for a Deep Coal-bed Gas Source in the Columbia Basin, Washington*, available from the American Association of Petroleum Geologists in AAPG Bulletin, v. 77.

**Summary:** AAPG Bulletin.

643. Jones, A. H.; Ahmen, U.; Bush, D.; Holland, M.; Kelkar, S.; and Rakop, K., 1984, *Methane Production Characteristics for a Deeply Buried Coalbed Reservoir in the San Juan Basin*, from Quarterly Review of Methane from Coal Seams Technology, v. 2, no. 1, available from the publisher.

**Summary:** Symposium Paper.

644. Jones, A. H.; Bell, G. J.; and Morales, R. H., 1987, *Examination of Potential Mechanisms Responsible for the High Treatment Pressures Observed During Stimulation of Coalbed Reservoirs*, from the proceedings of the Department of Energy / Society of Petroleum Engineers' 1987 Gas from Low Permeability Symposium, available from the Society of Petroleum Engineers as SPE Paper 16421.

**Summary:** SPE Symposium Paper.

645. Jones, A. H.; Bell, G. J.; Morales, R. H.; and Schraufnagel, R. A., 1987, *The Influence of Coal Fines/Chips on the Behavior of Hydraulic Fracture Stimulation Treatments*, from the proceedings of the 1987 Coalbed Methane Symposium, Tuscaloosa, Alabama, available as Paper 8723.

**Summary:** Symposium Paper.

646. Jones, A. H.; Bell, G. J.; and Schraufnagel, R. A., 1988, *A Review of the Physical and Mechanical Properties of Coal with Implications for Coal-bed Methane Well Completion and Production*, available from the Rocky Mountain Association of Geologists in Rocky Mountain Association of Geologists Guidebook.

**Summary:** RMAG Report.

647. Jones, A. H.; and Schraufnagel, R. A., 1991, *In-Situ Stress Variations in the Black Warrior Basin*,

from the proceedings of the 1991 Coalbed Methane Symposium, Tuscaloosa, Alabama, available from the University of Alabama.

**Summary:** Symposium Paper.

648. Jones, Allison L., 1988, *Geologic Setting and Water Quality of Selected Basins in the Active Coal-mining Areas of Ohio, June 1985 Through December 1986*, available from the United States Geological Survey as WRI 88-4084.

**Summary:** USGS Report / Map.

649. Jones, R. W.; and DeBruin, R. H., 1989, *Coalbed Methane in Wyoming*, from the 1989 Wyoming Geological Society 40th Field Conference, available from the Wyoming Geological Society.

**Summary:** WGS Guidebook.

650. Jordan, G., 1990, *Desorption, Diffusion and Coal Testing for Coalbed Methane*, available from the publisher, the Alberta Research Council in Coal-bed Methane Information Series 111.

**Summary:** Alberta Research Council Report.

651. Joubert, J. I.; Grein, C. T.; and Bienstock, D., 1973, *Sorption of Methane in Moist Coal*, from Fuel, v. 52, available from the publisher.

**Summary:** Article.

652. Joubert, J. I.; Grein, C. T.; and Bienstock, D., 1974, *Effect of Moisture on the Methane Capacity of American Coals*, from Fuels, v. 53, available from the publisher.

**Summary:** Article.

653. Junkin, P. D.; and Tipton, L. M., 1981, *Environmental Research Plan for Gas Supply Technologies. Volume II: Environmental Research Plan*, available from the Gas Technology Institute as GRI-80/0013.2.

**Summary:** This report discusses a five-year research plan that was developed for the environmental impacts and constraints associated with gas supply technologies used to produce various types of non-conventional natural gas. Among those types studied was coalbed methane. Contains discussion of the prioritization methodology used to rank research activities, based on environmental and technical criteria.

654. Junkin, P. D.; and Tipton, L. M., 1983, *Safety Research Plan for Gas Supply Technologies*, available from the Gas Technology Institute as GRI-81/0180.

**Summary:** This final report discusses the development of a research plan for safety issues related to gas supply technologies.

655. Kaiser, W. R.; and Swartz, T. E., 1989, *Fruitland Formation Hydrology and Producibility of Coalbed Methane in the San Juan Basin, New Mexico and Colorado*, from the proceedings of the 1989 Coalbed Methane Symposium, Tuscaloosa, Alabama, available as Paper 8926.

**Summary:** Symposium Paper.

656. Kaiser, W. R.; Tyler, R.; Ambrose, W. A.; Scott, A. R.; and Patchen, D. G., 1992, *Geologic Evaluation of Critical Production Parameters for Coalbed Methane Resources*, from Quarterly Review of Methane from Coal Seams Technology, v. 9, nos. 3-4, available from the publisher.

**Summary:** Report.

657. Kaiser, William R.; Scott, Andrew R.; Hamilton, Douglas S.; Tyler, Roger; McMurry, Ronald G.; Zhou, Naijiang; and Tremain, Carol M., 1993, *Geologic and Hydrologic Controls on Coalbed Methane: Sand Wash Basin, Colorado and Wyoming*, available from the Gas Technology Institute as GRI-92/0420.

**Summary:** This GRI report discusses a geologic and hydrologic study of the Sand Wash basin as a framework for evaluating development properties.

658. Kaiser, W. R.; and Ambrose, W. A., 1992, *Hydrology and Production of Coalbed Methane in Western United States Intermountain Basins*, published by the American Association of Petroleum Geologists and the Society of Economic Paleontologists and Mineralogists, available from the AAPG.

**Summary:** AAPG / SEPM Report.

659. Kaiser, W. R.; Hamilton, D. S.; and Patchen, D. G., 1993, *Geologic and Hydrologic Controls on Coalbed Methane Production in Western United States Intermountain Basins*, from Quarterly Review of Methane from Coal Seams Technology, v. 10, no. 3, available from the publisher.

**Summary:** Report.

660. Kaiser, W. R., 1993, *Hydrology of Coalbed Reservoirs*, from 1993 Coalbed Methane Symposium, Short Course 1, Birmingham, Alabama.

**Summary:** Symposium Document.

661. Kaiser, W. R.; and Ayers, W. B., Jr., 1994, *Coalbed Methane Production, Fruitland Formation, San Juan Basin: Geologic and Hydrologic Controls*, available from the New Mexico Bureau of Mines and Minerals in Bulletin 146.

**Summary:** New Mexico Bureau of Mines and Minerals Report.

662. Kaiser, W. R.; Scott, A. R.; Hamilton, D. S.; Tyler, Roger; McMurry, R. G.; Zhou, Naijiang; and Tremain, C. M., 1994, *Geologic and Hydrologic Controls on Coalbed Methane: Sand Wash Basin, Colorado and Wyoming*, available from the Colorado Geological Survey.

**Summary:** Includes structural stratigraphic and hydrologic setting of Mesaverde and Fort Union coals, coal seam natural gas resources, production and possible traps.

663. Kaiser, W. R.; Swartz, T. E.; and Hawkins, G. J., 1994, *Hydrologic Framework of the Fruitland Formation, San Juan Basin*, available from the New Mexico Bureau of Mines and Minerals in Bulletin 146.

**Summary:** New Mexico Bureau of Mines and Minerals Report.

664. Kaiser, W. R.; and Scott, A. R., 1994, *Hydrologic Setting of the Fort Union Formation, Sand Wash Basin*, available from the United States Geological Survey as a Report of Investigations.

**Summary:** USGS Report.

665. Kaiser, W. R.; Hamilton, D. S.; Scott, A. R.; Tyler, R.; and Finley, R. J., 1994, *Geological and Hydrological Controls on the Producibility of Coalbed Methane*, from Journal of the Geological Society, London, v. 151, Part 3, available from the publisher.

**Summary:** Article.

666. Kaiser, W. R.; Scott, A. R.; Zhou, N.; Hamilton, D. S.; and Tyler, R., 1994, *Resources and Producibility of Coalbed Methane in the Sand Wash Basin*, available from the Texas University, Bureau of Economic Geology.

**Summary:** Texas University Bureau of Economic Geology Report.

667. Kaiser, W. R.; Scott, A. R.; and Tyler, R., 1995, *Geology and Hydrology of Coalbed Methane Producibility in the United States: Analogs for the World*, from Intergas '95 Short Course,



Tuscaloosa, Alabama, available from the publisher.

**Summary:** Report.

668. Kalkreuth, W.; Abercrombie, H.; and Burchard, K., 1994, *The Coalbed Methane Potential of Jurassic/Cretaceous Coals from the Fernie Basin, British Columbia, Canada*, from Erdol und Kohle - Erdgas - Petrochemie, v. 47, no. 4, available from the publisher.

**Summary:** Article.

669. Kalkreuth, W. D.; Dawson, M.; and Hughes, J. D., 1994, *Geological Survey of Canada Coalbed Methane Research - CBM Potential of Coals from the Western Canada Sedimentary Basin*, from the Twenty-Eights Newcastle Symposium on Advances in the Study of the Sydney Basin, Newcastle, NSW, Australia.

**Summary:** Symposium Document.

670. Kalkreuth, W. D.; Dawson, M.; and Hughes, J. D., 1995, *Geological Survey of Canada Coalbed Methane Research*, from Coal Science and Technology 24, v. 1, available from the publisher, Elsevier, New York.

**Summary:** Report.

671. Kansas Geographic Information Systems Policy Board, 2001, *Kansas Ozark Aquifer*, available online from the Data Access & Support Center Web site, <http://gisdasc.kgs.ukans.edu/dasc/kanview.html>.

**Summary:** Kansas Geographic Information Systems Policy Board Map.

672. Kansas Geological Survey, 2002, *Fundamentals of Coalbed Methane Production Manual*, available from the University of Kansas, Tertiary Oil Recovery Project.

**Summary:** KGS Report.

673. Karacan, C. O.; and Okandan, E., 1999, *Heterogeneity Effects on the Storage and Production of Gas From Coal Seams*, from the proceedings of the 1999 Annual SPE Tech Conference, Houston, Texas, available from the Society of Petroleum Engineers as SPE Paper 56551.

**Summary:** SPE Conference Paper.

674. Karacan, C. O.; and Okandan, E., 2000, *Assessment of Energetic Heterogeneity of Coals for Gas Adsorption and Its Effect on Mixture Predictions for Coalbed Methane Studies*, from Fuel, v. 79, available from the publisher.

**Summary:** Article.

675. Karacan, C. O.; and Okandan, E., 2000, *Fracture/Cleat Analysis of Coals from Zonguldak Basin (Northwestern Turkey) Relative to the Potential of Coalbed Methane Production*, from International Journal of Coal Geology, v. 44, no. 2, available from the publisher.

**Summary:** Article.

676. Karpov, E. F.; Bassovsky, B. I.; and Petrov, A. K., 1997, *Main Trends in Improvement of Systems for Mine Air Monitoring and Mine Degassing*, from the proceedings of the 1997 International Coalbed Methane Symposium, Tuscaloosa, Alabama, available as Paper 9741.

**Summary:** Symposium Paper.

677. Kasimov, O. I.; Bukhantsov, A. I.; and Kasyanov, V. V., 1995, *Coal Seam Methane Drainage Through Surface Boreholes*, from the proceedings of the 1995 International Unconventional Gas Symposium, Tuscaloosa, Alabama, available as Paper 9537.

**Summary:** Symposium Paper.

678. Kaszuba, J. P.; and Buys, M. W., 1993, *Reclamation Procedures for Produced Water Spills from Coalbed Methane Wells, San Juan Basin, Colorado and New Mexico*, paper presented at the 1993 SPE/EPA Exploration and Production Environmental Conference, available from the Society of Petroleum Engineers as SPE paper 25970.

**Summary:** This SPE paper defines the quality of water produced from coal seam natural gas wells producing from the Fruitland Formation, characterizes affected soils, evaluates the environmental effects the water has on soil, and discusses specific reclamation procedures for a portion of the San Juan Basin.

679. Kelafant, J. R.; Wicks, D. E.; and Kuuskraa, V. A., 1988, *A Geologic Assessment of Natural Gas from Coal Seams in the Northern Appalachian Basin, Alabama*, available from the Gas Technology Institute as GRI-88/0039.

**Summary:** This report discusses the geologic assessment of Northern Appalachian Coal Basin gas-in-place estimates.

680. Kelso, B. S.; Goolsby, S. M.; and Tremain, C. M., 1980, *Deep Coal Bed Methane Potential of the San Juan River Coal Region, Southwestern Colorado*, available from the Colorado Geological Survey as Open-File Report 80-2.

**Summary:** CGS Open-File Report.

681. Kelso, B. S.; Decker, A. D.; Wicks, D. E.; and Horner, D. M., 1987, *GRI Geologic and Economic Appraisal of Coalbed Methane in the San Juan Basin*, from the proceedings of the 1987 Coalbed Methane Symposium, Tuscaloosa, Alabama, available as Paper 8731.

**Summary:** Symposium Paper.

682. Kelso, B. S.; and Kelafant, J. A., 1989, *A Strategy for Coalbed Methane Production Development Part I: Geologic Characterization*, from the proceedings of the 1989 Coalbed Methane Symposium, Tuscaloosa, Alabama, available as Paper 8911.

**Summary:** Symposium Paper.

683. Kelso, B. S., 1994, *Geologic Controls on Open-hole Cavity Completions in the San Juan Basin*, from Quarterly Review of Methane from Coal Seams Technology, v. 11, nos. 3-4, available from the publisher.

**Summary:** Report.

684. Kelso, B. S.; Lombardi, T. E.; and Kuuskraa, J. A., 1995, *Drilling and Production Statistics for Major U.S. Coalbed Methane and Gas Shale Reservoirs*, available from the Gas Technology Institute as GRI-96/0052.

**Summary:** This GRI-sponsored report gives a summary of the drilling and production statistics from the major coal seam gas and gas shale reservoirs in the U.S.

685. Kemp, J. H.; and Peterson, K. M., 1988, *Coal-bed Gas Development in the San Juan Basin: A Primer for the Lawyer and Landman*, from the Rocky Mountain Association of Geologists in Rocky Mountain Association of Geologists Guidebook.

**Summary:** RMAG Publication.

686. Kern, John W.; Sinha, A. K.; and Sookram, V. A., 1983, *Geophysical Techniques for Coalbed Evaluation*, available from the Gas Technology Institute as GRI-83/0055.

**Summary:** This GRI report reviews and summarizes the characteristics of geophysical logging

technologies and how they apply to coal seam gas resource evaluation.

687. Khavari-Khorasani, G.; and Michelsen, J. K., 1999, *Coal Bed Gas Content and Gas Undersaturation*, from Coalbed Methane: Scientific, Environmental and Economic Evaluation, available from Kluwer Academic Publishers, Boston.

**Summary:** Report.

688. Khodaverdian, Mohamad; McLennan, John D.; and Jones Arfon H., 1991, *Experimental Fracturing and Propping of Coal - Implications for Hydraulic Fracture Design*, from Quarterly Review of Methane from Coal Seams Technology, v. 8, no. 3, available from the publisher.

**Summary:** Article.

689. Khodaverdian, M.; and McLennan, J. D., 1993, *Hydraulic Fracturing Coalbed Methane Reservoirs: Obstacles and Solutions*, available from Government Institutes, Inc.

**Summary:** Conference paper that reports on a program working to identify the mechanisms responsible for high treatment pressures as they relate to lower production of gas produced from wells treated at high pressures. These abnormally high pressures are encountered during hydraulic fracturing. Presented at the 1992 International Gas Research Conference.

690. Khodaverdian, Mohamad F., 1994, *Coalbed Methane Stimulation Techniques: Mechanisms and Applicability*, available from the Gas Technology Institute as GRI-95/0003.

**Summary:** This GRI sponsored topical report examines the mechanisms responsible for the high fracturing pressures observed in coal in order to specify stimulation procedures required to achieve fracture characteristics that optimize gas production.

691. Khodaverdian, Mohamad F.; McLennan, John D.; and Jones Arfon H., 1994, *Hydraulic Fracture Stimulation for Enhanced Recovery of Coalbed Methane*, from the 8th International Conference on Computer Methods and Advances in Geomechanics.

**Summary:** Conference Paper.

692. Khodaverdian, M.; Vaziri, H. H.; Palmer, I. D.; and McLennan, J. D., 1995, *Openhole Cavity Completions in Coalbed Methane Wells - Modeling of Field Data*, from the proceedings of the 1995 International Unconventional Gas Symposium, Tuscaloosa, Alabama, available as Paper 9533.

**Summary:** Symposium Paper.

693. Khodaverdian, Mohamad F.; McLennan, John D.; Palmer, Ian D.; Vaziri, Hans H.; and Wang, X., 1996, *Cavity Completions for Enhanced Coalbed Methane Recovery*, available from the Gas Technology Institute as GRI-95/0432.

**Summary:** This report discusses an investigation of the cavity completion mechanisms causing formation stimulation.

694. Khodaverdian, Mohamad F.; McLennan, John D.; Palmer, Ian D.; and Vaziri, Hans H., 1996, *Coalbed Cavity Completion Analysis Suggests Improvements*, from Gas Tips, v. 2, no. 1, available from the publisher, the Gas Technology Institute.

**Summary:** Report.

695. Khoudin, Y. L., 1995, *Sudden Methane Outbursts in Mine Workings and Their Prevention by Degassing Methods*, from the proceedings of the 1995 International Unconventional Gas Symposium, Tuscaloosa, Alabama, available as Paper 9546.

**Summary:** Symposium Paper.

696. Kidd, J. T.; Camp, B. S.; Lottman-Craig, L. K.; Osborne, T. E.; Smith, J. L.; Saulsberry, J. L.; Steidl, P. F.; and Stubbs, P. B., 1992, *Geologic Manual for the Evaluation and Development of Coalbed Methane*, available from the Gas Technology Institute as GRI-91/0110.

**Summary:** GRI Topical Report.

697. Kim, A. G.; and Douglas, L. J., 1972, *Hydrocarbon Gases Produced in a Simulated Swamp Environment*, from U.S. Bureau of Mines Report of Investigations 7690, available from the National Technical Information Service.

**Summary:** USBM Report.

698. Kim, A. G., 1973, *The Composition of Coalbed Gas*, from U.S. Bureau of Mines Report of Investigations 7762, available from the National Technical Information Service.

**Summary:** USBM Report.

699. Kim, A. G.; and Douglas, L. J., 1973, *Gases Desorbed from Five Coals of Low Gas Content*, from U.S. Bureau of Mines Report of Investigations 7768, available from the National Technical Information Service.

**Summary:** USBM Report.

700. Kim, A. G., 1974, *Low-temperature Evolution of Hydrocarbon Gases from Coal*, from U.S. Bureau of Mines Report of Investigations 7965, available from the National Technical Information Service.
- Summary:** USBM Report.
701. Kim, A. G., 1974, *Methane in the Pittsburgh Coalbed, Washington County, Pa.*, from U.S. Bureau of Mines Report of Investigations 7969, available from the National Technical Information Service.
- Summary:** USBM Report.
702. Kim, A. G., 1975, *Methane in the Pittsburgh Coalbed, Greene County, Pa.*, from U.S. Bureau of Mines Report of Investigations 8026, available from the National Technical Information Service.
- Summary:** USBM Report.
703. Kim, A. G., 1977, *Estimating Methane Content of Bituminous Coalbeds from Adsorption Data*, from U.S. Bureau of Mines Report of Investigations 8245, available from the National Technical Information Service.
- Summary:** USBM Report.
704. Kim, A. G., 1978, *Experimental Studies on the Origin and Accumulation of Coalbed Gas*, from U.S. Bureau of Mines Report of Investigations 8317, available from the National Technical Information Service.
- Summary:** USBM Report.
705. Kim, A. G.; and Kissell, F. N., 1988, *Methane Formation and Migration in Coalbeds*, from U.S. Bureau of Mines Bulletin 687, available from the National Technical Information Service.
- Summary:** USBM Report.
706. Kindley, Mark, 1982, *Coal Bed Methane Offers Energy Options*, available from the publisher, the American Association of Petroleum Geologists.
- Summary:** AAPG Report.
707. Kindley, Mark, 1982, *Interest Grows in Coal Bed Methane, Technological, Legal Problems*

*Persist*, available from the publisher, the American Association of Petroleum Geologists.

**Summary:** AAPG Report.

708. King, G. R.; and Ertekin, T. M., 1989, *A Survey of Mathematical Models Related to Methane Production from Coal Seams: Part I: Empirical & Equilibrium Sorption Models*, from the proceedings of the 1989 Coalbed Methane Symposium, Tuscaloosa, Alabama, available as Paper 8951.

**Summary:** Symposium Paper.

709. King, G. R.; and Ertekin, T. M., 1989, *A Survey of Mathematical Models Related to Methane Production from Coal Seams: Part II: Non-Equilibrium Sorption Models*, from the proceedings of the 1989 Coalbed Methane Symposium, Tuscaloosa, Alabama, available as Paper 8951.

**Summary:** Symposium Paper.

710. Kirschbaum, M. A.; Correia, G. A.; and McPhillips, M., 1982, *Coal Exploratory Drilling During 1979 in Western Powder River County, Montana*, available from the United States Geological Survey as OF 82-0748.

**Summary:** USGS Open File Report.

711. Kirschbaum, Mark A.; Roberts, Laura N. R.; and Biewick, Laura R. H., 2000, *Geologic Assessment of Coal in the Colorado Plateau; Arizona, Colorado, New Mexico, and Utah*, available from the United States Geological Survey as P 1625-B.

**Summary:** This USGS Professional Paper presents a geologic assessment of coal deposits of the Colorado Plateau and gives new resource estimates for selected assessment units.

712. Kissel, F. N., 1972, *The Methane Migration and Storage Characteristics of the Pittsburgh, Pocahontas No. 3, and Oklahoma Hartshorne Coalbeds*, U. S. Bureau of Mines Report of Investigations 7677, available from the National Technical Information Service.

**Summary:** USBM Report.

713. Kissel, F. N.; McCulloch, C. M.; and Elder, C. H., 1973, *The Direct Method of Determining Methane Content of Coalbeds for Ventilation Design*, U. S. Bureau of Mines Report of Investigations 7767, available from the National Technical Information Service.

**Summary:** USBM Report.

714. Kizil-sshtein, L, Ya, 1998, *Heavy-metal Geochemistry of Coal; An Ecological Aspect*, available from MAIK Nauka/Interperiodica Publishing.

**Summary:** Report.

715. Kizil-sshtein, L, Ya, 1999, *Vanadium Geochemistry of Coal; An Ecological Aspect*, available from MAIK Nauka/Interperiodica Publishing.

**Summary:** Report.

716. Klawitter, A. L.; Hoak, T., E.; and Decker, A. D., 1995, *Integrated Exploration Strategy for Locating Areas Capable of High Gas Rate Cavity Completion in Coalbed Methane Reservoirs*, from the proceedings of the 1995 International Unconventional Gas Symposium, Tuscaloosa, Alabama, available as Paper 9517.

**Summary:** Symposium Paper.

717. Kline, R. J.; Mokwa, L. P.; and Blankenship, P. W., 1987, *Island Creek Corporation's Experience with Methane Degasification*, from the proceedings of the 1987 Coalbed Methane Symposium, Tuscaloosa, Alabama, available as Paper 8755.

**Summary:** Symposium Paper.

718. Knollenberg, P. S., 1999, *TEC Pioneers Oklahoma Coal Gas Play*, from American Oil & Gas Reporter, v. 42, no. 12, available from the publisher.

**Summary:** Article.

719. Knox, L. M.; and Hadro, J., 2001, *Canister Desorption Techniques: Variation and Reliability*, from the proceedings of the International Coalbed Methane Symposium, Tuscaloosa, Alabama, available as Paper 0123.

**Summary:** Symposium Paper.

720. Koenig, Robert A.; and Bell, Gregory J., 1985, *Design of Single-Phase Flow Tests for Water-Saturated Coalbed Methane Reservoirs*, from Quarterly Review of Methane from Coal Seams Technology, v. 3, no. 1, available from the publisher.

**Summary:** Article.



721. Koenig, R. A.; McKee, C. R.; Reverand, J. M.; Ward, W. P.; and Way, S. C., 1985, *Hydrologic Characterization of Coal Seams for Methane Recovery. Activity 2 Topical Report: Hydrologic Constraints and Single-Phase Test Procedures*, available from the Gas Technology Institute as GRI-83/0065.2.

**Summary:** Final report on 15 methods for analysis of single-phase well tests as they apply to low permeability coal seam natural gas reservoirs.

722. Koenig, R. A.; Bumb, A. C.; Kunkel, J. R.; McKee, C. R.; Murphy, C. L.; Ramesh, M. S.; and Reverand, J. M., 1989, *Hydrologic Characterizations of Coal Seams for Methane Recovery*, available from the Gas Technology Institute as GRI-89/0220.

**Summary:** Final report on methods developed to characterize the hydrologic properties of coal seam natural gas reservoirs.

723. Koenig, R. A., 1989, *Hydrologic Characterizations of Coal Seams for Optimum Dewatering and Methane Drainage*, from Quarterly Review of Methane from Coal Seams Technology, v. 7, available from the publisher.

**Summary:** Article.

724. Koenig, R. A.; and Schraufnagel, R. A., 1992, *Application of the Slug Test in Coalbed Methane Testing*, available from the Society of Petroleum Engineers in Reprint Series, 35.

**Summary:** SPE Report.

725. Koenig, R. A.; Choi, S. K.; and Meaney, K. T. A., 1995, *In-Situ Determination of Relative Permeability in Coal Seams Using a Two-Phase Well-Testing Tool*, from the proceedings of the 1995 International Unconventional Gas Symposium, Tuscaloosa, Alabama, available as Paper 9519.

**Summary:** Symposium Paper.

726. Kohler, T. E., 2000, *Development and Application of a Compositional Coalbed Methane Production Model*, PhD. Dissertation, available in Dissertation Abstract Int. Section B, v. 61, no. 2.

**Summary:** Doctoral Dissertation.

727. Koide, H.; and Yamazaki, I. K., 2000, *Subsurface CO<sub>2</sub> Disposal with Enhanced Gas Recovery and Biogeochemical Carbon Recycling*, from the proceedings of the 2000 AAPG International Conference, Bali, Indonesia, available from the American Association of Petroleum Geologists in AAPG Bulletin, v. 84, no. 9

**Summary:** AAPG Conference Paper.

728. Kopp, O. C.; Bennett, M. E., III; and Clark, C. E., 2000, *Volatiles Lost During Coalification*, from International Journal of Coal Geology, v. 44, available from the publisher.

**Summary:** Article.

729. Koraido, Scott M., 1993, *Natural Gas Industry Production Water and Waste Survey Demographics*, from Quarterly Review of Methane from Coal Seams Technology, v. 11, no. 2, available from the publisher.

**Summary:** Article.

730. Krasyuk, N. N.; Zolotykh, S. S.; Zharov, A. I.; and Zhmurovsky, D. I., 1999, *Coalbed Methane in Energy Sector. Mines of Coal Mining Stock Companies "Belovougol" and "Leninskugol,"* from the proceedings of the 1999 International Coalbed Methane Symposium, Tuscaloosa, Alabama, available from the University of Alabama.

**Summary:** Symposium Paper.

731. Kravits, S. J.; Schwoebel, J. J.; and Chiari, D., 1993, *Utilization of Horizontal In-Mine Gob Ventilation Boreholes at Cambria Slope No. 33 Mine*, from the proceedings of the 1993 International Coalbed Methane Symposium, Birmingham, Alabama, available as Paper 9338.

**Summary:** Symposium Paper.

732. Krooss, B. M.; Gensterblum, Y.; Siemons, N.; van Bergen, F.; Pagnier, H. J. M.; and David P., 2001, *High Pressure Methane and Carbon Dioxide Adsorption on Dry and Moisture-Equilibrated Carboniferous Coals*, from the proceedings of the 2001 International Coalbed Methane Symposium, Tuscaloosa, Alabama, available as Paper 0119.

**Summary:** Symposium Paper.

733. Kruger, D. W., 1993, *International Opportunities to Reduce Coal Mine Methane*, from the proceedings of the 1993 International Coalbed Methane Symposium, Birmingham, Alabama, available as Paper 9339.

**Summary:** Symposium Paper.

734. Kruger, D. W., 1995, *International Prospects for Coalbed Methane Recovery at Coal Mines: An*

*Overview of Methane Emissions, Recovery Practices and Key Opportunities*, from the proceedings of the 1995 International Unconventional Gas Symposium, Tuscaloosa, Alabama, available as Paper 9512.

**Summary:** Symposium Paper.

735. Kumar, P.; and Lochan, Rajiw, 2001, *Mine Related Coalbed Methane Recovery & Utilization Project in India*, from the proceedings of the 2001 International Coalbed Methane Symposium, Tuscaloosa, Alabama, available as Paper 0146.

**Summary:** Symposium Paper.

736. Kuuskraa, V.A.; McFall, K.S.; and Wicks, D.E., 1986, *Geologic Assessment of Natural Gas from Coal Seams in the Warrior Basin, Alabama*, available from the Gas Technology Institute as GRI-86/0272.

**Summary:** This report discusses the geologic assessment of Black Warrior Basin, Alabama, gas-in-place estimates.

737. Kuuskraa, V.A.; McFall, K.S.; Sedwick, K.B.; and Wicks, D.E., 1986, *Geologic Assessment of Natural Gas from Coal Seams in the Piceance Basin, Colorado*, available from the Gas Technology Institute as GRI-87/0060.

**Summary:** This report discusses the geologic assessment of the three major coal groups in the Piceance Basin and gives gas-in-place estimates.

738. Kuuskraa, Vello A.; and Brandenburg, Charles F., 1989, *Coalbed Methane Sparks a New Energy Industry*, from OGJ Special, October 9, 1989, available from the publishers of the Oil & Gas Journal.

**Summary:** Article.

739. Kuuskraa, V. A.; and Boyer, C. M., 1993, *Economic and Parametric Analysis of Coalbed Methane*, available from the American Association of Petroleum Geologists, in AAPG Studies in Geology, 38.

**Summary:** AAPG Report.

740. Kuuskraa, V. A.; and Campagna, D. J., 1999, *Low Cost Methods for Finding Tight Gas, Gas Shales and Coalbed Methane*, from the proceedings of the 1999 Department of Energy, Federal Energy Technology Center Oil and Gas Conference, Dallas, Texas, available as DOE/FETC Report No. 99-1103.

**Summary:** Federal Energy Technology Center Conference Report.

741. Kvenvolden, Keith A.; and Lorenson, Thomas D., 2000, *Methane and Other Hydrocarbon Gases in Sediment from the Southeastern North American Continental Margin*, from Proceedings of the Ocean Drilling Program, Scientific Results, available from Texas A & M University.

**Summary:** Discussion of residual concentrations and distributions of hydrocarbon gases from methane to n-heptane. Measurements were taken from sediments recovered from seven sites.

742. Lamarre, R. A., 1999, *Exploring for Large Coalbed Methane Stratigraphic Traps in Ferron Coals of East-Central Utah*, from the proceedings of the 1999 Annual GSA Meeting, Denver, Colorado, available from the Geological Society of America in Abstracts with Programs, v. 31, no. 7.

**Summary:** GSA Meeting Paper.

743. Lamarre, Robert, 2000, *Coalbed Methane Stratigraphic Traps in Ferron Coals of East-Central Utah*, from Texaco Exploration and Production.

**Summary:** Texaco Report.

744. Lamarre, R. A., 2002, *Hydrodynamic and Stratigraphic Controls for a Large Coalbed Methane Accumulation in Ferron Coals of East-Central Utah*, available from the Rocky Mountain Association of Geologists in Coalbed Methane in North America, II.

**Summary:** RMAG Report.

745. Lamarre, Robert A.; and Pratt, Timothy J., 2002, *Reservoir Characterizations Study: Calculation of Gas-in-Place in Ferron Coals at Drunkard's Wash Unit, Carbon and Emery Counties, Utah*, from The Mountain Geologist, v. 39, no. 2, available from the publisher.

**Summary:** Article.

746. Lamberson, M. N.; and Bustin, R. M., 1993, *Coalbed Methane Characteristics of Gates Formation Coals, Northeastern British Columbia: Effect of Maceral Composition*, available from the American Association of Petroleum Geologists in AAPG Bulletin, v. 77.

**Summary:** AAPG Bulletin.

747. Lambert, S. W.; and Trevits, M. A., 1980, *The Feasibility of No-Propant Stimulation to Enhance Removal of Methane from the Mary Lee Coalbed*, available from the United States Department of

Energy as Report of Investigations CMTC-TR80-1.

**Summary:** DOE Contracted Study.

748. Lambert, S. W.; Trevits, M. A.; and Steidl, P. F., 1980, *Vertical Borehole Design and Completion Practices to Remove Methane Gas from Minable Coalbeds*, available from the U. S. Department of Energy as DOE/CMTC/TR-80/2.

**Summary:** DOE Report.

749. Lambert, S. W.; Niederhofer, J. D.; and Reeves, S. R., 1987, *Multiple Coal Seams Well Completion Experience in the Deerlick Creek Field, Black Warrior Basin, Alabama*, from the proceedings of the 1987 Coalbed Methane Symposium, Tuscaloosa, Alabama, available as Paper 8721.

**Summary:** Symposium Paper.

750. Lambert, S. W., 1989, *Comparison of Open Hole, Slotting and Perforating Completion Methods for Multiseam Coalbed Gas Wells*, from the proceedings of the 1989 Coalbed Methane Symposium, Tuscaloosa, Alabama, available as Paper 8972.

**Summary:** Symposium Paper.

751. Lambert, S. W.; Graves, S. L.; and Jones, A. H., 1989, *Warrior Basin Drilling and Stimulation*, from *Oil & Gas Journal*, October 9, 1989, available from the publisher.

**Summary:** Article.

752. Lambert, S. W.; Palmer, I. D.; and Spitler, J. L., 1993, *Coalbed Methane Well Completions and Stimulations*, available from the American Association of Petroleum Geologists in *AAPG Studies in Geology*, 38, Chapter 14.

**Summary:** AAPG Report.

753. Lambert, S. W.; Saulsberry, J. L.; and Reeves, S. R., 1995, *Coalbed Methane Production Improvement/Recompletion Project in the Warrior Basin*, available from the Gas Technology Institute as GRI-95/0034.

**Summary:** This GRI report discusses research into reasons why Warrior Basin wells producing natural gas from coal seams are not producing satisfactorily.

754. Lambert, S. W.; Saulsberry, J. L.; Steidl, P. F.; Conway, M. W.; and Spafford, S. D., 1995, *Fracturing Experience at the Rock Creek Multiple Coal Seams Project*, available from the Gas Technology Institute as GRI-95/0035.

**Summary:** This topical report reviews well stimulation design considerations, diagnostic results, and production results for a number of production wells stimulated at the Rock Creek Project.

755. Lambert, Stephen W.; and Siegfried, Robert W., 2001, *Evaluation of Frontier Coalbed Methane and Shale Plays in the United States*, from GasTIPS, v. 7, no. 2, available from the Gas Technology Institute.

**Summary:** Article.

756. Lambert, S. W.; and Lombardi, T. E., 2001, *Frontier Coalbed Gas Area Selection; Screening Process*, from the proceedings of the 2001 International Coalbed Methane Symposium, Tuscaloosa, Alabama, available as Paper 0109.

**Summary:** Symposium Paper.

757. Landis, E. R., 1977, *Coal Resources of Colorado and Wyoming*, available from the American Association of Petroleum Geologists.

**Summary:** AAPG Report.

758. Lang, Karl, 2002, *Options for Coalbed Methane Water Management*, from PTTC Network News, v. 8, no. 1, available from the Petroleum Technology Transfer Center.

**Summary:** Article.

759. Langenberg, W.; Kalkreuth, W.; Levine, J.; Strobl, R.; Demchuk, T.; Hoffman, G.; and Jerzykiewicz, T., 1990, *Coal Geology and Its Application to Coal-bed Methane Reservoirs*, from lecture notes for a short course, available from the Alberta Resource Council in Information Series 109.

**Summary:** Alberta Resource Council Short Course.

760. Langenberg, W., 1991, *Coalification Patterns and Coalbed Methane Potential in the Cadomin Area, Alberta, Canada*, from Journal of Coal Quality, v. 10, available from the publisher.

**Summary:** Report.

761. Langenberg, C. W.; Grunsky, E.; Chao, D.; and Ledrew, J., 2000, *The Coal Valley of the Central Alberta Foothills*, from the proceedings of the Geocanada 2000 Millennium Geoscience Summit Conference, Calgary, Canada.

**Summary:** Conference Paper.

762. Larsen, Veryl E.; and Merry, Ray D., 1982, *Geologic Investigations of the Methane Potential of Western U. S. Coal Beds*, available from the Gas Technology Institute as GRI-80/0180.

**Summary:** This GRI final report discusses the coal seam gas potential of the Raton and Piceance Basins.

763. Larsen, Veryl E., 1989, *Preliminary Evaluation of Coalbed Methane Geology and Activity in the Recluse Area, Powder River Basin, Wyoming*, from Quarterly Review of Methane from Coal Seams Technology, v. 6, no. 3, available from the publisher.

**Summary:** Article.

764. Larson, L. R.; and Daddow, Richard L., 1984, *Ground-Water-Quality Data from the Powder River Basin, Northeastern Wyoming*, available from the United States Geological Survey as Open File Report OF 83-0939.

**Summary:** USGS Open File Report.

765. Larson, L. R., 1984, *Ground-Water Quality in Wyoming*, available from the United States Geological Survey as Report WRI 84-4034.

**Summary:** USGS Report.

766. Larson, L. R., 1988, *Coal-Spoil and Ground-Water Chemical Data from Two Coal Mines; Hanna Basin and Powder River Basin, Wyoming*, available from the United States Geological Survey as Open File Report OF 88-0481.

**Summary:** USGS Open File Report.

767. Lasseter, Edward L., Jr., 1993, *Organizational Aspects of the Warrior Basin Environmental Cooperative*, from the proceedings of the 1993 International Coalbed Methane Symposium, Birmingham, Alabama, available as Paper 9398.

**Summary:** Symposium Paper.

768. Laubach, S. E.; Tremain, C. M.; and Ayers, W. B., 1991, *Coal Fracture Studies: Guides for Coalbed Methane Exploration and Development*, from Journal of Coal Quality, v. 10, available from the publisher.

**Summary:** Article.

769. Laubach, Stephen E.; and Tremain, Carol M., 1991, *Distribution and Origin of Regional Coal Fracture (Cleat) Domains in Upper Cretaceous Fruitland Formation Coal; Possible Effects on Coalbed Stimulation and Methane Production*, available from the American Association of Petroleum Geologists.

**Summary:** AAPG Report.

770. Laubach, S. E.; Tyler, Roger; Tremain, C. M.; Grout, M. A.; and Ambrose, W. A., 1991, *Fracture Patterns in Coal in the Western United States; Observations and Implications for Development of Coalbed Methane Resources*, available from the Geological Society of America.

**Summary:** GSA paper.

771. Laubach, S. E.; Tyler, Roger; Ambrose, W. A.; Tremain, C. M.; and Grout, M. A., 1992, *Preliminary Map of Fracture Patterns in Coal in the Western United States*, available from the Wyoming Geological Association.

**Summary:** WGA Map.

772. Laubach, S. E.; and Tremain, C. M., 1994, *Fracture Swarms: Potential Targets for Methane Exploration in Upper Cretaceous Sandstone and Coal, Northern San Juan Basin*, available from the New Mexico Bureau of Mines and Mineral Resources as Bulletin 146.

**Summary:** New Mexico Bureau of Mines and Mineral Resources Bulletin.

773. Laubach, S. E.; Marrett, R. A.; Olson, J. E.; and Scott, A. R., 1998, *Characteristics and Origins of Coal Cleat: A Review*, from International Journal of Coal Geology, v. 35, available from the publisher.

**Summary:** Article.

774. Law, B. E.; and Grazia, S. L., 1972, *Preliminary Geologic Map and Coal Resources of the Decker Quadrangle, Big Horn County, Montana*, available from the United States Geological Survey as OF 72-0220.

**Summary:** USGS Open File Report / Map.



775. Law, B. E., 1977, *Geophysical Logs of Test Holes from the Henry Mountains Coal Field, Garfield and Wayne Counties, Southeastern Utah*, available from the United States Geological Survey as OF 77-0041.

**Summary:** USGS Open File Report / Map.

776. Law, B. E., 1978, *Geologic Map and Coal Deposits of the Gillette West Quadrangle, Campbell County, Wyoming*, available from the United States Geological Survey as MF-974.

**Summary:** USGS Map.

777. Law, B. E.; Barnum, B. E.; and Wollenzien, T. P., 1979, *Coal Bed Correlations in the Tongue River Member of the Fort Union Formation, Monarch, Wyoming, and Decker, Montana*, available from the United States Geological Survey as I-1128.

**Summary:** USGS Report.

778. Law, B. E., 1979, *Coal Deposits of the Emery Coal Zone, Henry Mountains Coal Field, Garfield and Wayne Counties, Utah*, available from the United States Geological Survey as MF-1082-A.

**Summary:** USGS Report / Map.

779. Law, B. E., 1979, *Surface Coal Sections in the Emery Coal Zone, Henry Mountains Coal Field, Garfield and Wayne Counties, Utah*, available from the United States Geological Survey as MF-1082-B.

**Summary:** USGS Report.

780. Law, B. E.; Hatch, J. R.; Kukal, G. C.; and Keighin, C. W., 1983, *Geologic Implications of Coal Dewatering*, available from the American Association of Petroleum Geologists in AAPG Bulletin, 67.

**Summary:** This AAPG paper discusses the coal-derived water and how it compares to other formation fluids.

781. Law, B. E.; Hatch, J. R.; Kukal, G. C.; and Keighin, C. William, 1983, *Geologic Implications of Dewatering of Coal and Other Carbonaceous Lithologies; A Hypothesis*, AAPG Annual Convention with Divisions SEPM/EMD/DPA, from AAPG annual convention, available from the American Association of Petroleum Geologists in AAPG Bulletin, 67.

**Summary:** AAPG Conference Document.

782. Law, B. E., 1988, *Coal-bed Methane*, available from the United States Geological Survey as B 1870.

**Summary:** USGS Report.

783. Law, B. E.; Nuccio, V. F.; and Stanton, R. W., 1989, *Evaluation of Source-Rock Characteristics, Thermal Maturation & Pressure History, of the Upper Cretaceous Cameo Coal Zone, Deep Seam Well, Piceance Basin, Colorado*, from the proceedings of the 1989 Coalbed Methane Symposium, Tuscaloosa, Alabama, available as Paper 8984.

**Summary:** Symposium Paper.

784. Law, B. E.; Anders, D. E.; and Michael, G. E., 1990, *Use of Rock-Eval Pyrolysis and Vitrinite Reflectance Data in Characterizing Type and Maturity of Organic Matter in Coal, Upper Cretaceous Fruitland Formation, San Juan Basin, New Mexico and Colorado*, from AAPG Rocky Mountain Section Meeting, available from the American Association of Petroleum Geologists in AAPG Bulletin, 74.

**Summary:** AAPG Bulletin.

785. Law, B. E.; Rice, D. D.; and Flores, R. M., 1991, *Coalbed Gas Accumulations in the Paleocene Fort Union Formation, Powder River Basin, Wyoming*, available from the Rocky Mountain Association of Geologists.

**Summary:** Paper.

786. Law, B. E., 1992, *Coalbed Methane*, available from the United States Geological Survey as B 2007.

**Summary:** USGS Report.

787. Law, B. E.; and Rice, D. D., 1993, *Coalbed Methane - New Perspectives on an Old Source of Energy*, from the proceedings of the Tenth Annual International Pittsburgh Coal Conference.

**Summary:** Conference Document.

788. Law, B. E.; and Rice, D. D., 1993, *Hydrocarbons from Coal*, available from the American Association of Petroleum Geologists, in AAPG Studies in Geology, 38.

**Summary:** AAPG Report.

789. Law, B. E., 1993, *The Relationship Between Coal Rank and Cleat Spacing; Implications for the Prediction of Permeability in Coal*, from the proceedings of the 1993 International Coal Symposium, Birmingham, Alabama, available as Paper 9341.

**Summary:** Symposium Paper.

790. Law, B. E.; Spencer, C. W.; Crovelli, R. A.; Schmoker, J. W.; Ryder, R. T.; Sutherland, W. M.; and Frohne, K. H., 1995, *Low Permeability (Tight) Gas Reservoirs; an Environmentally Acceptable Major Source of Energy for the 21st Century?*, from the 10th V.E. McKelvey Forum on Mineral and Energy Resources, available from the United States Geological Survey as C 1108.

**Summary:** USGS Conference Paper.

791. Law, B. E., 1998, *Geologic Attributes of Coalbed Methane Accumulations in the United States*, from the proceedings of the International Symposium of the All-Russian Petroleum Scientific-Research Geological-Exploration Institute (VNIGRI).

**Summary:** Symposium Document.

792. Lawrence, A. W., 1993, *Coalbed Methane Produced-water Treatment and Disposal Options*, from Quarterly Review of Methane from Coal Seams Technology, v. 11, no. 2, available from the publisher.

**Summary:** Report.

793. Laxminarayana, C.; and Crosdale, P. J., 1999, *Role of Coal Type and Rank on Methane Sorption Characteristics of Bowen Basin, Australia Coals*, from International Journal of Coal Geology, v. 40, no. 4, available from the publisher.

**Summary:** Article.

794. Laxminarayana, C.; and Crosdale, P. J., 2001, *Heat of Methane Adsorption of Coal: Implications for Pore Structure Development*, from the proceedings of the International Coalbed Methane Symposium, Tuscaloosa, Alabama, available as Paper 114.

**Summary:** Symposium Paper.

795. Laxminarayana, Chikatamarla; and Crosdale, Peter J., 2002, *Controls on Methane Sorption Capacity of Indian Coals*, available from the American Association of Petroleum Geologists in AAPG Bulletin, v. 86, no. 2.

**Summary:** AAPG Report.

796. Layne, A. W.; Siriwardane, H. J.; and Byrer, C. W., 1987, *Factors that Influence the Effective Placement of Coalbed Methane Drainage Wells for Removal of Gob Gas Above Longwall Panels*, from the proceedings of the 1987 Coalbed Methane Symposium, Tuscaloosa, Alabama, available as Paper 8753.

**Summary:** Symposium Paper.

797. Lee, A. A.; Skillern, C. R.; and Watkins, D. R., 1981, *Gas Recovery from Coal Deposits*, available from the Gas Technology Institute as GRI-80/0033.

**Summary:** This GRI report discusses tests that were conducted in the Greater Green River Area and in the Piceance Basin to assess the potential for production of coal seam gas from coalbeds below 2,500 feet.

798. Lee-Ryan, P. B.; Fillo, John P.; Tallon, James T.; and Evans, James M., 1991, *Evaluation of Management Options for Coalbed Methane Produced Water*, available from Dan A. Thompson, University of Alabama, College of Continuing Studies.

**Summary:** This is a conference paper presented at the Coalbed Methane Symposium, 3rd, in 1991. This paper reports on an investigation into the feasibility and costs associated with treatment and disposal of waters produced with coal seam natural gas. Waters from the Black Warrior Basin in Alabama and the Lance-Fox Hills aquifer in Wyoming were used for the evaluation.

799. Leel, Woodruff; and Wickstrom, Charles, 1987, *Methane Emissions Along a Salt Marsh Salinity Gradient*.

**Summary:** Report.

800. Leel, Woodruff; and Wickstrom, Charles, 1990, *Coalbed Methane Resource of the Rock Springs Formation on the Rock Springs Uplift, Sweetwater County, Wyoming*, available from the American Association of Petroleum Geologists.

**Summary:** AAPG Report.

801. Leighfield, K. G., 1999, *Coal as an Energy Resource*, from Minerals '98, Institution of Mining and Metallurgy, Transactions, Section B, Applied Earth Science, v. 108, available from the publisher.

**Summary:** Article.

802. Lemons, B. N.; and Nemirow, L., 1989, *Maximizing the Section 29 Credit in Coal Seam Methane Transactions*, from Journal of Taxation, v. 70, available from the publisher.

**Summary:** Article

803. Levine, J. R., 1987, *Influence of Coal Composition on the Generation and Retention of Coalbed Natural Gas*, from the proceedings of the 1987 Coalbed Methane Symposium, Tuscaloosa, Alabama, available as Paper 8711.

**Summary:** Symposium Paper.

804. Levine, J. R., 1990, *Generation, Storage and Migration of Natural Gas in Coal Bed Reservoirs*, from the Alberta Research Council, available in Information Series 109.

**Summary:** Alberta Research Council Report.

805. Levine, J. R., 1991, *The Impact of Oil Formed During Coalification on Generation and Storage of Natural Gas in Coalbed Reservoir Systems*, from the proceedings of the 1991 Coalbed Methane Symposium, Tuscaloosa, Alabama, available as Paper 9126.

**Summary:** Symposium Paper.

806. Levine, J. R., 1991, *New Methods for Assessing Gas Resources in Thin-bedded, High-ash Coals*, from the proceedings of the 1991 Coalbed Methane Symposium, Tuscaloosa, Alabama, available as Paper 9125.

**Summary:** Symposium Paper.

807. Levine, J. R., 1992, *Five Common Misconceptions Regarding Coalbed Gas Reservoir Systems*, from Quarterly Review of Methane from Coal Seams Technology, v. 9, nos. 3-4, available from the publisher.

**Summary:** Report.

808. Levine, J. R., 1992, *Oversimplifications Can Lead to Faulty Coalbed Gas Reservoir Analysis Five*, from Oil & Gas Journal, v. 90, no. 47, available from the publisher.

**Summary:** Article.

809. Levine, J. R., 1993, *Coalification: The Evolution of Coal as Source Rock and Reservoir Rock for*

*Oil and Gas*, available from the American Association of Petroleum Geologists in AAPG Studies in Geology, 38.

**Summary:** AAPG Report.

810. Levine, J. R., 1996, *Model Study of the Influence of Matrix Shrinkage on Absolute Permeability of Coal Bed Reservoirs*, available from the publisher, the Geological Society, London, as Special Publication 109.

**Summary:** Geological Society Report.

811. Levine, J. R.; Camp, B. S.; Lewis, C. R.; and Faulkinberry, D., 1997, *Maximizing Production and Profitability of Coal Seam Gas Without Tax Credit Incentives, White Oak Creek Field, Black Warrior Basin, Alabama*, from the proceedings of the 1997 International Coalbed Methane Symposium, Tuscaloosa, Alabama, available as Paper 9780.

**Summary:** Symposium Paper.

812. Lewin, J. L., 1995, *Energy and Environmental Policy Options to Promote Coalbed Methane Recovery*, from the proceedings of the 1995 International Unconventional Gas Symposium, Tuscaloosa, Alabama, available as Paper 9540.

**Summary:** Symposium Paper.

813. Lewis, R. T., 1999, *Coalbed Methane Production of the Buck Knob Anticline Field, Wise County, Virginia*, available from the American Association of Petroleum Geologists in AAPG Bulletin, v. 83.

**Summary:** AAPG Bulletin.

814. Li, H.; and Ogawa, Y., 2001, *Enhanced Methane Storage and Generation in the Shear Zones Along Coal Seams: A Potentially Significant Coalbed Methane Reservoir*, from the proceedings of the 2001 International Coalbed Methane Symposium, Tuscaloosa, Alabama, available as Paper 0150.

**Summary:** Symposium Paper.

815. Li, L.; and Tang, F., 2000, *Two Kinds of Nontraditional Mining Technology*, from the proceedings of the 2000 International Geological Conference, Hubei, China.

**Summary:** Conference Paper.

816. Lico, M. S.; Kharaka, Y. K.; Carothers, W. W.; and Wright, V. A., 1982, *Methods for Collection and Analysis of Geopressured Geothermal and Oil Field Waters*, available from the United States Geological Survey as Report W 2194.

**Summary:** USGS Report.

817. Lindley, Laura, 2001, *Coalbed Methane Life Cycle of a Federal Unit*, from the proceedings of the 2001 AAPL Annual Meeting and Conference, Salt Lake City, Utah, available from the American Association of Petroleum Landmen.

**Summary:** AAPL Conference Paper.

818. Lindsay, P.; Campbell, R. N.; Moore, T. A.; and Ferm, J. C., 2002, *Lithological Types and Envirogeotechnical Characteristics of the Waikato Coal Measures, New Zealand*, from International Journal of Coal Geology, v. 49, no. 2-3, available from the publisher.

**Summary:** Article.

819. Linz, David G.; Simpson, T. E.; Lawrence, Alonzo W.; Miller, Jeffrey A.; and Davis, Hal A., 1993, *Coalbed Methane Produced Water Management Strategies in the Black Warrior Basin of Alabama*, available from the University of Alabama.

**Summary:** Paper contains a summary of data gathered for the development of a guidance manual that presents the methodology for managing produced water in the Black Warrior Basin of Alabama. The method presented manages the water through the use of treatment ponds and National Pollutant Discharge Elimination System (NPDES) permits.

820. Littke, R.; and Leythaeuser, D., 1993, *Migration of Oil and Gas in Coals*, available from the American Association of Petroleum Geologists in AAPG Studies in Geology, 38.

**Summary:** AAPG Report.

821. Liu, M.; Gou, J.; Yu, G.; and Lin, J., 2000, *Application of Seismic Anisotropy Caused by Fissures in Coal Seams to the Detection of Coal-Bed Methane Reservoirs*, available from the Geological Society of China.

**Summary:** Geological Society of China Paper.

822. Logan, Terry L; and Marshall, Richard B., 1985, *Drilling and Configuration Methods for Deep Coalbed Methane Wells Used at the Red Mountain Site, Piceance Basin, Colorado*, available from the Gas Technology Institute as GRI-85/0137.

**Summary:** This GRI topical report discusses the findings from engineering analyses and field experiences of the Deep Coal Seam Project in the Piceance Basin of Colorado.

823. Logan, Terry L., 1986, *Baseline Stimulation Results for a Deep Coal Seam at the Red Mountain Unit, Piceance Basin, Colorado*, available from the Gas Technology Institute as GRI-86/0169.

**Summary:** Discusses reservoir, core and stress tests that were conducted to design fracture stimulation treatments for two wells drilled into the coal seam in the Piceance basin.

824. Logan, T. L., 1988, *Horizontal Drainhole Drilling Techniques Used in Rocky Mountain Coal Seams*, available from the Rocky Mountain Association of Geologists in Rocky Mountain Association of Geologists Guidebook.

**Summary:** RMAG Report.

825. Logan, T. L., 1989, *Coalbed Methane; 6, Western Basins Dictate Varied Operations*, from Oil & Gas Journal, available from the publisher.

**Summary:** Article.

826. Logan, T. L.; Clark W. F.; and McBane Richard A., 1989, *Comparing Different Coalbed Methane Completion Techniques, Hydraulic Fracture and Openhole Cavity, at the Northeast Blanco Unit, San Juan Basin*, available from the publisher, the University of Alabama, School of Mines and Energy Development.

**Summary:** This conference paper discusses the different completion techniques used on wells in the San Juan Basin.

827. Logan, T. L.; Clark W. F.; and McBane R. A., 1992, *Comparing Openhole Cavity and Cased Hole Hydraulic Fracture Completion Techniques, San Juan Basin, New Mexico*, available from the Society of Petroleum Engineers in Reprint Series, 35.

**Summary:** SPE Report.

828. Logan, T. L., 1993, *Drilling Techniques for Coalbed Methane*, available from the American Association of Petroleum Geologists in AAPG Studies in Geology, 38.

**Summary:** AAPG Report.

829. Logan, T. L.; Mavor, M. J.; and Khodaverdian, M., 1993, *Optimization and Evaluation of*



*Open-Hole Completion Techniques for Coal Gas Wells*, from the proceedings of the 1993 International Coalbed Methane Symposium, Birmingham, Alabama, available as Paper 9346.

**Summary:** Symposium Paper.

830. Logan, Terry L; McLennan, John D.; and Wyman, Richard E., 1995, *Cavity Completion Technique for Coal Gas Reservoirs: Procedures*, available from the Gas Technology Institute as GRI-95/0452.

**Summary:** This GRI topical report outlines the various techniques, costs, and potential hazards associated with openhole cavity completion of natural gas from coal seams.

831. Logan, T. L.; and Mavor, M. J., 1995, *Western Cretaceous Coal Seam Project Final Report*, available from the Gas Technology Institute as GRI-94/0089.

**Summary:** This final report presents the 11-year history of the Deep Coal Seam and Western Cretaceous Coal Seam Projects.

832. Logan, T. L.; and Robinson, J. R., 1995, *Western Cretaceous Coal Seam Project: Summary of the Evergreen Operating Corporation Rosa #283 Well, Cooperative Research Project, San Juan Basin*, available from the Gas Technology Institute as GRI-95/0110.

**Summary:** This GRI report discusses a remedial stimulation treatment done to enhance gas production from a previously hydraulically fractured well.

833. Lopez, D. L.; Cobb, M.; Golding, S. D.; and Glikson, M., 1999, *Modeling the Hydrothermal Generation of Coals and Coal-Seam Gas*, from Coalbed Methane: Scientific Environmental and Economic Evaluation, available from the publisher.

**Summary:** Report.

834. Lorenson, T. D.; Kvenvolden, K. A.; Barnes, P. W.; Poppe, B. N.; Sansone, F. J.; Rust, T. M.; Lilley, M. D.; and Olson, E. J., 1995, *Isotopic Composition of Methane in Seawater of the Alaska Beaufort Sea*, from International Union of Geodesy and Geophysics, available from the University of Hawaii.

**Summary:** Conference paper. Non-USGS publication by USGS and Non-USGS authors.

835. Lu, S.; He, J.; and Li, Z., 2000, *Responses of Geophysical Field Caused by Coal and Gas Outbursts*, from Journal of Changchun University of Science and Technology, v. 30.

**Summary:** Report.

836. Lyman, R. M., 1999, *Coal Update*, from Wyoming Geo-Notes, v. 61, available from the Wyoming State Geological Survey.

**Summary:** Report.

837. Lyman, R. M., 1999, *Minerals Update*, from Wyoming Geo-Notes, v. 62, available from the Wyoming State Geological Survey.

**Summary:** Report.

838. Lyman, R. M.; Harris, R. E.; Hausel, W. D.; and DeBruin, R. H., 1999, *1998 Mineral and Oil and Gas Exploration Summary, Wyoming*, from Wyoming Geo-Notes, v. 62, available from the Wyoming State Geological Survey.

**Summary:** Report.

839. Lyman, R. M.; and De Bruin, R. H., 1999, *Wyoming Fossil Fuels for the 21st Century*, from the proceedings of the National Meeting of the American Chemical Society, available in Abstracts of Papers, v. 217.

**Summary:** American Chemical Society Meeting Paper.

840. Lyman, Robert M.; and Volkmer, John E., 2001, *Pyrophoricity (spontaneous combustion) of Powder River Basin Coals - Considerations for Coalbed Methane Development*, available online from the Wyoming State Geological Survey as Coal Report CR 01-1.

**Summary:** Discussion of potential for self-ignition of coal in the immediate vicinity of coal seam natural gas wells of the Powder River Basin. This report details the conditions that favor spontaneous combustion in subbituminous coals of the Powder River Basin.

841. Lyman, R. M.; De Bruin, R. H.; Harris, R. E.; and Hausel, W. D., 2001, *Wyoming*, from Annual Review 2000, available from the Society for Mining, Metallurgy, and Exploration.

**Summary:** Society for Mining, Metallurgy, and Exploration Report.

842. Lyman, R. M.; and DeBruin, R. H., 2002, *Coalbed Methane Update*, from Wyoming Geo-Notes, v. 73, available from the Wyoming State Geological Survey.

**Summary:** Report.

843. Lyons, Paul C.; and Ryder, Robert T., 1995, *Selected Bibliography of Appalachian Coalbed Methane*, available from the United States Geological Survey as OF 95-0572.

**Summary:** USGS Report.

844. Lyons, Paul C., 1996, *Coalbed Methane Potential in the Appalachian States of Pennsylvania, West Virginia, Maryland, Ohio, Virginia, Kentucky, and Tennessee; An Overview*, available from the United States Geological Survey as OF 96-0735.

**Summary:** USGS Report.

845. Lyons, Paul C., 1997, *Appalachian Coalbed Methane*, from International Journal of Coal Geology, 38, available from the publisher, Elsevier.

**Summary:** Article.

846. Lyons, Paul C., 1997, *Central-Northern Appalachian Coalbed Methane Flow Grows*, from Oil & Gas Journal, July 7, 1997, available from the publisher.

**Summary:** Article.

847. Lyons, Paul C., 1998, *The Central and Northern Appalachian Basin; A Frontier Region for Coalbed Methane Development*, from International Journal of Coal Geology, 38 (1-2), available from the publisher, Elsevier.

**Summary:** Conference Document.

848. Lyons, W. S., 2001, *Seismic Maps Ferron Coalbed Sweetspots*, available from the American Association of Petroleum Geologists in AAPG Explorer, v. 22, no. 12.

**Summary:** AAPG Report.

849. MacDonald, D. J., 1995, *Coalbed Methane Resources in the Carboniferous of Nova Scotia: Canada - An Overview and Update*, from the proceedings of the 1995 International Unconventional Gas Symposium, Tuscaloosa, Alabama, available as Paper 9520.

**Summary:** Symposium Paper.

850. Macleod, R. K.; Cech, R.; and Hughes, D., 2000, *CBM (Coalbed Methane) Resource Potential in the Plains Area of Alberta*, from the proceedings of the 2000 SPE Canadian Energy Resource

Institute Gas Technology Symposium, Calgary, Canada, available from the Society of Petroleum Engineers as SPE-59784.

**Summary:** SPE Symposium Paper.

851. Magee, R.A.; Faist, M.B.; and Barrs, T.W., 1983, *Characterization and Disposal of Coal Gasification Waste Products: Phase 1 - Program Design*, available from the Gas Technology Institute as GRI-81/0119.

**Summary:** This is a final report on a five-year research plan that was developed to support design and permitting for disposal of solid wastes from a coal gasification facility. Discusses the regulatory and legal liabilities associated with the disposal.

852. Malone, P. G.; Briscoe, F. H.; Camp, B. S.; and Boyer, C. M., 1987, *Discovery and Explanation of Low Gas Contents Encountered in Coalbeds at the GRI/USSC Big Indian Creek Site, Warrior Basin, Alabama*, from the proceedings of the 1987 Coalbed Methane Symposium, Tuscaloosa, Alabama, available as Paper 8715.

**Summary:** Symposium Paper.

853. Malone, P. G.; Briscoe, F. H.; Camp, B. S.; and Boyer, C. M., 1987, *Methods of Calculating Coalbed Methane Reserves With Insight into the Advantages and Disadvantages of Each Method*, from the proceedings of the 1987 Coalbed Methane Symposium, Tuscaloosa, Alabama, available as Paper 8716.

**Summary:** Symposium Paper.

854. Malone, P. G.; Briscoe, F. H.; and Camp, B. S., 1987, *A Study of Coalbed Methane Production Trends as Related to Geological Features*, from the proceedings of the 1987 Coalbed Methane Symposium, Tuscaloosa, Alabama, available as Paper 8762.

**Summary:** Symposium Paper.

855. Malone, P. G.; Camp, B. S.; and Smith, J. L., 1989, *An Investigation of Parameters Affecting Desorption Rates of Warrior Basin Coals*, from the proceedings of the 1989 Coalbed Methane Symposium, Tuscaloosa, Alabama, available as Paper 8921.

**Summary:** Symposium Paper.

856. Malone, R. D.; and Byrer, C. W., 1981, *Methane Recovery from Coalbeds Well Description and Field Activities Log Procedures Manual*, available from the U.S. Department of Energy Morgantown

Energy Technology Center as Technical Report 82-3.

**Summary:** DOE Report.

857. Manik, J., 1999, *Compositional Modeling of Enhanced Coalbed Methane Recovery*, Doctoral Dissertation, available from Pennsylvania State University.

**Summary:** Doctoral Dissertation.

858. Manik, J.; Ertekin, T.; and Kohler, T. E., 2000, *Development and Validation of a Compositional Coalbed Simulator*, from the proceedings of the 2000 Annual CIM Petroleum Society Technology Meeting, Calgary, Canada, available from the Canadian Institute of Mining, Metallurgy and Petroleum as Paper CIM-2000-44.

**Summary:** CIM Meeting Paper.

859. Manik, J.; and Ertekin, T., 2000, *Performance Comparison of Various Injection Schemes in Enhanced Recovery of Coalbed Methane*, from the 2000 AAPG International Conference, Bali, Indonesia, available from the American Association of Petroleum Geologists in AAPG Bulletin, v. 84, no. 9.

**Summary:** AAPG Conference Paper.

860. Manydeeds, Stephen A., 1991, *CBM Potential of the Wind River Indian Reservation*, available from the U.S. Department of the Interior, Bureau of Indian Affairs.

**Summary:** BIA Report.

861. Maoyuan, Sun; and Shengchu, Huang, 1997, *Programs, Policies and Laws to Promote the Development of Coalbed Methane in China*, from the proceedings of the 1997 International Coalbed Methane Symposium, Tuscaloosa, Alabama, available as Paper 9750.

**Summary:** Symposium Paper.

862. Marinello, S. A.; and Quinn, J. C., 1995, *Methane Seeps in the San Juan Basin: Potential Pathways*, from the proceedings of the 1995 International Unconventional Gas Symposium, Tuscaloosa, Alabama, available as Paper 9507.

**Summary:** Symposium Paper.

863. Markochick, Dennis J.; and Law, Ben E., 1981, *Estimates of Gas Content in Coal and Carbonaceous Rocks from Deep Drilling in Pacific Creek Area, Northeastern Green River Basin, Sweetwater County, Wyoming*, available from the American Association of Petroleum Geologists in AAPG Bulletin, 65 (3).

**Summary:** AAPG Bulletin.

864. Markowski, A. K., 1993, *Coalbed Methane: New Energy from an Old Scourge?*, from Pennsylvania Geology, v. 24, no. 2, available from the Pennsylvania Geological Survey.

**Summary:** PGS Article.

865. Markowski, A. K., 1995, *Reconnaissance of Gas Contents and Geologic Aspects of the Coalbed Methane Resources of Pennsylvania*, available from the Pennsylvania Geological Survey as Open-File Report 95-09.

**Summary:** PGS Report.

866. Markowski, A. K., 1998, *Coalbed Methane Resource Potential and Current Prospects in Pennsylvania*, from International Journal of Coal Geology, v. 38, nos. 1-2, available from the Pennsylvania Geological Survey.

**Summary:** PGS Article.

867. Markowski, A. K., 2000, *Pennsylvania Coalbed Methane Wells Spreadsheet*, available from the Pennsylvania Geological Survey as Open-File Report 00-01.

**Summary:** PGS Report.

868. Markowski, A. K., 2001, *Reconnaissance of the Coalbed Methane Resources in Pennsylvania*, available from the Pennsylvania Geological Survey as Mineral Resource Report 95.

**Summary:** PGS Report.

869. Markowski, A. K., (Forthcoming), *Addenda to the Reconnaissance of the Coalbed Methane Resources in Pennsylvania*, to be available from the Pennsylvania Geological Survey.

**Summary:** PGS Report.

870. Mason, Richard Z.; Siegel, Martin M.; Barone, Saverio Peter; and Gash, Bruce W., 1987, *Economic*

*Evaluation of Underground Coal Gasification of Western Subbituminous Coal*, available from the U.S. Department of Energy Morgantown Energy Technology Center.

**Summary:** DOE Conference Paper.

871. Masszi, D., 1991, *Cavity Stress-relief Method for Recovering Methane from Coal Seams*, available from the Rocky Mountain Association of Geologists in Coalbed Methane of Western North America.

**Summary:** RMAG Report.

872. Massarotto, P.; Rudolph, V.; and Golding, S. D., 2001, *4-D Permeability Characterization of Coal Enhances Exploration and Production of CBM*, from the proceedings of the 2001 International Coalbed Methane Symposium, Tuscaloosa, Alabama, available from the University of Alabama.

**Summary:** Symposium Paper.

873. Mastalerz, M.; and Kvale, E. P., 1998, *Coal-bed Gas Potential in Daviess County, Indiana*, available from the Indiana Geological Survey as Open-File Study 98-7.

**Summary:** Indiana Geological Survey Open-File Study.

874. Mastalerz, M.; Glikson, M.; and Golding, S. D., eds., 1999, *Coalbed Methane: Scientific, Environmental and Economic Evaluation*, available from Kluwer Academic Publishers, Boston.

**Summary:** Paper.

875. Mastalerz, M.; and Kvale, E. P., 2000, *Coal Quality Variation and Coalbed Gas Content in Boreholes SDH-383 and SDH-384 in Posey County, Indiana*, available from the Indiana Geological Survey as Open-File Study 00-5.

**Summary:** Indiana Geological Survey Open-File Study.

876. Mastalerz, M.; and Kvale, E. P., 2000, *Coalbed Gas Potential in Illinois Basin Based on Recent Data from Indiana*, from the proceedings of the 2000 Annual AAPG-SEPM Convention, New Orleans, Louisiana, available from the American Association of Petroleum Geologists.

**Summary:** AAPG Convention Paper.

877. Matson, R. E., 1991, *Coal-bed Methane Discoveries in Powder River Basin*, available from the

American Association of Petroleum Geologists.

**Summary:** AAPG Report.

878. Mavor, M. J.; and Close, J. C., 1989, *Evaluation of the Cooperative Research Area Northeast Blanco Unit: Topical Report (Jan 88 to Dec 89)*, from Western Cretaceous Coal Seam Project, available from the Gas Technology Institute as GRI-90/0041.

**Summary:** GRI Report.

879. Mavor, M. J.; and Close, J. C., 1989, *Evaluation of the Cooperative Research Well, Hamilton #3: Topical Report (Jan 88 to Dec 89)*, from Western Cretaceous Coal Seam Project, available from the Gas Technology Institute as GRI-90/0040.

**Summary:** GRI Report.

880. Mavor, M. J.; Close, J. C.; Britton, R. N.; Erwin, T. M.; Logan, T. L.; and Marshall, R. B., 1989, *Western Cretaceous Coal Seam Project: Evaluation of the Cooperative Research Well, Colorado 32-7 #9, Operated by Mobil Oil Corporation*, available from the Gas Technology Institute as GRI-90/0043.

**Summary:** This GRI topical report discusses the findings on a San Juan basin coal seam gas well drilled in Colorado. This report includes data on coal content, gas content, permeability, thickness, pressure, and fracture geometry estimates.

881. Mavor, M. J.; Close, J. C.; Britton, R. N.; Erwin, T. M.; Logan, T. L.; and Marshall, R. B., 1989, *Western Cretaceous Coal Seam Project: Evaluation of the Cooperative Research Well, Southern Ute-Mobil 36-1, Operated by McKenzie Methane Corporation*, available from the Gas Technology Institute as GRI-90/0042.

**Summary:** This GRI topical report discusses the findings on a San Juan basin coal seam gas well drilled in Colorado. This report includes data on coal content, gas content, permeability, thickness, pressure, and fracture geometry estimates.

882. Mavor, M. J.; Dhir, R.; McLennan, J. D.; and Close, J. C., 1991, *Evaluation of Hydraulic Fracture Stimulation of the Colorado 32-7 Well, San Juan Basin*, available from the Rocky Mountain Association of Geologists in Coalbed Methane of Western North America.

**Summary:** RMAG Report.

883. Mavor, Matt J.; Britton, Randy; Close, Jay C.; Dern, Robert R., Jr.; Dhir, Rahul; Logan, Terry;



Marshall, Rick; and Pratt, Tim, 1991, *Western Cretaceous Coal Seam Project: Economic and Reserve Evaluation of San Juan Basin, Fruitland Formation Coalbed Natural Gas Reservoirs*, available from the Gas Technology Institute as GRI-91/0336.

**Summary:** This GRI topical report includes two papers on the methodology of economic evaluation of the Fruitland Formation coalbed natural gas reservoirs.

884. Mavor, M. J., 1991, *Western Cretaceous Coal Seam Project: Evaluation of Coalbed Natural Gas Openhole Cavity Completion Productivity*, available from the Gas Technology Institute as GRI-91/0374.

**Summary:** This GRI topical report discusses two openhole cavity wells evaluated to determine the reasons for the greater productivity of cavity well completions relative to cased, fractured well completions.

885. Mavor, Matt J.; Britton, Randy; Close, Jay C.; Logan, Terry; and Marshall, Rick, 1991, *Western Cretaceous Coal Seam Project: Formation Evaluation of Coalbed Methane Wells*, available from the Gas Technology Institute as GRI-91/0334.

**Summary:** This GRI topical report outlines procedures and presents examples of the methodology required to evaluate the properties of coal seam gas reservoirs for deliverability projections.

886. Mavor, Matt J.; Close, Jay C.; Owen, Larry B.; and Pratt, Tim J., 1991, *Western Cretaceous Coal Seam Project: Measurement and Evaluation of Coal Sorption Isotherm Data*, available from the Gas Technology Institute as GRI-91/0335.

**Summary:** This GRI topical report discusses the measurement and interpretation of sorption isotherm data in relation to predicting the gas production performance of a coal seam gas reservoir.

887. Mavor, M. J.; Close, J. C.; and Pratt, T. J., 1991, *Western Cretaceous Coal Seam Project: Summary of the Completion Optimization and Assessment Laboratory (COAL) Site*, available from the Gas Technology Institute as GRI-91/0377.1.

**Summary:** This GRI topical report summarizes the project, whose primary purpose was to quantify the reasons for the increased productivity of San Juan basin, Fruitland Formation coal seam gas wells.

888. Mavor, M. J.; and Close, J. C., 1992, *Formation Evaluation of Coalbed Methane Wells*, available from the Gas Technology Institute as GRI-91/0334.

**Summary:** GRI Topical Report.

889. Mavor, M. J.; Close, J. C.; and McBane, R. A., 1992, *Formation Evaluation of Exploration Coalbed Methane Wells*, available from the Society of Petroleum Engineers in Reprint Series, 35.

**Summary:** SPE Report.

890. Mavor, M. J.; Owen, L. B.; and Pratt, T. J., 1992, *Measurement and Analysis of Sorption Isotherm Data*, available from the Gas Technology Institute as GRI-91/0335.

**Summary:** GRI Topical Report.

891. Mavor, M.; Pratt, T. J.; Crandlemire, A.; and Ellerbrok, G., 1993, *Assessment of Coalbed Methane Resources at the Donkin Mine Site, Cape Breton, Nova Scotia, Canada*, from the proceedings of the 1993 International Coalbed Methane Symposium, Birmingham, Alabama, available as Paper 9368.

**Summary:** Symposium Paper.

892. Mavor, Mathew J., 1993, *Coal Gas Reservoir Cavity Completion Well Performance*, from the 1992 International Gas Research Conference, available from the publisher, Government Institutes, Inc.

**Summary:** This conference paper discusses San Juan Basin, Fruitland Formation coal seam natural gas wells completed with openhole cavities using a controlled injection-blowout technique.

893. Mavor, M.J.; Logan, T. L.; Close, J. C.; Pratt, T. J.; and Robinson, J. R., 1993, *Western Cretaceous Coal Seam Project: 1992 Annual Report*, available from the Gas Technology Institute as GRI-93/0245.

**Summary:** This GRI annual report discusses the Western Cretaceous Coal Seam Project's concentration on dynamic open hole completions in natural gas wells.

894. Mavor, M. J.; and Logan, T. L., 1994, *Recent Advances in Coal Gas-well Openhole Well Completion Technology*, from Journal of Petroleum Technology, v. 46, available from the publisher.

**Summary:** Article.

895. Mavor, Matt, 1995, *Coal Natural Gas Reservoir Properties and Formation Evaluation Techniques*, available from the Gas Technology Institute as GRI-95/0168.

**Summary:** This GRI topical report summarizes coal seam natural gas reservoir and fluid properties as well as the techniques necessary to obtain quantitative estimates of the properties.

896. Mavor, M. J.; Pratt, T. J.; and Nelson, C. R., 1995, *Quantify the Accuracy of Coal Seam Gas Content*, from Petroleum Engineer International, v. 68, no. 10, available from the publisher.

**Summary:** Article.

897. Mavor, M. J.; Pratt, T. J.; and Nelson, C. R., 1995, *Quantitative Evaluation of Coal Seam Gas Content Estimate Accuracy*, from the proceedings of the 1995 International Unconventional Gas Symposium, Tuscaloosa, Alabama, available as Paper 9525.

**Summary:** Symposium Paper.

898. Mavor, M.; and Nelson, C. R., 1997, *Coalbed Reservoir Gas-in-Place Analysis*, available from the American Association of Petroleum Geologists Catalog #196 and from the Gas Technology Institute as GRI-97/0263.

**Summary:** This report prepared by the Gas Research Institute is a “how-to” manual that helps producers accurately determine the gas-in-place volume of coal seam natural gas reservoirs.

899. Mavor, M. J.; and Vaughn, J. E., 1997, *Increasing Absolute Permeability in the San Juan Basin Fruitland Formation*, from the proceedings of the 1997 International Coalbed Methane Symposium, Tuscaloosa, Alabama, available as Paper 9738.

**Summary:** Symposium Paper.

900. Mavor, M.; Pratt, T.; and DeBruin, R., 1999, *Study Quantifies Powder River Coal Seam Properties*, from Oil & Gas Journal, v. 97, no. 17, available from the publisher.

**Summary:** Article.

901. McCabe, M. A.; Robert, L. M.; Blauch, M. E.; Terracina, J. M.; Lehman, L. V.; and Bowles, B., 1999, *Investigations of a New Fracturing Fluid and Conductivity Enhancement Technology on Coalbed Methane Production*, paper presented at the 1999 SPE Mid-Continent Operations Symposium, available from the Society of Petroleum Engineers as SPE paper 52193.

**Summary:** This SPE paper presents the results of field trials of a new fracturing-fluid system and liquid surface-modification additive for coating propan in the Fruitland Coal reservoir in the San Juan Basin.

902. McCabe, Peter J.; Gautier, Donald L.; Lewan, Michael D.; and Turner, Christine, 1993, *The Future of Energy Gasses*, available from the United States Geological Survey as C 1115.

**Summary:** This USGS report discusses ways to mitigate the impact of energy gasses on the environment.

903. McCallister, T., 2000, *Impact of Unconventional Gas Technology* in the *Annual Energy Outlook 2000*, available online from the U.S. Department of Energy, Energy Information Administration at [http://www.eia.gov/oiaf/analysispaper/unconventional\\_gas.html](http://www.eia.gov/oiaf/analysispaper/unconventional_gas.html).

**Summary:** This section of the Department of Energy's *Annual Energy Outlook 2000* discusses unconventional gas sources such as coal seam natural gas, tight sands and gas shales.

904. McClanahan, Elizabeth A., 1995, *Coalbed Methane: Myths, Facts, and Legends of Its History and the Legislative and Regulatory Climate into the 21st Century*, available from *Oklahoma Law Review*, cited as 48 Okla. L. Rev. 471.

**Summary:** Law review article.

905. McCord, J. P., 1980, *Geologic Overview, Coal and Coalbed Methane Resources of the Greater Green River Coal Region, Wyoming and Colorado*, from TRW, Inc.

**Summary:** TRW Report.

906. McCulloch, C. M.; and Deul, M., 1973, *Geologic Factors Causing Roof Instability and Methane Emission Problems: The Lower Kittanning Coalbed, Cambria County, Pa.*, U. S. Bureau of Mines Report of Investigations 7769, available from the National Technical Information Service.

**Summary:** USBM Report.

907. McCulloch, C. M.; Deul, M.; and Jeran, P. W., 1974, *Cleat in Bituminous Coalbeds*, U. S. Bureau of Mines Report of Investigations 7910, available from the National Technical Information Service.

**Summary:** USBM Report.

908. McCulloch, C. M.; Levine, J. R.; Kissel, F. N.; and Deul, M., 1975, *Measuring the Methane Content of Bituminous Coal Beds*, U. S. Bureau of Mines Report of Investigations 8043, available from the National Technical Information Service.

**Summary:** USBM Report.

909. McCulloch, C. M.; Lambert, S. W.; and White, J. R., 1976, *Determining Cleat Orientation of Deeper Coalbeds from Overlying Coals*, U. S. Bureau of Mines Report of Investigations 8116, available from the National Technical Information Service.

**Summary:** USBM Report.

910. McCulloch, C. M.; and Deul, M, 1977, *Methane from Coal*, from 1976 Symposium, available from the Colorado Geological Survey in Resources Series 1.

**Summary:** CGS Symposium Paper.

911. McCulloch, C. M.; and Diamond, W. P., 1979, *Inexpensive Method Helps Predict Methane Content of Coal Beds*, from Planbook of Coal Mining, available from the publisher, McGraw-Hill, Inc., New York.

**Summary:** Report.

912. McCune, D., 2002, *Fundamentals of Coalbed Methane Production*, available from the publisher, The University of Kansas, Tertiary Oil Recovery Project, Lawrence, Kansas.

**Summary:** TORP Report.

913. McElhiney, J. E.; Paul, G. W.; Young, G. B. C.; and McCartney, J. A., 1993, *Reservoir Engineering Aspects of Coalbed Methane*, available from the American Association of Petroleum Geologists in AAPG Studies in Geology, 38.

**Summary:** AAPG Report.

914. McGarry, D. E., 2000, *Challenges in Assessment, Management and Development of Coalbed Methane Resources in the Powder River Basin, Wyoming*, from the proceedings of the 25th International Technical Conference on Coal Utilization and Fuel Systems.

**Summary:** Conference Document.

915. McGinnis, Norman F., 1983, *Dewatering Systems and Techniques for Coalbed Methane Wells: Volume I*, available from the Gas Technology Institute as GRI-81/0159.1.

**Summary:** Final report on study of oil and gas pumping systems evaluated for coal seam natural gas dewatering operations. Ten well systems are evaluated. First of two volumes.

916. McGinnis, Norman F., 1983, *Dewatering Systems and Techniques for Coalbed Methane Wells: Volume II*, available from the Gas Technology Institute as GRI-81/0159.2.

**Summary:** Final report on study of dewatering operations. Supplies dewatering system designs for six pump types. Includes tables and graphs that illustrate the associated costs.

917. McGinnis, Norman; Scheppan, James E.; Popovich, Gregory S.; and Rightmire, Craig T., 1993, *Systems for Dewatering Coalbed Methane Wells*, from Quarterly Review of Methane from Coal Seams Technology, v. 0, no. 0, available from the publisher.

**Summary:** Article.

918. McKay, E. J.; Butler, B. A.; and Robinson, L. N., 1979, *Coal Resource Occurrence and Coal Development Potential Maps of the Bear Creek Quadrangle, Powder River County, Montana*, available from the United States Geological Survey as OF 79-106.

**Summary:** USGS Maps / Report.

919. McKay, E. J.; and Robinson, L. N., 1979, *Coal Resource Occurrence and Coal Development Potential Maps of the Fort Howes Quadrangle, Rosebud and Powder River County, Montana*, available from the United States Geological Survey as OF 79-104.

**Summary:** USGS Maps / Report.

920. McKay, E. J.; and Robinson, L. N., 1979, *Coal Resource Occurrence and Coal Development Potential Maps of the Otter Quadrangle, Powder River County, Montana*, available from the United States Geological Survey as OF 79-105.

**Summary:** USGS Maps / Report.

921. McKee, C. R.; Bumb, A. C.; Way, S. C.; Koenig, R. A.; Reverand, J. M.; and Brandenburg, D. F., 1986, *Using Permeability-vs-Depth Correlations to Assess the Potential for Producing Gas from Coal Seams*, from Quarterly Review of Methane from Coal Seams Technology, v. 4, no. 1, available from the publisher.

**Summary:** Report.

922. McKee, C. R.; Bumb, A. C.; and Koenig, R. A., 1988, *Stress-dependent Permeability and Porosity of Coal*, available from the Rocky Mountain Association of Geologists in Rocky Mountain Association of Geologists Guidebook.

**Summary:** RMAG Report.

923. McKinnon, I., 2002, *Canadian Coalbed Methane*, from Oil and Gas Investor, v. 22, no. 3, available from the publisher.

**Summary:** Article.

924. McLellan, M. W.; and Biewick, L. H., 1989, *Geologic Map of the Bloom Creek Quadrangle, Powder River County, Montana*, available from the United States Geological Survey as I-1968.
- Summary:** USGS Map / Report.
925. McLennan, J.D.; Schafer, P.S.; and Pratt, T.J., 1995, *A Guide to Determining Coalbed Gas Content*, Gas Research Institute report no. GRI-94/0396, available from the American Association of Petroleum Geologists.
- Summary:** This guide discusses methods for quantifying the amount and type of gas present in coalbeds through the use of recovered coal samples.
926. McPherson, Malcomb J.; and Harpalani, Satya, 1985, *Permeability and Sorption Tests on Coal*, available from the Gas Technology Institute as GRI-85/0309.
- Summary:** This GRI topical report discusses an investigation which describes the release and migration of methane through coal. Emphasis is on samples taken from the Blue Creek Seam in Alabama.
927. Mead, S. W.; Wang, F. T.; and Ganow, H. C., 1978, *Control Aspects of Underground Coal Gasification*, from the 1978 DOE Environmental Control Symposium, Washington, available from the U.S. Department of Energy as Lawrence Livermore Laboratory document UCRL-81887.
- Summary:** DOE Symposium Document.
928. Mead, S. W.; Wang, F. T.; Ganow, H. C.; and Stuermer, D. H., 1979, *Environmental Studies of LLL's Hoe Creek II Underground Coal Gasification Experiment*, from the 1979 5th Annual Underground Coal Conversion Symposium, Arlington, VA, available from the U.S. Department of Energy as Lawrence Livermore Laboratory document UCRL-82409.
- Summary:** DOE Symposium Document.
929. Mead, S. W.; Wang, F. T.; Ganow, H. C.; Stuermer, D. H., and Stone, R., 1979, *Ground-water Effects of Underground Coal Gasification Experiments in Northeastern Wyoming*, from the proceedings of the 54th Annual Fall Technical Conference of the Society of Petroleum Engineers, Las Vegas, Nevada, available from the Society of Petroleum Engineers.
- Summary:** SPE Conference Document.
930. Mead, S. W.; Wang, F. T.; Stuermer, D. H.; Raber, E.; Ganow, H. C.; and Stone, R., 1980, *Implications of Ground-water Measurements at the Hoe Creek UCG Site in Northeastern Wyoming*, from the 6th Annual Underground Coal Conversion Symposium, Afton, OK, available from the

U.S. Department of Energy as Lawrence Livermore Laboratory document UCRL-82428.

**Summary:** Symposium Document.

931. Mead, S. W.; and Ganow, H. C., 1982, *Environmental Studies of Underground Coal Gasification Experiment in Northeastern Wyoming, Subsidence Investigations*, available from the U.S. Department of Energy as a Lawrence Livermore Laboratory Technical Report.

**Summary:** DOE Report.

932. Medek, J.; and Weishauptova, Z., 1999, *Desorption as Criterion for the Estimation of Methane Content in a Coal Seam*, from Coalbed Methane; Scientific, Environmental and Economic Evaluation, available from the publisher.

**Summary:** Report.

933. Medina, J. C.; Butala, S. J.; Bartholomew, C. H.; and Lee, M. L., 2000, *Iron Catalyzed CO<sub>2</sub> Hydrogenation as a Mechanism for Coalbed Gas Formation*, from Fuel, v. 79, available from the publisher.

**Summary:** Article.

934. Medina, J. C.; Butala, S. J.; Bartholomew, C. H.; and Lee, M. L., 2000, *Low Temperature Iron- and Nickel-catalyzed Reactions Leading to Coalbed Gas Formation*, from Geochemica et Cosmochimica Acta, v. 64, available from the publisher.

**Summary:** Article.

935. Medlin, J. H.; Swanson, Vernon E.; and Coleman, S. L., 1976, *Major, Minor, and Trace Elements in U.S. Coal*, available from the United States Geological Survey as C 0757.

**Summary:** USGS Conference Document.

936. Meissner, C. R., Jr.; Cecil, C. B.; and Stricker, G. D., eds. 1976, *Coal Geology and the Future; Symposium Abstracts and Selected References*, available from the United States Geological Survey as C 0757.

**Summary:** USGS Publication.

937. Meissner, F. F., 1984, *Cretaceous and Lower Tertiary Coals as Source for Gas Accumulations in*



*the Rocky Mountain Area*, available from the Rocky Mountain Association of Geologists in Hydrocarbon Source Rocks of the Greater Rocky Mountain Region.

**Summary:** RMAG Report.

938. Meissner, F. F., 1987, *Mechanisms and Patterns of Gas Generation, Storage Expulsion-Migration and Accumulation Associated with Coal Measures, Green River and San Juan Basins, Rocky Mountain Region, USA*, from Collection Colloques et Seminaires, v. 45, available from the publisher.

**Summary:** Article.

939. Meissner, F. F.; and Thompson, R., 1999, *Exploration Opportunities in the Greater Rocky Mountain Region, Central Western, U.S.A.*, from the proceedings of the AAPG W. E. Pratt Memorial Conference, San Diego, California, abstract available from the American Association of Petroleum Geologists in AAPG Bulletin, v. 83, no. 12.

**Summary:** AAPG Conference Paper.

940. Metcalfe, R. S.; Yee, D.; Seidle, J. P.; and Puri, R., 1991, *Review of Research Efforts in Coalbed Methane Recovery*, from the 1991 SPE Asia-Pacific Conference, Perth, Australia, available from the Society of Petroleum Engineers as SPE Paper 23025.

**Summary:** This SPE conference paper discusses a variety of coal seam gas recovery research. Primarily focuses on the San Juan and Warrior basins.

941. Meyer, Howard S., 1989, *Research in Small-Scale Gas Processing*, from Quarterly Review of Methane from Coal Seams Technology, v. 7, no. 1, available from the publisher.

**Summary:** Article.

942. Meyer, J., 2000, *Coal Bed Methane Produced Water-Infiltration/Evapotranspiration, Belle Fourche River Basin, 1993-1999*, available from the Bureau of Land Management.

**Summary:** BLM Report.

943. M'Gonigle, John W.; and Robinson Roberts, Laura N., 1997, *Mineral Resource Potential; Leasable Minerals (Energy Resources); Coal Geology and Resources*, available from the United States Geological Survey as B 2127.

**Summary:** USGS Report.

944. Michael, G. Eric; Law, Ben E.; and Anders, D. E., 1990, *Geochemical Evaluation of Gas-Bearing Coals With Respect to Maturity, Upper Cretaceous Fruitland Formation, San Juan Basin, New Mexico and Colorado*, available from the United States Geological Survey in C 1060.

**Summary:** USGS Conference Paper.

945. Michelsen, J. K.; and Khaavari-Khorasani, G., 1999, *The Physics and Efficiency of Petroleum Expulsion from Coal*, available from the publisher, Kluwer Academic Publishers, Boston.

**Summary:** Report.

946. Milici, R. C.; and Nolde, J. E., 1999, *Assessment of Coalbed Methane Potential in the Pocahontas Basin of Southwestern Virginia*, from the 1999 Annual GSA Meeting, Denver, Colorado, available from the Geological Society of America in Abstracts with Programs, v. 31, no. 7.

**Summary:** GSA Meeting Document.

947. Mink, Robert E., 2001, *Enhanced Coalbed Methane Recovery Through Sequestration of Carbon Dioxide: Potential for a Market-Based Environmental Solution in the Black Warrior Basin of Alabama*, from the NETL 2001 First National Conference on Carbon Sequestration, available from the National Energy Technology Laboratory.

**Summary:** NETL Conference Report.

948. Mitcham, S. A.; and Wobeser, G., 1993, *Effects of Coalbed Methane Development on the Water-Quality and Fish and Benthic Invertebrate Communities of the Big Sandy Creek Drainage System, Alabama*, available from the Geological Survey of Alabama.

**Summary:** GSA Report.

949. Mitchell, T. E.; and Pappajohn, S. P., 1991, *Coalbed Methane Production Potential in Complex Geologic Settings*, available from the publisher Techbooks, Fairfax, VA, in Geology in Coal Resource Utilization.

**Summary:** Report.

950. Mitsui, H., 1999, *Coalbed Methane Development in China; Overview of Present Status and Feasibility for Business Development*, from Journal of Geography, v. 108, available from the publisher.

**Summary:** Article.

951. Moffat, D. H.; and Weale, K. E., 1955, *Sorption by Coal of Methane at High Pressure*, from Fuel, v. 34, available from the publisher.

**Summary:** Article.

952. Molnia, C. L.; Kottowski, F. E.; Jobin, D. A.; and O'Connor, J. T., 1985, *Coal in New Mexico: Issues in Quality and Resources*, available from the United States Geological Survey.

**Summary:** USGS Report.

953. Montgomery, S. L., 1986, *Coalbed Methane: An Old Hazard Becomes a New Resource*, from Petroleum Frontiers, v. 3, no. 4, available from the publisher.

**Summary:** Article.

954. Montgomery, S. L., 1999, *Powder River Basin Coalbed Methane Play*, from Petroleum Frontiers, v. 16, no. 1, available from the publisher.

**Summary:** Article.

955. Montgomery, S. L., 1999, *Powder River Basin, Wyoming: An Expanding Coalbed Methane (CBM) Play*, available from the American Association of Petroleum Geologists in AAPG Bulletin, v. 83.

**Summary:** AAPG Bulletin.

956. Montgomery, Scott L.; Tabet, David E.; and Barker, Charles E., 2001, *Upper Cretaceous Ferron Sandstone; Major Coalbed Methane Play in Central Utah*, available from the American Association of Petroleum Geologists in AAPG Bulletin, 85 (2).

**Summary:** This AAPG bulletin discusses drilling for coal seam natural gas in the Upper Cretaceous Ferron Sandstone of central Utah.

957. Moore, B. R.; and Moore, P. R., 1999, *Low Altitude Airborne Multispectral Microfracture Analysis in the Control of Oil and Gas Production, Coalbed Methane and Site Location of Directional Drilling*, from the 1999 AAPG East Section Meeting, Indianapolis, Indiana, available from the American Association of Petroleum Geologists in AAPG Bulletin, v. 83, no. 8.

**Summary:** AAPG Meeting Paper.

958. Morales, Graciela; and Barrufet, Maria, 2002, *Desalination of Produced Water Using Reverse*

*Osmosis*, from Gas TIPS, v. 8, no. 3, available from the Gas Technology Institute.

**Summary:** Article.

959. Morales, R. H.; McLennan, J. D.; Jones, A. H.; and Schraufnagel, R. A., 1990, *Classification of Treating Pressures in Coal Fracturing*, from the proceedings of 1995 U. S. Symposium on Rock Mechanics.

**Summary:** Symposium Paper.

960. Morgan, J. P., 2001, *Automation Key in Coalbed Methane*, from Oil & Gas Journal, v. 44, no. 8, available from the publisher.

**Summary:** Article.

961. Moritis, G., 1999, *Emerging Technologies to Boost Hydrocarbon Production Efficiency*, from Oil & Gas Journal, v. 97, available from the publisher.

**Summary:** Article.

962. Morris, J. P.; and Pyak-Nolte, L. J., 1999, *Fracture Network Geometry and Relative Permeability*, from the proceedings of the 1999 U. S. Rock Mechanics Symposium, Vail, Colorado, available in v. 2.

**Summary:** Symposium Paper.

963. Mount, David R.; and Gulley, David D., 1992, *Development of a Salinity/Toxicity Relationship to Predict Acute Toxicity of Saline Waters to Fresh Water Organisms*, available from the Gas Technology Institute as GRI-92/0301.

**Summary:** Report on work to develop a Salinity / Toxicity Relationship (STR) that can be used to predict the toxicity of saline waters to freshwater organisms. Reports on the application of STR to field data.

964. Mount, David R.; Drottar, Kurt R.; Gulley, David D.; Frillo, John P.; and O'Neil, Patrick E., 1992, *Use of Laboratory Toxicity Data for Evaluating the Environmental Acceptability of Produced Water Discharge to Surface Waters*, available from the publisher, Plenum Press, New York, N.Y.

**Summary:** This conference paper summarizes the findings of studies as they apply to the surface discharge of produced waters. Discusses how aquatic organisms respond to the discharge.

965. Mount, David R.; O'Neil, Patrick E.; and Evans, James M., 1993, *Discharge of Coalbed Produced Water to Surface Waters – Assessing, Predicting, and Preventing Ecological Effects*, available from the Gas Technology Institute as GRI-93/0486-0001.

**Summary:** This journal article discusses a GRI study into the environmental acceptability of discharging coalbed produced waters in the Black Warrior Basin. Discusses the safety of discharging such waters.

966. Mount, David R.; Gulley, David D.; and Evans, James M., 1993, *Salinity/Toxicity Relationships to Predict the Acute Toxicity of Produced Waters to Freshwater Organisms*, available from the Society of Petroleum Engineers as SPE paper 26007.

**Summary:** This conference paper discusses the Salinity/Toxicity Relationships equations used to provide accurate predictions of the toxicity of produced waters.

967. Mountain Fuel Resources, Inc., 1978, *Demonstration Project for Methane Recovery from Unminable Coalbeds*, from a technical proposal submitted to the U. S. Department of Energy.

**Summary:** Mountain Fuel Resources technical proposal.

968. Mountain Fuel Supply Company, 1980, *Demonstration Project for Methane Recovery from Unminable Coalbeds, Progress Report No. 11*, prepared for the U. S. Department of Energy.

**Summary:** DOE Contracted Report.

969. Mowers, T.; and Wade, L., 1994, *Greater Green River Basin Bibliography: Selected References*, available from the Gas Technology Institute as GRI-95/0018.

**Summary:** Bibliography containing more than 260 items in two sections: Coalbed Methane and Tight Gas Sands.

970. Mroz, T. H.; Ryan, J. G.; and Byrer, C. W., 1983, *Methane Recovery from Coalbeds: A Potential Energy Source*, available from the U. S. Department of Energy.

**Summary:** DOE Report.

971. Mukhopadhyay, P. K.; Fowler, M. G.; and Dow, W., 1991, *Selected Papers from the Symposium on Coal and Terrestrial Organic Matter as a Source Rock for Petroleum*, from the proceedings of the 1991 American Chemical Society National Meeting, in *Organic Geochemistry*, v. 7, no. 6, available from the publisher.

**Summary:** Article.

972. Mukhopadhyay, P. K.; MacDonald, D. J.; and Calder, J. H., 1995, *Evaluation of Coalbed Methane Potential of the Stellarton Basin, Nova Scotia, Canada, Based on Geological, Physical, and Geochemical Properties*, from the proceedings of the 1995 International Unconventional Gas Symposium, Tuscaloosa, Alabama, available as Paper 9505.

**Summary:** Symposium Paper.

973. Mukhopadhyay, P. K.; MacDonald, D. J.; Calder, J. H.; Hughes, J. D.; and Hatcher, P. G., 1997, *Relationship Between Methane/Generation/Adsorption Potential, Micropore System, and Permeability with Composition and Maturity - Examples from the Carboniferous Coals of Nova Scotia, Eastern Canada*, from the proceedings of the 1997 International Coalbed Methane Symposium, Tuscaloosa, Alabama, available as Paper 9733.

**Summary:** Symposium Paper.

974. Mulhern, J. J.; Ely, K. W.; and Meadows, W. H., 1993, *Mining Methane*, from the proceedings of the 1993 International Coalbed Methane Symposium, Birmingham, Alabama, available as Paper 9391.

**Summary:** Symposium Paper.

975. Mullen, M. J., 1988, *Log Evaluation in Wells Drilled for Coal-bed Methane*, available from the Rocky Mountain Association of Geologists in Rocky Mountain Association of Geologists Guidebook.

**Summary:** RMAG Report.

976. Mullen, M. J., 1989, *Coalbed Methane Resource Evaluation from Wireline Logs in the Northeastern San Juan Basin - A Case Study*, from the proceeding of the 1989 Coalbed Methane Symposium, Tuscaloosa, Alabama, available as Paper 8953.

**Summary:** Symposium Paper.

977. Mullen, M. J., 1991, *Cleat Detection in Coalbeds Using the Microlog*, available from the Rocky Mountain Association of Geologists.

**Summary:** RMAG Report.

978. Murphy, Edward C.; and Goven, Gerald E., 1998, *The Coalbed Methane Potential of North Dakota Lignites*, available from the North Dakota Geological Survey.

**Summary:** NDGS Report.

979. Murray, D. K., 1991, *Coalbed Methane: Natural Gas Resources from Coal Seams*, available from the publisher, Techbooks, Fairfax, VA, in Geology in Coal Resource Utilization.

**Summary:** Report.

980. Murray, D. K., 1996, *Coalbed Methane in the USA: Analogues for Worldwide Development*, available from the Geological Society, London, as Special Publication 109.

**Summary:** Geological Society Report.

981. Murray, D. K., 1997, *Coalbed Methane Production Potential of Anthracite Reservoirs*, from the proceedings of the 1997 International Coalbed Methane Symposium, Tuscaloosa, Alabama, available as Paper 9776,

**Summary:** Symposium Paper.

982. Murray, D. K., 2000, *CBM in the United States*, from World Coal, March 2000, available from the publisher.

**Summary:** Article.

983. Murray, D. K., 2002, *Deep Coals Hold Big Part of Resource*, from American Oil & Gas Reporter, v. 45, no. 5, available from the publisher.

**Summary:** Article.

984. Murrie, G. W., 1977, *Coal and Gas Resources of the Lower Hartshorne Coalbed in LeFlore and Haskell Counties, Oklahoma*, available from the Geological Society of America in GSA Abstracts with Programs, v. 9, no. 1.

**Summary:** GSA Report.

985. Muthukumarappan, R.; Rogers, R. E.; and Weida, D., 1999, *Analysis of the Success of Cavity Completions in the Fairway Zone of the San Juan Basin*, from the proceedings of the 1999 SPE Rocky Mountain Regional Meeting, Gillette, Wyoming, available from the Society of Petroleum Engineers as SPE 55603.

**Summary:** This SPE paper discusses a method for identifying potentially successful coal seams for completion by the openhole cavity technique. Data from numerous San Juan basin wells was used. Discusses the application of the findings to unexplored basins.

986. Mutmansky, J. M., 1999, *Guidebook on Coalbed Methane Drainage for Underground Coal Mines*, available from the Coalbed Methane Outreach Program of the U.S. Environmental Protection Agency as Document No. 60938.

**Summary:** EPA Report.

987. Nelson, Charles R., 1993, *GRI Basic Research Group Coalbed Methane Research*, available from the Gas Technology Institute as GRI-93/0486-0003.

**Summary:** This journal article discusses the evaluation of the accuracy of measurements on coal seam reservoirs by the GRI's Basic Research Group.

988. Nelson, Charles R., 1997, *Advances in Coalbed Reservoir Gas-In-Place Analysis*, from Gas Tips, v. 4, no. 1, available online from the Gas Technology Institute at <http://www.gti-ticora.com/Publications.html>.

**Summary:** This GRI report discusses new log and core analysis methods used to determine the gas-in-place volume of coalbed reservoirs.

989. Nelson, C. R.; Li, W.; Lazar, J. M.; Malik, A.; and Lee, M. L., 1997, *Influence of Geologic Variables on the Content of Light Oils in U. S. Coals*, from the proceedings of the 1997 International Coalbed Methane Symposium, Tuscaloosa, Alabama, available as Paper 9731.

**Summary:** Symposium Paper.

990. Nelson, C. R.; Mavor, M. J.; Pratt, T. J.; and Casey, T. A., 1997, *Protocol Ups Coal Seam Gas Analysis*, from American Oil & Gas Reporter, v. 40, available from the publisher.

**Summary:** Article.

991. Nelson, Charles R., 1999, *Changing Perceptions Regarding the Size and Production Potential of Coalbed Methane Resources*, from Gas Tips, v. 5, no. 2, available from the Gas Technology Institute.

**Summary:** GRI Report.

992. Nelson, C. R., 1999, *Common Sources of Error in Coalbed Gas Resource and Reservoir Gas-In-Place Values*, available from the publisher, the American Association of Petroleum Geologists as AAPG Bulletin, v. 83.

**Summary:** AAPG Bulletin.



993. Nelson, C. R., 1999, *Critical Assessment of Coalbed Reservoir Gas-in-Place Analysis Methods*, from the proceedings of the 1999 International Coalbed Methane Symposium, Tuscaloosa, Alabama, available from the University of Alabama

**Summary:** Symposium Paper.

994. Nelson, C. R., 1999, *Effects of Coalbed Reservoir Property Analysis Methods on Gas-in-Place Estimates*, from the proceedings of the 1999 SPE East Regional Meeting, Charleston, West Virginia, available from the Society of Petroleum Engineers as SPE 57443.

**Summary:** SPE Meeting Paper.

995. Nelson, C. R., 1999, *Gem in the Rough; Technology, Economics Putting New Shine on Coalbed Methane*, from *American Oil & Gas Reporter*, v. 42, no. 3, available from the publisher.

**Summary:** Article.

996. Nelson, Charles R., 2000, *Coalbed Methane Potential of the U.S. Rocky Mountain Region*, from *Gas Tips*, available online from the Gas Technology Institute at <http://www.gti-ticora.com/Publications.html>.

**Summary:** This GRI report discusses the potential for production of natural gas from Rocky Mountain region coal seams.

997. Nelson, C. R., 2000, *Effects of Geologic Variables on Cleat Porosity Trends in Coalbed Gas Reservoirs*, from the proceedings of the 2000 SPE/Canadian Energy Research Institute Gas Technology Symposium, Calgary, Canada, available from the Society of Petroleum Engineers as SPE 59787.

**Summary:** This SPE paper discusses the development of a model for predicting the effective cleat porosity of coal seam gas reservoirs.

998. Nelson, Charles R., 2000, *New Methods for Coalbed Reservoir Gas-In-Place Analysis: Results from Case Studies in the San Juan, Powder River, Black Warrior and Central Appalachian Basins*, available online from the Gas Technology Institute at <http://www.gti-ticora.com/Publications.html>.

**Summary:** This GRI report discusses new methods used to determine the gas-in-place volume of coalbed reservoirs.

999. Nelson, C. R.; Hill, D. G.; and Pratt, T. J., 2000, *Properties of Paleocene Fort Union Formation Canyon Seam Coal at the Triton Federal Coalbed Methane Wells, Campbell County, Wyoming*,

from the proceedings of the 2000 SPE/Canadian Energy Research Institute Gas Technology Symposium, Calgary, Canada, available from the Society of Petroleum Engineers as SPE 59786.

**Summary:** SPE Symposium Paper.

1000. Nelson, C. R.; and Pratt, T. J., 2000, *Reservoir Properties of Paleocene Fort Union Formation Canyon Seam Coal, Campbell County, Wyoming*, from the proceedings of the 2000 AAPG Rocky Mountain Section Meeting, Albuquerque, New Mexico, available from the American Association of Petroleum Geologists in AAPG Bulletin, v. 84, no. 8.

**Summary:** AAPG Meeting Report.

1001. Nelson, C. R., 2001, *Geologic Controls on Effective Cleat Porosity Variation in San Juan Basin Fruitland Formation Coalbed Reservoirs*, from the proceedings of the International Coalbed Methane Symposium, Tuscaloosa, Alabama, available as Paper 108.

**Summary:** Symposium Paper.

1002. Nelson, C. R.; and Pratt, T. J., 2001, *In Coalbed Gas Plays, Reservoir Variables Key to Success*, from American Oil & Gas Reporter, v. 44, no. 3, available from the publisher.

**Summary:** Article.

1003. Nichols, D. J., 1999, *Stratigraphic Palynology of the Fort Union Formation (Paleocene) in the Powder River Basin, Montana and Wyoming; A Guide to Correlations of Methane-producing Coal Zones*, available from the Wyoming Geological Association in Guidebook - Wyoming Geological Association, 50.

**Summary:** WGA Publication.

1004. Nick, K. E.; Conway, M. W.; and Fowler, K. S., 1995, *The Relation of Diagenetic Clays and Sulfates to the Treatment of Coalbed Methane Reservoirs*, from the proceedings of the 1995 SPE Annual Technical Conference & Exhibition, Dallas, Texas, available from the Society of Petroleum Engineers as SPE 30736.

**Summary:** This SPE paper describes experiments that investigated the occurrence of cements in the permeability pathways in coal samples from mines and cores. Samples were taken from the San Juan and Warrior basins.

1005. Niederhofer, J. D.; and Lambert, S. W., 1987, *Lease Operating Expenses for Multiple-Zone Completion Wells, Black Warrior Basin, Alabama*, from the proceedings of the 1987 Coalbed Methane

Symposium, Tuscaloosa, Alabama, available as Paper 8735.

**Summary:** Symposium Paper.

1006. Nielsen, P. E.; and Hanson, M. E., 1987, *Analysis and Implications of Three Fracture Treatments in Coal at the USX Rock Creek Site Near Birmingham, Alabama*, from the proceedings of the 1987 Coalbed Methane Symposium, Tuscaloosa, Alabama, available as Paper 8725.

**Summary:** Symposium Paper.

1007. Nikiforuk, Andres, 2002, *Into the Black*, from Canadian Business, v. 75, no. 4, available from the publisher.

**Summary:** Article.

1008. Nikols, D. J.; and Rottenfusser, B. A., 1991, *Coalbed Methane - A Canadian Resource for the 1990's*, available from the Rocky Mountain Association of Geologists in Coalbed Methane of Western North America.

**Summary:** RMAG Report.

1009. Ning, N.; and Zhang, J., 1999, *Research on the Method of Geological Regional Selection Evaluation of Coalbed Gas*, from Natural Gas Industry, v. 19, available from the publisher.

**Summary:** Article.

1010. Noack, K., 1998, *Control of Gas Emissions in Underground Coal Mines*, from International Journal of Coal Geology, v. 35, nos. 1-4, available from the publisher.

**Summary:** Article.

1011. Nolde, J. E.; and Spears, D., 1998, *A Preliminary Assessment of In-place Coalbed Methane Resources in the Virginia Portion of the Central Appalachian Basin*, from International Journal of Coal Geology, v. 38, available from the publisher.

**Summary:** Article.

1012. Nuccio, Vito, 2000, *Coal-bed Methane: Potential and Concerns*, available online from the United States Geological Survey as Fact Sheet FS-123-00.

**Summary:** This USGS Fact Sheet describes the coal seam natural gas industry in the United States and broadly discusses some of the concerns associated with its production.

1013. Nuccio, V. F., 2002, *What is it? And Why All the Fuss?*, available from the Rocky Mountain Association of Geologists in Coalbed Methane of North America, II.

**Summary:** RMAG Report.

1014. Nuttall, Brandon C.; Chesnut, Donald R.; and Drahovzal, James A., 1999, *Western Kentucky Coalbed Methane Consortium: A Proposed Joint Geologic Study of Coal-Bearing Strata of the Western Kentucky Coal Field Emphasizing Coalbed Methane Resource Characterization*, available online from the Kentucky Geological Survey.

**Summary:** This is a proposal for a study designed to provide stratigraphic and structural framework, and coal thickness models for use by industry for exploration.

1015. Nye, B.; Reid, D.; Childers, R. D.; Miller, G. C.; and Sanchez, E., 2001, *Cost-Effective Recompletions of Fruitland Formation Coalbed Methane Gas Wells are Achieved with PDC Technology-Based One-Trip Sidetracking and Lateral-Drilling Technique*, from the proceedings of the 2001 SPE Rocky Mountain Petroleum Technology Conference, Keystone, Colorado, available from the Society of Petroleum Engineers as SPE 71052.

**Summary:** This SPE paper discusses sidetracking mills used to mill a casing window and drill the required lateral in one trip.

1016. Ogbe, D. O.; Hawley, M. A.; Clough, J.; and Bott, J., 1999, *Planning Exploratory Drilling for Coalbed Methane Resource Development in Rural Alaska*, from the proceedings of the 1999 SPE Annual West Regional Meeting, Anchorage, Alaska, available from the Society of Petroleum Engineers as SPE 54640.

**Summary:** SPE Meeting Paper.

1017. Ogbe, D. O.; Packer, J. B.; and Clough, J. G., 2002, *Risk-weighted Volumetric Analysis to Estimate Gas Reserves and Evaluate Coalbed Methane Potential of the Lower Matanuska Valley, Cook Inlet Basin, Alaska*, available from the American Association of Petroleum Geologists in AAPG Bulletin, v. 86.

**Summary:** AAPG Bulletin.

1018. Ogha, Kotaro; Higuchi, Kiyoshi; Shimada, Souhei; and Deguchi, Gotai, 1995, *Evaluation of Methane Drainage from Mining Panel*, from the proceedings of the 1995 International Unconventional

Gas Symposium, Tuscaloosa, Alabama, available as Paper 9538.

**Summary:** Symposium Paper.

1019. Ogha, Kotaro; Shimada, Souhei; Ishii, Eiji; and Tamari, Akira, 1997, *Gas Drainage Control of Deep Coal Seams*, from the proceedings of the 1997 International Coalbed Methane Symposium, Tuscaloosa, Alabama, available as Paper 9762.

**Summary:** Symposium Paper.

1020. Ogha, K.; Shimada, S.; Higuchi, K.; and Deguchi, G., 1999, *Countermeasures and Researches for Prevention of Methane Emission into the Atmosphere in a Japanese Coal Mine*, from Coalbed Methane: Scientific, Environmental and Economic Evaluation, available from the publisher.

**Summary:** Report.

1021. Ogha, K.; and Higuchi, K., 2000, *Utilization of Methane and Injection of Carbon Dioxide into Abandoned Coal Mines*, from the proceedings of the AAPG International Conference, Bali, Indonesia, available from the American Association of Petroleum Geologists in AAPG Bulletin, v. 84, no. 9.

**Summary:** AAPG Conference Document.

1022. Oil & Gas Journal, 1998, *Emerging Natural Gas Resources*, available from the Gas Technology Institute as GRI-98/0296.

**Summary:** Article.

1023. Oil & Gas Journal, 1999, *Deeper Wildcatting Under Way in Two New Mexico Areas*, from Oil & Gas Journal, v. 97, no. 34, available from the publisher.

**Summary:** Article.

1024. Oil & Gas Journal, 1999, *Louisiana Pursues Coalbed Methane Drilling*, from Oil & Gas Journal, v. 97, no. 31, available from the publisher.

**Summary:** Article.

1025. Oil & Gas Journal, 1999, *New Mexico Raton Basin Coalbed Methane Development Resumes*, from Oil & Gas Journal, v. 97, no. 17, available from the publisher.

**Summary:** Article.

1026. Oil & Gas Journal, 1999, *Unocal Targets Coalbed Methane Resource North of Anchorage*, from Oil & Gas Journal, v. 97, no. 36, available from the publisher.

**Summary:** Article.

1027. Oil & Gas Journal, 2000, *Infill Drilling Land Use Issues Heat in SW Colorado*, from Oil & Gas Journal, v. 98, available from the publisher.

**Summary:** Article.

1028. Oil & Gas Journal, 2000, *Large Alberta Coalbed Methane Program Launched*, from Oil & Gas Journal, v. 98, available from the publisher.

**Summary:** Article.

1029. Oil & Gas Journal, 2000, *Two British Columbia Basins May Be Opened for Exploration*, from Oil & Gas Journal, v. 98, available from the publisher.

**Summary:** Article.

1030. Oklahoma Corporation Commission, 2001, *Depth to Base of Treatable Water Map Series*, available from the Oklahoma Corporation Commission.

**Summary:** Maps.

1031. Olague, N. E.; and Smith, D. M., 1989, *Diffusion of Gases in American Coals*, from Fuel, v. 68, available from the publisher.

**Summary:** Article.

1032. Olajossy, A.; and Mickiewicz, Aleja, 1997, *Slow Desorption as a Reason of Delayed Yield of Methane from Coal Bed Matrix in Seams*, from the proceedings of the 1997 International Coalbed Methane Symposium, Tuscaloosa, Alabama, available as Paper 9775.

**Summary:** Symposium Paper.

1033. Oldaker, P. R., 1991, *Hydrogeology of the Fruitland Formation, San Juan Basin, Colorado and*

*New Mexico*, available from the Rocky Mountain Association of Geologists in Coalbed Methane of Western North America.

**Summary:** RMAG Report.

1034. Oldaker, Paul, 2000, *San Juan Basin Gas Seeps*, from the 2000 International Coalbed Methane Symposium.

**Summary:** Symposium Document.

1035. Olszewski, A. J.; Luffel, D. L.; Hawkins, J.; Zuber, M. D.; Colvin, G. E.; McLennan, J. D.; and Schatz, J. F., 1992, *Development of Formation Evaluation Technology for Coalbed Methane*, available from the Gas Technology Institute as GRI-92/0103.

**Summary:** This GRI annual report discusses the use of geophysical log data to estimate coal formation parameters for optimization of gas production.

1036. Olszewski, A. J.; Luffel, D. L.; Hawkins, J.; Zuber, M. D.; McLennan, J. D.; Schatz, J. F.; and Truman, R. B., 1993, *Development of Formation Evaluation Technology for Coalbed Methane*, available from the Gas Technology Institute as GRI-93/0178.

**Summary:** This GRI report discusses the identification and development of methodologies for estimating zone thickness, coal quality, gas content, isotherm, permeability, and cleat orientation from log data.

1037. Oman, Charles L.; Finkelman, R. B.; Coleman, S. L.; and Bragg, L. J., 1988, *Selenium in Coal from the Powder River Basin, Wyoming and Montana*, available from the United States Geological Survey as C 1025.

**Summary:** USGS Conference Document.

1038. O'Neil, Patrick E.; Mettee, Maurice F.; and Harris, Steven C., 1987, *Coalbed Methane Development in Alabama: Biological and Hydrological Conditions of Streams Draining the Cedar Cove Degassification Field*, available from the Geological Survey of Alabama as Circular 133.

**Summary:** Findings of a study into the biological and water quality impacts of coal seam natural gas production water disposal into surface water streams in the Cedar Cove degassification field within Alabama's Warrior Coal Basin.

1039. O'Neil, P. E.; Harris, S. C.; Drott, K. R.; Mount, D. R.; Fillo, J. P.; and Mettee, M. F., 1989, *Biomonitoring of a Produced Water Discharge from the Cedar Cove Degassification Field*,

Alabama, available from the Geological Survey of Alabama as Bulletin 135.

**Summary:** Examines the environmental fate and effect of a natural gas produced water effluent. This study provides information and methodologies for defining acceptable conditions under which produced waters from coal seam natural gas wells can be discharged into surface waters.

1040. O'Neil, P. E.; Harris, S. C.; and Mettee, M. F., 1989, *Stream Monitoring of Coalbed Methane Produced Water from the Cedar Cove Degasification Field, Alabama*, available from the University of Alabama.

**Summary:** Conference paper that discusses the instream effects of an NPDES-permitted discharge of produced waters on biological communities in a stream environment. Data from this study was used to develop concentration response models.

1041. O'Neil, Patrick E.; Harris, Steven C.; Mettee, Maurice F.; McGregor, Stuart W.; and Shepard, Thomas E., 1991, *Long-Term Biomonitoring of a Produced Water Discharge from the Cedar Cove Degasification Field, Alabama*, available from the Gas Technology Institute as GRI-90/0233.

**Summary:** Final report on samples of coal seam natural gas produced water that was discharged to a receiving stream in the Warrior Coal Basin of Alabama. The study was conducted to determine the long-term environmental effects.

1042. O'Neil, P. E.; and Harris, S. C., 1992, *Development of an Instream Bioassessment Methodology for the Surface Disposal of Coalbed Methane Produced Waters*, available from the Geological Survey of Alabama as Bulletin 149.

**Summary:** Reports on the development and testing of an instream bioassessment technique for assessing the effects of stream discharged production water. This bioassessment technique was developed in the coal seam natural gas fields of Alabama's Warrior Basin.

1043. O'Neil, Patrick E.; Harris, Steven C.; Mettee, Maurice F.; Isaacson, H. Ronald; and Evans, James M., 1992, *Biological Fate and Effect of Coalbed Methane Produced Waters Discharged into Streams of the Warrior Basin, Alabama*, available from the publisher, Plenum Press, New York, NY.

**Summary:** This is a conference paper that reviews studies containing relevant information to the biological fate and effect of saline waters discharged to stream environments. Presents data relative to studies relating to producing natural gas from coal seams.

1044. O'Neil, Patrick E.; Isaacson, H. Ronald; and Evans, James M., 1992, *Surface Discharge of Coalbed Methane Produced Waters in the Warrior Basin of Alabama, The Cedar Cove Model*, available from the publisher, Plenum Press, New York, NY.



**Summary:** This conference paper asserts that recent implementation of water quality-based control of effluents with toxicity testing and possible biocriteria requirements is proof that in the future there will be a more comprehensive regulation of the discharge of waste water. Discusses the Cedar Cove Model within the framework of existing discharge permit requirements, future regulation, and coal seam natural gas studies completed in the state of Alabama.

1045. O'Neil, Patrick E., 1994, *A Review of Water-Quality, Biological Risk, and Discharge Monitoring Studies Relative to the Surface Disposal of Produced Waters from the Development of Coal-Seam Methane in Alabama*, available from the Geological Survey of Alabama as Circular 177.

**Summary:** Presents results of water-quality, aquatic toxicity, and biomonitoring studies in the Warrior Coal Basin of Alabama. Presents the Cedar Cove Model, which is a systematic approach for monitoring the discharge of produced-water effluents to surface waters.

1046. Onsager, P. R.; and Cox, D. O., 2000, *Aquifer Controls on Coalbed Methane Development in the Powder River Basin, Wyoming*, from the proceedings of the 2000 SPE Annual Technology Conference, Dallas, Texas, available from the Society of Petroleum Engineers as SPE 63090.

**Summary:** SPE Conference Paper.

1047. Onsager, Paul, 2002, *Recovery Efficiency and the Power of the Langmuir Isotherm in Coalbed Methane Reservoirs*, from The Rocky Mountain Oil Journal, v. 82, no. 8, available from the publisher.

**Summary:** Article.

1048. Ortiz, Isais; Weller, T. F.; Anthony, R. V.; Frank, James; Linz, David G.; and Nakles, David V., 1993, *Disposal of Produced Waters: Underground Injection Option in the Black Warrior Basin*, available from the University of Alabama.

**Summary:** Conference paper discusses study that summarizes underground injection activity as an alternative to stream discharge of coal seam natural gas produced waters.

1049. Osborne, T. E.; Moore, D. K.; Kidd, J. T.; and Pescatore, F. T., 1991, *Coalbed Methane Potential of the Northern Coosa Basin in Alabama*, from Journal of Coal Quality, v. 10, available from the publisher.

**Summary:** Article.

1050. Osborne, T. E., 1999, *Structure and Rank of Coal Groups in the Southern Half of the Cahaba Synclinorium*, from Geology of the Cahaba Coalfield.

**Summary:** Report.

1051. Osisanya, S. O.; and Schaffitzel, R. F., 1996, *A Review of Horizontal Drilling and Completion Techniques for Recovery of Coalbed Methane*, from the proceedings of the 1996 SPE International Conference on Horizontal Well Technology, Calgary, Canada, available from the Society of Petroleum Engineers as SPE 37131.

**Summary:** This SPE conference paper discusses the coalbed properties necessary for horizontal drilling and completion. Several techniques are compared.

1052. Osmonson, L. M.; Rohrbacher, T. J.; Molnia, C. L.; and Sullivan, G. L., 2000, *Coal Recoverability in the Hilight Quadrangle, Powder River Basin, Wyoming; A Prototype Study in a Western Coal Field*, available from the United States Geological Survey as an Open-File Report.

**Summary:** USGS Open-File Report.

1053. Outlaw, L., 1999, *Western Active Across Revenue Chain*, from American Oil & Gas Reporter, v. 42, no. 12, available from the publisher.

**Summary:** Article.

1054. Overbey, W. K., Jr.; Locke, C. D.; Reeves, T. K.; Johnson, H. R.; and Salamy, S. P., 1993, *An Innovative Approach to Natural Gas Resource Development Including Basin Analysis, Dual Completion, and Stimulation of Coalbed Methane and Conventional Gas Resources in Southern West Virginia*, from the proceedings of the 1993 International Coalbed Methane Symposium, Birmingham, Alabama, available as Paper 9345.

**Summary:** Symposium Paper.

1055. Owsiacki, G.; and Payie G., 2000, *Coalbed Methane Potential in British Columbia*, available from the British Columbia Ministry of Energy and Mines as GeoFile 2000-7.

**Summary:** British Columbia Ministry of Energy and Mines Report.

1056. Oyler, D. C.; Diamond, W. P.; and Jeran, P. W., 1979, *Directional Drilling for Coalbed Degasification*, U. S. Bureau of Mines Report of Investigations 8380, available from the National Technical Information Service.

**Summary:** USBM Report.

1057. Oyler, D. C.; and Diamond, W. P., 1982, *Drilling a Horizontal Coalbed Methane Drainage System from a Directional Surface Borehole*, U. S. Bureau of Mines Report of Investigations 8640, available from the National Technical Information Service.

**Summary:** USBM Report.

1058. Oyler, D. C.; and Stubbs, R. B., 1985, *Measuring Formation Pressures and the Degree of Gas Drainage in a Large Coalbed Gas Drainage Field*, U. S. Bureau of Mines Report of Investigations 8986, available from the National Technical Information Service.

**Summary:** USBM Report.

1059. Palmer, I. D.; King, N. S.; and Sparks, D. P., 1991, *The Character of Coal Fracture Treatments in Oak Grove Field, Black Warrior Basin*, from the proceedings of the 1991 SPE Annual Technical Conference and Exhibition, available from the Society of Petroleum Engineers as SPE 22914.

**Summary:** SPE Conference Paper.

1060. Palmer, I. D.; Fryar, R. T.; Tumino, K. A.; and Puri, R., 1991, *Comparison Between Gel-Fracture and Water-Fracture Stimulations in the Black Warrior Basin*, from the proceedings of the 1991 Coalbed Methane Symposium, Tuscaloosa, Alabama, available from the University of Alabama.

**Summary:** Symposium Paper.

1061. Palmer, I. D.; Fryar, R. T.; Tumino, K. A.; and Puri, R., 1991, *Water Fracs Outperform Gel Fracs in Coalbed Pilot*, from Oil & Gas Journal, August 12, 1991, available from the publisher.

**Summary:** Article.

1062. Palmer, I. D.; Davids, M. W.; and Jeu, S. J., 1992, *Analysis of Unconventional Behavior Observed During Coalbed Fracturing Treatments*, available from the Society of Petroleum Engineers in Reprint Series, 35.

**Summary:** SPE Report.

1063. Palmer, I. D.; and Sparks, D. P., 1992, *Measurement of Induced Fractures by Downhole TV Camera in Black Warrior Basin Coalbeds*, available from the Society of Petroleum Engineers in Reprint Series, 35.

**Summary:** SPE Report.

1064. Palmer, I. D.; Mavor, M. J.; Seidle, J. P.; Spitler, J. L.; and Voiz, R. F., 1992, *Openhole Cavity Completions in Coalbed Methane Wells in the San Juan Basin*, from the proceedings of the 1992 SPE Annual Technical Conference and Exhibition, Washington, D.C., available from the Society of Petroleum Engineers as SPE 24906.

**Summary:** This SPE conference paper discusses alternative stimulation techniques, such as the openhole cavity completion, used on coal seam gas wells in the San Juan basin.

1065. Palmer, I. D.; King, N. S.; and Sparks, D. P., 1993, *The Character of Coal Fracture Treatments in the Oak Grove Field, Black Warrior Basin*, from *In Situ*, 17, available from the publisher.

**Summary:** Article.

1066. Palmer, I. D.; Lambert, S. W.; and Spitler, J. L., 1993, *Coalbed Methane Well Completions and Stimulations*, available from the American Association of Petroleum Geologists in *AAPG Studies in Geology*, 38.

**Summary:** AAPG Report.

1067. Palmer, I. D., 1993, *Induced Stresses Due to Propped Hydraulic Fracture in Coalbed Methane Wells*, paper presented at the 1993 SPE Rocky Mountain Regional Low Permeability Reservoirs Symposium, available from the Society of Petroleum Engineers as SPE Paper 25861.

**Summary:** This SPE paper discusses applications of the concept of altered-stress fracturing as they apply to the San Juan Basin.

1068. Palmer, I.; Vaziri, H.; Khodaverdian, M.; McLennan, J.; Prasad, K. V. K.; Edwards, p.; Brackin, c.; Kutas, M.; and Fincher, R., 1995, *Completions and Stimulations for Coalbed Methane Wells*, from the proceedings of the 1995 SPE International Meeting on Petroleum Engineering, Beijing, China, available from the Society of Petroleum Engineers as SPE 30012.

**Summary:** This SPE paper discusses the different treatments of an operator's coal seam gas wells in the San Juan and Black Warrior Basins.

1069. Palmer, I. D.; McLennan, J. D.; and Vaziri, H. H., 2000, *Cavity-Like Completions in Weak Sands*, from a 2000 SPE Symposium, Lafayette, Louisiana, available from the Society of Petroleum Engineers as SPE 58719.

**Summary:** SPE Symposium Paper.

1070. Pappajohn, S., 2000, *A Model for 21st Century Geoscientists as High Performance Leaders in*

*the Global Energy Marketplace; Liberating Beliefs, Great Expectations, and Elegant Solutions*, from the proceedings of the 2000 AAPG Rocky Mountain Section Meeting, available from the American Association of Petroleum Geologists.

**Summary:** AAPG Meeting Document.

1071. Pashin, J. C.; Chandler, R. V.; and Mink, R. M., 1989, *Geologic Controls on Occurrence and Producibility of Coalbed Methane, Oak Grove Field, Black Warrior Basin, Alabama*, from the proceedings of the 1989 Coalbed Methane Symposium, Tuscaloosa, Alabama, available as Paper 8963.

**Summary:** Symposium Paper.

1072. Pashin, J.C.; Ward, W.E., II; Winston, R.B.; Chandler, R.V.; Bolin, D.E.; Hamilton, R.P.; and Mink, R.M., 1990, *Geologic Evaluation of Critical Production Parameters for Coalbed Methane Resources: Part II, Black Warrior Basin*, available from the Gas Technology Institute as GRI-90/0014.2.

**Summary:** This is an annual report that discusses the geologic evaluation of coal seam natural gas production parameters for the Black Warrior Basin in Alabama.

1073. Pashin, J. C., 1991, *Regional Analysis of the Black Creek-Cobb Coalbed-Methane Target Interval, Black Warrior Basin, Alabama*, available from the Geological Survey of Alabama as Bulletin 145.

**Summary:** Geological Survey of Alabama Bulletin.

1074. Pashin, J.C.; Ward, W.E., II; Winston, R.B.; Chandler, R.V.; Bolin, D.E.; Richter, K. E.; Osborne, W. E.; and Sarnecki, J. C., 1991, *Structure, Sedimentology, Coal Quality and Hydrology of the Black Warrior Basin in Alabama: Controls on the Occurrence and Producibility of Coalbed Methane*, available from the Gas Technology Institute as GRI-91/0034.

**Summary:** This GRI topical report discusses the geologic evaluation of coal seam natural gas production parameters for the Black Warrior Basin in Alabama.

1075. Pashin, J. C.; and Carroll, R. E., 1993, *Origin of the Pottsville Formation (Lower Pennsylvanian) in the Cahaba Synclinorium of Alabama: Genesis of Coalbed Reservoirs in a Synsedimentary Foreland Thrust System*, from the proceedings of the 1993 International Coalbed Methane Symposium, Birmingham, Alabama, available as Paper 9358.

**Summary:** Symposium Paper.

1076. Pashin, J. C., 1994, *Coal-body Geometry and Synsedimentary Detachment Folding in Oak Grove Coalbed Methane Field, Black Warrior Basin, Alabama*, available from the American Association of Petroleum Geologists in AAPG Bulletin, v. 78.

**Summary:** AAPG Bulletin.

1077. Pashin, J. C., 1994, *Cycles and Stacking Patterns in Carboniferous Rocks of the Black Warrior Foreland Basin*, from Transactions of the Gulf Coast Association of Geological Societies, 44, available from the American Association of Petroleum Geologists.

**Summary:** AAPG Publication.

1078. Pashin, J. C.; Groshong, R. H., Jr.; and Wang, S., 1995, *Thin-Skinned Structures Influence Gas Production in Alabama Coalbed Methane Fields*, from the proceedings of the 1995 International Unconventional Gas Symposium, Tuscaloosa, Alabama, available as Paper 9508.

**Summary:** Symposium Paper.

1079. Pashin, J. C., 1997, *Productivity of Coalbed Methane Wells in Alabama*, proceedings from the 1997 International Coalbed Methane Symposium, available from the University of Alabama.

**Summary:** Conference paper that discusses productivity parameters in coal seam natural gas wells and the geologic controls on natural gas production from those wells.

1080. Pashin, Jack C.; and Hinkle, Frank, 1997, (Reprinted 2001), *Coalbed Methane in Alabama*, available from the Geological Survey of Alabama as Circular 192.

**Summary:** Documents the rapid growth of the coal seam natural gas industry since 1984. Summarizes the current state of the industry in Alabama. This report also discusses the numerous scientific and technological advances made since 1984.

1081. Pashin, J. C., 1998, *Stratigraphy and Structure of Coalbed Methane Reservoirs in the United States: An Overview*, from the International Journal of Coal Geology v. 35, available from the publisher, Elsevier.

**Summary:** A review paper that discusses stratigraphic and structural controls on coal seam natural gas production in the United States with emphasis on the Black Warrior and San Juan basins.

1082. Pashin, J. C.; and Groshong, R. H., Jr., 1998, *Structural Control of Coalbed Methane Production in Alabama*, from the International Journal of Coal Geology v. 38, available from the publisher, Elsevier.

**Summary:** This research paper discusses the influence of extensional and compressional folds and faults on the performance of coal seam natural gas wells.

1083. Pashin, J. C.; and Carroll, R. E., 1999, *Day 1 Road Log; Stop 5, Nunnally and Harkness Coal Zones at Grant's Mill*, from Geology of the Cahaba Coalfield, available from the publisher.

**Summary:** Report.

1084. Pashin, J. C.; and Carroll, R. E., 1999, *Geology of the Cahaba Coalfield*, available from the publisher.

**Summary:** Report.

1085. Pashin, J. C.; Carroll, R. E.; Hatch, J. R.; and Goldhaber, M. B., 1999, *Interplay Among Cleating, Maturation, and Mineralization in Coalbed Methane Reservoirs of the Black Warrior Basin*, proceedings from the 1999 International Coalbed Methane Symposium, available from the University of Alabama.

**Summary:** This paper discusses fracturing, faulting, and mineralization in coal seam natural gas reservoirs.

1086. Pashin, Jack C.; Carroll, Richard E.; Hatch, Joseph R.; and Goldhaber, Martin B., 1999, *Mechanical and Thermal Control of Cleating and Shearing in Coal; Examples from the Alabama Coalbed Methane Fields*, from the proceedings of the 1998 International Conference on Coal Seam Gas and Oil, available from Kluwer Academic Publishers, Dordrecht, Netherlands.

**Summary:** Conference Paper.

1087. Pashin, J. C., 1999, *Stratigraphy and Structure of the Pottsville Formation in the Cahaba Coalfield*, from Geology of the Cahaba Coalfield, available from the publisher.

**Summary:** Report.

1088. Pashin, J. C.; Groshong, R. H., Jr.; and Carroll, R. E., 2001, *Carbon Sequestration Potential of Coalbed Methane Reservoirs in the Black Warrior Basin: A Preliminary Look*, from the proceedings of the International Coalbed Methane Symposium, Tuscaloosa, Alabama, available as Paper 143.

**Summary:** Symposium Paper.

1089. Pashin, J. C.; Groshong, R. H., Jr.; and Carroll, R. E., 2001, *Enhanced Coalbed Methane Recovery*

*Through Sequestration of Carbon Dioxide: Potential for a Market-Based Environmental Solution in the Black Warrior Basin of Alabama*, proceedings from the U.S. Department of Energy, National Energy Technology Laboratory, First National Conference on Carbon Sequestration, available from the National Energy Technology Laboratory as DOE/NETL-2001/1144.

**Summary:** This paper discusses the potential for enhanced coal seam natural gas recovery through injection of carbon dioxide and the basic considerations of geology, technology, and infrastructure required to formulate an enhanced recovery strategy.

1090. Pashin, J. C.; Carroll, R. E.; Groshong, R. H., Jr.; Raymond, D. E.; McIntyre, Marcella; and Payton, W. J., 2002, *Geologic Screening Criteria for Sequestration of CO<sub>2</sub> in Coal: Quantifying Potential of the Black Warrior Coalbed Methane Fairway, Alabama*, from the U.S. Department of Energy, National Technology Laboratory, Annual Technical Progress Report, available online from the Geological Survey of Alabama at <http://www.gsa.state.al.us/gsa/CO2PAGE/CO2page.htm>.

**Summary:** This report discusses geologic factors affecting the potential for carbon sequestration and enhanced coal seam natural gas recovery. Includes important stratigraphic, structural, geothermic, hydrologic, and coal quality data.

1091. Patching, T. C., 1970, *The Retention and Release of Gas in Coal - A Review*, available from the Canadian Institute of Mining and Metallurgy in *CIM Transactions*, v. 63.

**Summary:** Canadian Institute of Mining and Metallurgy Report.

1092. Patton, S.; Jiang, Y.; Deb, D.; Novak, T.; and Park, D., 1995, *Role of Longwall Gob Formation in Coalbed Methane Emission*, from the proceedings of the 1995 International Unconventional Gas Symposium, Tuscaloosa, Alabama, available as Paper 9555.

**Summary:** Symposium Paper.

1093. Paul, George W., 1999, *Coalbed Methane Simulation*, from *Quarterly Review of Methane from Coal Seams Technology*, v. 7, no. 4, available from the publisher.

**Summary:** Article.

1094. Pearson, D. L.; and Moore, T. R., 2000, *Coal as a Thermal Insulator and Oil Source Rock*, from the 2000 AAPG-SEPM Annual Convention, New Orleans, available from the American Association of Petroleum Geologists.

**Summary:** AAPG Convention Document.



1095. Peck, C., 1999, *Review of Coalbed Methane Development in the Powder River Basin of Wyoming/Montana*, from the 1999 SPE Rocky Mountain Regional Meeting, Gillette, Wyoming, available from the Society of Petroleum Engineers as SPE 55801.

**Summary:** SPE Meeting Paper.

1096. Peng, Zewen; Jiang, Yonggan; Guo, Wenzhang, 1993, *Coalbed Methane Recovery Techniques in Songzao Coalmines with Respect to Mine Safety and Production*, from the proceedings of the 1993 International Coalbed Methane Symposium, Birmingham, Alabama, available as Paper 9393.

**Summary:** Symposium Paper.

1097. Penny, G. S.; and Conway, M. W., 1992, *Coordinated Studies in Support of Hydraulic Fracturing of Coalbed Methane: Annual Report (Jul 90 to Oct 91)*, available from the Gas Technology Institute as GRI-92/0218.

**Summary:** GRI Report.

1098. Penny, G. S.; and Conway, M. W., 1993, *Coordinated Studies in Support of Hydraulic Fracturing of Coalbed Methane*, available from the Gas Technology Institute as GRI-93/0125.

**Summary:** This GRI report discusses a study that examined common and potential fracturing fluids in terms of coal-fluid interactions.

1099. Penny, Glenn S.; and Conway, Michael W., 1994, *Coordinated Studies in Support of Hydraulic Fracturing of Coalbed Methane*, available from the Gas Technology Institute as GRI-94/0398.

**Summary:** Report on laboratory research into hydraulic fracturing procedures and products used on coal seam natural gas wells. Contains appendix with additional research papers.

1100. Penny, Glenn S.; and Conway, Michael W., 1995, *Coordinated Studies in Support of Hydraulic Fracturing of Coalbed Methane*, available from the Gas Technology Institute as GRI-95/0283.

**Summary:** Findings of a project that coordinates laboratory data with field operations to ensure the application of current technology in stimulating coalbed methane wells. Data used in designing fracturing and remedial treatments in the Black Warrior Basin.

1101. Penny, Glenn S.; and Conway, Michael W., 1996, *Coordinated Studies in Support of Gas Well Stimulation*, available from the Gas Technology Institute as GRI-96/0444.

**Summary:** This GRI report summarizes research conducted on formation damage resulting from

hydraulic fracturing.

1102. Penny, Glenn S.; Conway, Michael W.; Almond, Stephen W.; Himes, Ron; and Nick, Kevin E., 1996, *Mechanisms and Impact of Damage Resulting from Hydraulic Fracturing*, available from the Gas Technology Institute as GRI-96/0183.

**Summary:** This GRI topical report discusses research into the mechanisms of formation damage following hydraulic fracturing and its impact upon gas well productivity.

1103. Perry, J. H.; Aul, G. N.; and Cervik, J., 1978, *Methane Drainage Study in the Sunnyside Coalbed, Utah*, U. S. Bureau of Mines Report of Investigations 8323, available from the National Technical Information Service.

**Summary:** USBM Report.

1104. Perry, J. H.; Prosser, L. J., Jr.; and Cervik, J., 1980, *Methane Drainage from the Mary Lee Coalbed, Alabama, Using Horizontal Drilling Techniques*, from the proceedings of the SPE/DOE First Annual Symposium on Unconventional Gas Recovery, available from the Society of Petroleum Engineers.

**Summary:** SPE Symposium Document.

1105. Petersen, Henrik I.; Bojesen-Koefoed, Jorgen A.; and Nytoft, Hans P., 2002, *Source Rock Evaluation of Middle Jurassic Coals, Northeast Greenland, by Artificial Maturation: Aspects of Petroleum Generation from Coal*, available from the American Association of Petroleum Geologists in AAPG Bulletin, v. 86, no. 2.

**Summary:** AAPG Report.

1106. Petroleum Frontiers, 1986, *Coalbed Methane - An Old Hazard Becomes a New Resource*, from Petroleum Frontiers, v. 3, no. 4, available from the publisher.

**Summary:** Article.

1107. Petroleum Information / Dwigths, 1998, *\$110 Million Gas Gathering System Proposed for Powder River*, available from the publisher, Petroleum Information / Dwigths.

**Summary:** Article.

1108. Petroleum Technology Transfer Council, 2002, *Coalbed Methane Workshop On-line (Rockies*

*Newsletter*), Colorado School of Mines.

**Summary:** PTTC Workshop.

1109. Petzet, G. Alan, 1996, *Utah Coalbed Gas Exploration Poised for Growth*, from Oil & Gas Journal, August 5, 1996, available from the publisher.

**Summary:** Article.

1110. Petzet, G. A., 1999, *Pipelines, 44 Rigs Facilitate Powder River Basin Coal Gas Play*, from Oil & Gas Journal, v. 97, no. 38, available from the publisher.

**Summary:** Article.

1111. Picciano, Laura, 1994, *Gas Research Institute's Coalbed Methane Research: Selected Bibliography. (Preliminary Issue)*, available from the Gas Technology Institute as GRI-94/0473.

**Summary:** Bibliography lists reports, papers and workshop citations on the topic of coal seam natural gas. This bibliography contains only works funded by the GRI, or which extensively used GRI data.

1112. Picciano, Laura, 1995, *Gas Research Institute's Appalachian Basin Research: Selected Bibliography*, available from the Gas Technology Institute as GRI-95/0297.

**Summary:** Bibliography of research and development reports. Contains reports on coal seam natural gas in the Appalachian Basin.

1113. Picciano, Laura; and Sole, Linda S., 1995, *San Juan Basin Bibliography: Selected References*, available from the Gas Technology Institute as GRI-95/0120.

**Summary:** Bibliography of publications on natural gas exploration in the San Juan Basin. Contains citations of works on the topic of coal seam natural gas.

1114. Pierce, Brenda, 1993, *Coalbed Methane in the Forest City Basin*, available online from the United States Geological Survey at <http://www.energy.usgs.gov/factsheets/Forest/forest.html>.

**Summary:** This USGS Fact Sheet discusses the potential for natural gas production from the coal seams in the Forest City Basin.

1115. Pilcher, R. C.; Collings, R. C.; and Marshall, J. S., 2000, *An Overview of Emerging Practices and*

*Models Used in Coal Mine Methane Resource Estimation and Reserve Evaluation*, from the proceedings of the Second International Methane Mitigation Conference, Novosibirsk, Russia.

**Summary:** Conference Document.

1116. Pillard, David, *Predicting the Toxicity of Common Ions Found in Produced Waters*, available online from the Gas Technology Institute or from ENSR Consulting, Engineering, and Remediation.

**Summary:** This article discusses a software application developed to help producers determine the cause of toxicity in produced waters.

1117. Plant, J. A.; Ball, D. F.; Bradley, A. D.; Chadwick, R. A.; Evans, D. J.; Jones, D. G.; Kirby, G. A.; Milodowski, A. E.; Nicholson, R. A.; Shepherd, T. J.; Smith, N. J. P.; Warrington, G.; and Wilson, A. A., 1999, *Resources of the Basin; Base Metals, Industrial Mineral, Hydrocarbons and Groundwater*, from The Cheshire Basin; Basin Evolution, Fluid Movement and Mineral Resources in Permo-Triassic Rift Setting, available from the publisher.

**Summary:** Report.

1118. Popp, J. T.; and McCulloch, C. M., 1976, *Geological Factors Affecting Methane in the Beckley Coalbed*, U.S. Bureau of Mines Report of Investigations 8137, available from the National Technical Information Service.

**Summary:** USBM Report.

1119. Popp, J. T.; Coleman, D. D.; and Deogh, R. A., 1979, *Investigations of the Gas Content of Coal Seams in the Vicinity of Charleston, Illinois*, available from the Illinois Institute of Natural Resources as Document 79-38.

**Summary:** Illinois Institute of Natural Resources Document.

1120. Poulsen, d.; Soliman, M. Y.; and Jameson, J., 1989, *Optimal Proppant Schedule Selection and Its Application to Coalbed Methane Production*, from the proceedings of the 1989 Coalbed Methane Symposium, Tuscaloosa, Alabama, available as Paper 8991.

**Summary:** Symposium Paper.

1121. Powder River Coalbed Methane Information Council, *Coalbed Methane Development Information*, available from the Powder River Coalbed Methane Information Council.

**Summary:** This publication discusses many aspects of development of coal seam natural gas in

the Powder River Basin.

1122. Pratt, T. J.; Mavor, M. J.; and DeBruin, R. H., 1999, *Coal Gas Resource and Production Potential of Subbituminous Coal in the Powder River Basin*, from the proceedings of the 1999 SPE Rocky Mountain Regional Meeting, Gillette, Wyoming, available from the Society of Petroleum Engineers as SPE 55599.

**Summary:** SPE Meeting Paper.

1123. Price, H. S.; and Ancell, K. L., 1993, *Performance Characteristics of High Permeability Saturated and Undersaturated Coals*, from the proceedings of the 1993 International Coalbed Methane Symposium, Birmingham, Alabama, available as Paper 9360.

**Summary:** Symposium Paper.

1124. Prinz, D.; Krooss, B.; Littke, R.; and Pyckhout-Hintzen, W., 2001, *Investigations on the Micro- and Mesoporous Structure of Coals of Varying Rank: A Combined Small Angle Neutron Scattering (SANS) and Gas Adsorption Experiments Study*, from the proceedings of the 2001 International Coalbed Methane Symposium, Tuscaloosa, Alabama, available as Paper 0137.

**Summary:** Symposium Paper.

1125. Puchkov, L. A.; Slastounov, S. V.; and Krassiouk, N. N., 1999, *Problems of Coalbed Methane Recovery and Utilization*, from the proceedings of the 1999 International Coalbed Methane Symposium, Tuscaloosa, Alabama, available from the University of Alabama.

**Summary:** Symposium Paper.

1126. Puglio, D. G., 1981, *Evaluating Geologic Conditions and Methane Contents of Coalbeds Through Exploration Programs in the Northern Appalachian Coalfield*, from the proceedings of the Third International Coal Exploration Symposium.

**Summary:** Symposium Paper.

1127. Puri, R.; King, G. E.; and Palmer, I. D., 1991, *Damage to Coal Permeability During Hydraulic Fracturing*, from the proceedings of the 1991 SPE Low Permeability Reservoirs Symposium, Denver, Colorado, available from the Society of Petroleum Engineers as SPE 21813.

**Summary:** SPE Symposium Paper.

1128. Puri, R.; Evanoff, J. C.; and Brugler, M. L., 1992, *Measurement of Coal Cleat Porosity and Relative Permeability Characteristics*, available from the Society of Petroleum Engineers in Reprint Series, 35.

**Summary:** SPE Report.

1129. Puri, R.; and Seidle, J. P., 1992, *Measurement of Stress-dependent Permeability in Coal and its Influence on Coalbed Methane Production*, from In Situ, v. 16, available from the publisher.

**Summary:** Article.

1130. Puri, R.; and Volz, R. F., 1993, *Temporary Storage of Natural Gas in Coal Wells*, from the proceedings of the 1993 International Coalbed Methane Symposium, Birmingham, Alabama, available as Paper 9385.

**Summary:** Symposium Paper.

1131. Puri, R.; Volz, R.; and Duhrkopf, D., 1995, *A Micro-Pilot Approach to Coalbed Methane Reservoir Assessment*, from the proceedings of the 1995 International Unconventional Gas Symposium, Tuscaloosa, Alabama, available as Paper 9556.

**Summary:** Symposium Paper.

1132. Pyrak-Nolte, Laura J., 1991, *Multiphase Flow in a Structure*, available from the University of Alabama.

**Summary:** This conference paper discusses fracture void simulations that exhibit the spatial correlations observed in natural fractures.

1133. Pyrak-Nolte, Laura J., 1992, *Multiphase Flow Through Cleats in Coal*, available from the Gas Technology Institute as GRI-91/0386.

**Summary:** Discusses the production potential of natural gas from coal seams. This annual report examines the work that has been done to determine how multiphase flow is controlled by the geometry of the voids in the coal cleats and the amount of saturation of each phase.

1134. Pyrak-Nolte, L. J.; Haley, G. M.; and Gash, B. W., 1993, *Effective Cleat Porosity & Clean Geometry from Wood's Metal Porosimetry*, from the proceedings of the 1993 International Coalbed Methane Symposium, Birmingham, Alabama, available as Paper 9361.

**Summary:** Symposium Paper.

1135. Pyrak-Nolte, Laura J., 1993, *Multiphase Flow Through Cleats in Coal*, available from the Gas Technology Institute as GRI-92/0503.

**Summary:** This final report discusses data on the gas-water relative permeability characteristics of coal cleats. Discusses data on the effective cleat porosity, aperture, and interconnectedness properties of five coal drill core samples.

1136. Pyrak-Nolte, Laura J., 1994, *Multiphase Flow Through Cleats in Coal*, available from the Gas Technology Institute as GRI-94/0076.

**Summary:** This is an annual report that discusses data on the effective cleat porosity, aperture, and interconnectedness properties of coal core samples taken from the Fruitland Formation in the San Juan Basin of Colorado and New Mexico.

1137. Pyrak-Nolte, L. J.; and Roy, S., 1997, *The Effect of Drying and Re-Saturation on the Gas Permeability of Coal*, from the proceedings of the 1997 International Coalbed Methane Symposium, Tuscaloosa, Alabama, available as Paper 9743.

**Summary:** Symposium Paper.

1138. Pyrak-Nolte, Laura J., 1997, *Simulation of Three-Dimensional Fracture Network Geometry in Coal*, available from the Gas Technology Institute as GRI-96/0411.

**Summary:** This report describes a method for simulating three-dimensional fracture networks used in the development of a simulator that realistically models macroscopic and meso-scale geometrical properties of coal cleats.

1139. Qin, Y.; Zhang, Y.; Zhu, Y.; Fan, B.; Jiang, B.; and Li, T., 2000, *Lagging and Its Kinetic Mechanism of Hydrocarbon Re-Generation from Organic Matters in Coals*, from Journal of China University of Geosciences, v. 11.

**Summary:** Report.

1140. Questa Engineering Corporation, 2000, *The 3M CBM Final Report; Volume I: Analysis and Results* and *Volume II: The 3M CBM Model Users Guide*, available online from the Colorado Oil and Gas Conservation Commission.

**Summary:** Describes the 3M Model, which was developed to conduct a large scale, two-dimensional simulation of the Colorado portion of the Fruitland Coal in the San Juan Basin. Provides a tool that can be used to evaluate the impact of various factors on gas seepage. This coal seam natural gas model can also be used to evaluate potential infill drilling, alternative production or operation scenarios, or other coal seam natural gas issues.

1141. Quick, J. C.; and Tabet, D. E., 1999, *Suppressed Vitrinite Reflectance in the Ferron Coalbed Gas Fairway, Central Utah*, from the proceedings of the 1999 GSA Annual Meeting, Denver, Colorado, available from the Geological Society of America in Abstract with Programs, v. 31, no. 7.

**Summary:** GSA Meeting Paper.

1142. Quick, J. C.; and Brill, T., 2002, *Provincial Variation of Carbon Emissions from Bituminous Coal: Influence of Inertinite and Other Factors*, from International Journal of Coal Geology, v. 49, no. 4, available from the publisher.

**Summary:** Article.

1143. Radlinski, A. P.; and Radlinska, E. Z., 1999, *The Microstructure of Pore Space in Coals of Different Rank*, available from Kluwer Academic Publishers, Boston.

**Summary:** Report.

1144. Radlinski, A. P.; Hinde, A. L.; Mastalerz, M.; Hainbuchner, M.; Rauch, H.; Baron, M.; Lin, J. S.; Fan, L.; and Thiyagarajan, P., 2001, *Non-invasive Measurements of Pore Size Distribution in Coal Pellets Using X-ray and Neutron Techniques*, from the proceedings of the 2001 International Coalbed Methane Symposium, Tuscaloosa, Alabama, available as Paper 0118.

**Summary:** Symposium Paper.

1145. Ramaswamy, G., 2001, *Advances Key for Coalbed Methane*, from American Oil & Gas Reporter, v. 44, no. 10, available from the publisher.

**Summary:** Article.

1146. Ramaswamy, G., 2001, *Production History Provides CBM (Coalbed Methane) Insights*, from Oil & Gas Journal, v. 99, no. 14, available from the publisher.

**Summary:** Article.

1147. Ramurthy, M.; Weida, D.; and Rogers, R. E., 1999, *Analysis of the Success of Cavity Completions in the Fairway Zone of the San Juan Basin*, from the proceedings of the 1999 SPE Rocky Mountain Regional Meeting, Gillette, Wyoming, available from the Society of Petroleum Engineers as SPE 55603.

**Summary:** SPE Meeting Paper.



1148. Randall, A. G., 1991, *Shallow Tertiary Gas Production, Powder River Basin, Wyoming*.

**Summary:** Report.

1149. Rao, K. L. N., 1999, *Perspectives of Non Conventional Hydrocarbon Resources (Coal Bed Methane) in the Next Millennium*, from the 1999 Indian Oil Corporation Ltd. International Conference, New Delhi, India, available in Proceedings, v. 4.

**Summary:** Conference Paper.

1150. Ray, James P.; and Engelhardt, F. Rainer, 1992, *Produced Water Technology*, from Environmental Issues and Solutions, available from the publisher, Plenum Press.

**Summary:** Report.

1151. Reeves, S. R.; Lambert, S. W.; and Zuber, M. D., 1987, *A Field Derived Inflow Performance Relationship for Coalbed Gas Wells in the Black Warrior Basin*, from the proceedings of the 1987 Coalbed Methane Symposium, Tuscaloosa, Alabama, available as Paper 8744.

**Summary:** Symposium Paper.

1152. Reeves, S. R.; Boyer, C. M., II; and Herrington, M. R., 1993, *Designing Practical Reservoir Evaluation Programs for Frontier International Coalbed Methane Plays*, from the proceedings of the 1993 International Coalbed Methane Symposium, Birmingham, Alabama, available as Paper 9363.

**Summary:** Symposium Paper.

1153. Reeves, S. R.; and Pekot, L. J., 2001, *Advanced Reservoir Modeling in Desorption-Controlled Reservoirs*, from the proceedings of the 2001 International Coalbed Methane Symposium, Tuscaloosa, Alabama, available as Paper 0127.

**Summary:** Symposium Paper.

1154. Reeves, S., 2001, *Geologic Sequestration of CO<sub>2</sub> in Deep, Unminable Coalbeds: An Integrated Research and Commercial-scale Demonstration Project*, from the proceedings of the National Energy Technology Laboratory First National Conference on Carbon Sequestration, available from the U.S. Department of Energy, National Energy Technology Laboratory.

**Summary:** NETL Conference Document.

1155. Reeves, Scott, 2002, *The Coal-Seq Project*, from Greenhouse Issues, no. 59, available from the publisher.

**Summary:** Article.

1156. Reinecke, Kurt M.; Rice, Dudley D.; and Johnson, Ronald C., 1991, *Characteristics and Development of Fluvial Sandstone and Coalbed Reservoirs of Upper Cretaceous Mesaverde Group, Grand Valley Field, Garfield County, Colorado*, from the proceedings of the 1991 Field Conference of the Rocky Mountain Association of Geologists, available from the RMAG.

**Summary:** RMAG Conference Document.

1157. Ren, T. X.; and Edwards, J. S., 2000, *Three-Dimensional Computational Fluid Dynamics Modeling of Methane Flow Through Permeable Strata Around a Longwall Face*, from International Mining and Minerals, v. 3, available from the publisher.

**Summary:** Article.

1158. Reynolds, Rodney R.; Kiker, Bob; and Cole, Lance, 2002, *Produced Water, and the Issues Associated With It*, from Network News, v. 8, no. 3, available from the Petroleum Technology Transfer Council.

**Summary:** PTTC Article.

1159. Rice, C.A., 1999, *Waters Co-Produced with Coalbed Methane from the Ferron Sandstone in East-Central Utah*, from the 1999 annual meeting of the GSA, available from the Geological Society of America.

**Summary:** GSA Conference Paper.

1160. Rice, C. A.; Ellis, M. S.; and Bullock, J. H., Jr., 2000, *Water Co-Produced with Coalbed Methane in the Powder River Basin, Wyoming: Preliminary Compositional Data*, available online from the United States Geological Survey as Open File Report 00-372.

**Summary:** Report provides preliminary data on water samples taken from 47 coal seam natural gas wells drilled in the Powder River Basin, Wyoming. The samples were taken between June 1999 and May 2000. Includes data on major, minor and trace elements.

1161. Rice, Cynthia A.; and Nuccio, Vito, 2000, *Water Produced with Coalbed Methane*, available online from the United States Geological Survey as FS-0156-00.

**Summary:** USGS Fact Sheet.

1162. Rice, C. A.; Bartos, T. T.; and Ellis, M. S., 2002, *Chemical and Isotopic Composition of Water in the Fort Union and Wasatch Formations of the Powder River Basin, Wyoming and Montana: Implications for Coalbed Methane Development*, available from the Rocky Mountain Association of Geologists.

**Summary:** RMAG Report.

1163. Rice, D. D.; and Threlkeld, C. N., 1982, *Occurrences and Origin of Natural Gas in Ground Water, Southern Weld County, Colorado*, available from the United States Geological Survey as Open-File Report 82-496.

**Summary:** USGS Open-File Report.

1164. Rice, Dudley D.; and Threlkeld, Charles N., 1986, *Comparison of Natural Gases Produced from Upper Cretaceous Fruitland Formation Coal Beds and Adjacent Reservoirs, San Juan Basin, New Mexico and Colorado*, available from the American Association of Petroleum Geologists in AAPG Bulletin, v. 70 (5).

**Summary:** AAPG Conference Document.

1165. Rice, D. D.; Clayton, J. L.; and Pawlewicz, M. J., 1989, *Characterization of Coal-Derived Hydrocarbons and Source Rock Potential of Coal Beds, San Juan Basin, New Mexico and Colorado, USA*, from International Journal of Coal Geology, v. 13, available from the publisher.

**Summary:** Article.

1166. Rice, D. D., 1989, *Coal-bed Methane as a Source of Hydrocarbon Gas*, from the proceedings of the 1989 International Seminar of the United Nations; Petroleum Geology and Geochemistry, Kiev, USSR, available from the publisher, Akademiya Nauk URSR, Kiev.

**Summary:** United Nations Conference Document.

1167. Rice, Dudley D.; and Flores, Romeo M., 1989, *Nature of Natural Gas in Anomalously Thick Coal Beds, Powder River Basin, Wyoming*, available from the American Association of Petroleum Geologists in AAPG Bulletin, 73 (9).

**Summary:** AAPG Conference Document.

1168. Rice, D. D.; Flores, R. M.; and Law, B. E., 1989, *Nature and Origin of Lower Tertiary Coalbed Gases, Powder River Basin, Wyoming*, from the proceedings of the Coalbed Methane Symposium.

**Summary:** Symposium Paper.

1169. Rice, D. D.; Epsman, M. L.; and Mancini, E. A., 1989, *Origin of Conventional and Coalbed Gases in the Black Warrior Region, Alabama*, from the proceedings of the 1989 Coalbed Methane Symposium, available as Paper 8981.

**Summary:** Symposium Document.

1170. Rice, D. D.; and Flores, R. M., 1990, *Coalbed Methane Potential of Tertiary Coal Beds and Adjacent Sandstone Deposits, Powder River Basin, Wyoming and Montana*, available from the American Association of Petroleum Geologists in AAPG Bulletin, v. 74.

**Summary:** AAPG Bulletin.

1171. Rice, Dudley D.; and Flores, Romeo M., 1991, *Controls on Bacterial Gas Accumulations in Thick Tertiary Coal Beds and Adjacent Channel Sandstones, Powder River Basin, Wyoming and Montana*, available from the American Association of Petroleum Geologists in AAPG Bulletin, 75 (3).

**Summary:** AAPG Conference Document.

1172. Rice, D. D.; Clayton, J. L.; Flores, R. M.; Law, B. E.; and Stanton, R. W., 1992, *Some Geologic Controls of Coalbed Gas Generation, Accumulation, and Production, Western United States*, available from the United States Geological Survey as Circular 1074.

**Summary:** USGS Circular.

1173. Rice, Dudley D., 1993, *Composition and Origins of Coalbed Gas*, available from the American Association of Petroleum Geologists.

**Summary:** AAPG Report. Non-USGS publication with USGS authors.

1174. Rice, Dudley D.; Law, Ben E.; and Clayton, Jerry L., 1993, *Coalbed Gas; An Undeveloped Resource*, available from the United States Geological Survey as P 1570.

**Summary:** USGS Conference Document.

1175. Rice, D. D., 1993, *Controls of Coalbed Gas Composition*, from the proceedings of the 1993

International Coalbed Methane Symposium, Birmingham, Alabama, available as Paper 9394

**Summary:** Symposium Paper.

1176. Rice, Dudley D.; Wanty, Richard B.; Byrer, Charles W.; and Kruger, Dina W., 1995, *Coalbed Methane; From Hazard to Environmental Concern and Untapped Energy Resource*, available from the United States Geological Survey as C-1108.

**Summary:** USGS Circular.

1177. Rice, Dudley D.; Charpentier, Ronald R.; Fouch, Thomas D.; Schmoker, James W.; and Attanasi, Emil D., 1995, *Is "Unconventional" Gas a Sustainable Energy Source?*, available from the United States Geological Survey as C 1108.

**Summary:** USGS Conference Document.

1178. Rice, D. D., 1996, *Geologic Framework and Description of Coalbed Gas Plays*, available from the United States Geological Survey as Digital Data Series DDS-30, Release 2, on CD-ROM.

**Summary:** USGS Report.

1179. Rice, D. D.; Young, G. B. C.; and Paul, G. W., 1996, *Methodology for Assessment of Technically Recoverable Resources of Coalbed Gas*, available from the United States Geological Survey as Digital Data Series DDS-30, Release 2, on CD-ROM.

**Summary:** USGS Report.

1180. Rice, Dudley, 1997, *Coalbed Methane — An Untapped Energy Resource and an Environmental Concern*, available from the United States Geological Survey as FS-019-97.

**Summary:** USGS Fact Sheet.

1181. Rice, Dudley D., 1997, *Mineral Resources Potential; Leasable Minerals (Energy Sources); Coalbed Resources*, available from the United States Geological Survey as B 2127.

**Summary:** USGS Report.

1182. Rieke, H. H., 1980, *Arkoma Basin Report; A Study of Pennsylvanian Geology, Coal and Coalbed Methane Resources in Arkansas and Oklahoma*, from a report of the Methane Recovery from Coalbeds Project of the U. S. Department of Energy, available from the Department of Energy.

**Summary:** MRCP Report.

1183. Rieke, H. H.; and Kirr, J. N., 1984, *Geologic Overview, Coal, and Coalbed Methane Resources of the Arkoma Basin - Arkansas and Oklahoma*, available from the American Association of Petroleum Geologists in AAPG Studies in Geology, 17.

**Summary:** AAPG Report.

1184. Riese, C.; Franks, G.; Fehn, U.; and Moran, J. E., 1999, *Fruitland Formation Waters, San Juan Basin, Colorado, and Their Relevance to Understanding Fruitland Coalbed Methane Reservoirs*, from the proceeding of the 1999 Annual AAPG-DEG-DPA-EMD-SEPM Convention, San Antonio, Texas, available from the American Association of Petroleum Geologists.

**Summary:** AAPG Convention Report.

1185. Rightmire, Craig T.; and Byrer, C. W., 1983, *Coal Bed Methane Exploration and Development*, from Coal Age Min. Inf. Service, available from the publisher, McGraw-Hill.

**Summary:** Report.

1186. Rightmire, C. T.; Eddy, G. E.; and Kirr, J. N., 1984, *Coalbed Methane Resources of the United States*, available from the American Association of Petroleum Geologists in AAPG Studies in Geology 17.

**Summary:** AAPG Report.

1187. Rightmire, C. T.; and Choate, R., 1986, *Coal-bed Methane and Tight Gas Sands Interrelationships*, available from the American Association of Petroleum Geologists in AAPG Studies in Geology 24.

**Summary:** AAPG Report.

1188. Roberts, R. D., 2001, *Coalbed Methane Development: A Land Owner's Prospective*, paper presented at the SPE/EPA/DOE Exploration and Production Environmental Conference, available from the Society of Petroleum Engineers as SPE Paper 66572.

**Summary:** This SPE paper discusses several aspects of the Mineral Extraction Agreement between the current owner of a large tract of property in Colorado and New Mexico and the previous owner, who retained the mineral rights that include the Raton Basin coal seam natural gas.

1189. Roberts, S. B.; Clark, A. C.; and Carey, M. A., 1988, *Analyses of Seven Core Samples from Two Tertiary Coal Beds in the Sagwon Member of the Sagavanirktok Formation, North Slope, Alaska*, available from the United States Geological Survey as OF 88-0021.

**Summary:** USGS Report.

1190. Roberts, S. B.; and Stanton, R. W., 1994, *Stratigraphy and Depositional Setting of Thick Coal Beds in the Grass Creek Coal Mine, Southeastern Bighorn Basin, Wyoming*, available from the publisher, the Wyoming State Geological Survey.

**Summary:** WSGS Report.

1191. Roberts, S. B.; and Bossiroy, Dominique, 1995, *Stratigraphy and Coal Geology of the Lower Part of the Fort Union Formation in the Grass Creek Coal Mine Area, Southeastern Bighorn Basin, Wyoming*, available from the United States Geological Survey as C-0146.

**Summary:** USGS Map / Report.

1192. Roberts, S. B.; Wilde, Edith M.; Rossi, G. S.; Blake, Dorsey; Ellis, M. S.; Stricker, G. D.; Ochs, A. M.; Gunther, G. L.; Schuenemeyer, J. H.; and Power, H. C., 1999, *Ashland Coalfield, Powder River Basin, Montana; Geology, Coal Quality, and Coal Resources, 1999 Resource Assessment of Selected Tertiary Coal Beds and Zones in the Northern Rocky Mountains and Great Plains Region*, available from the United States Geological Survey as P 1625-A.

**Summary:** USGS Paper.

1193. Roberts, S. B.; Wilde, Edith M.; Rossi, G. S.; Blake, Dorsey; Bader, L. R.; Ellis, M. S.; Stricker, G. D.; Gunther, G. L.; Ochs, A. M.; Kinney, S. A.; Schuenemeyer, J. H.; and Power, H. C., 1999, *Colstrip Coalfield, Powder River Basin, Montana; Geology, Coal Quality, and Coal Resources, 1999 Resource Assessment of Selected Tertiary Coal Beds and Zones in the Northern Rocky Mountains and Great Plains Region*, available from the United States Geological Survey as P 1625-A.

**Summary:** USGS Paper.

1194. Roberts, S. B.; Gunther, G. L.; Taber, T. T.; Ochs, A. M.; Blake, Dorsey; Ellis, M. S.; Stricker, G. D.; Wilde, Edith M.; Schuenemeyer, J. H.; and Power, H. C., 1999, *Decker Coalfield, Powder River Basin, Montana; Geology, Coal Quality, and Coal Resources, 1999 Resource Assessment of Selected Tertiary Coal Beds and Zones in the Northern Rocky Mountains and Great Plains Region*, available from the United States Geological Survey as P 1625-A.

**Summary:** USGS Paper.

1195. Roberts, S. B.; and Rossi, G. S., 1999, *A Summary of Coal in the Coalmont Formation (Tertiary), North Park Basin, Colorado, 1999 Resource Assessment of Selected Tertiary Coal Beds and Zones in the Northern Rocky Mountains and Great Plains Region*, available from the United States Geological Survey as P 1625-A.

**Summary:** USGS Paper.

1196. Roberts, S. B.; and Rossi, G. S., 1999, *A Summary of Coal in the Fort Union Formation (Tertiary), Bighorn Basin, Wyoming and Montana, 1999 Resource Assessment of Selected Tertiary Coal Beds and Zones in the Northern Rocky Mountains and Great Plains Region*, available from the United States Geological Survey as P 1625-A.

**Summary:** USGS Paper.

1197. Roberts, Stephen B.; and Fishman, Neil S., 2000, *Coal-bed Methane Potential in the Laramie Formation, Greater Wattenberg Area, Denver Basin, Colorado; Just Wishful Thinking?*, available from the American Association of Petroleum Geologists in AAPG Bulletin, 84 (8).

**Summary:** This AAPG conference document discusses the potential for natural gas production from coal seams in the Denver Basin of Colorado.

1198. Roberts, S. B., (Submitted), *Coal in the Front Range Urban Corridor - An Overview of Coal Geology, Coal Production, and Coal-bed Methane Potential in Selected Areas of the Denver Basin, Colorado, and the Potential Impact of Historic Coal Mining and Development and Land Use Planning*, available from the United States Geological Survey as a Professional Paper.

**Summary:** USGS Paper.

1199. Robertson, S. K.; Pool, M.; Farrens, M. J.; and Butts, T. J., 1999, *Case Study: Coalbed Methane Automation System for River Gas Corporation*, from the proceedings of the 1999 SPE East Regional Meeting, Charleston, West Virginia, available from the Society of Petroleum Engineers as SPE 57448.

**Summary:** SPE Meeting Paper.

1200. Robertson, S. K.; Pool, M.; Farrens, M. J.; and Butts, T. J., 2000, *Automation System Case Study of Coalbed Methane Development*, from the proceedings of the 2000 SPE/Canadian Energy Research Institute Gas Technology Symposium, Calgary, Canada, available from the Society of Petroleum Engineers as SPE 59789.

**Summary:** SPE/Canadian Energy Research Institute Symposium Paper.



1201. Robinson, B. M.; and Holditch, S. A., 1999, *Coal Gas Requires Stimulation*, from American Oil & Gas Reporter, v. 42, no. 12, available from the publisher.

**Summary:** Article.

1202. Robinson, L. N.; Culbertson, W. C.; and Affolter, R. H., 1981, *Geology, Coal Resources, and Coal Quality of the Prairie Dog Creek EMRIA Study Area, Rosebud County, Montana*, available from the United States Geological Survey as OF 81-1136.

**Summary:** USGS Report.

1203. Robson, S. G.; and Wright, Winfield G., 1995, *Ground-Water Resources of the Florida Mesa Area, La Plata County, Colorado*, available from the United States Geological Survey as Water-Resources Investigations Report 95-4190.

**Summary:** USGS Report.

1204. Rodrigues, C. F.; and Lemos de Sousa, M. J., 2002, *The Measurement of Coal Porosity With Different Gases*, from International Journal of Coal Geology, v. 48, available from the publisher.

**Summary:** Article.

1205. Rodvelt, G.; Willis, S.; Mullins, D.; and Toothman, R., 2002, *CT Fracturing: Multiple Coals, One Trip*, from American Oil & Gas Reporter, v. 45, no. 5, available from the publisher.

**Summary:** Article.

1206. Rogers, R. E., 1994, *Coalbed Methane: Principles and Practice*, available from the publisher, Prentice Hall.

**Summary:** Report.

1207. Rowan, E. L.; Goldhaber, M. B.; and Hatch, J. R., 2002, *Regional Fluid Flow as a Factor in the Thermal History of the Illinois Basin: Constraints from Fluid Inclusions and the Maturity of Pennsylvanian Coals*, available from the American Association of Petroleum Geologists in AAPG Bulletin, v. 86, no. 2.

**Summary:** AAPG Report.

1208. Roybal, G. H.; Anderson, O. J.; and Beaumont, E. C., eds., 1987, *Coal Deposits and Facies*

*Changes Along the Southwestern Margin of the Late Cretaceous Seaway, West-Central New Mexico*, available from the New Mexico Bureau of Mines and Mineral Resources as Bulletin 121.

**Summary:** New Mexico Bureau of Mines and Mineral Resources Report.

1209. Rozak, A. T.; and Bustin, R. M., 2001, *Measuring Permeability in Coals Utilizing Well Log Data and Log FAC Analysis*, from the proceedings of the 2001 International Coalbed Methane Symposium, Tuscaloosa, Alabama, available as Paper 0111.

**Summary:** Symposium Paper.

1210. Ruppel, T. C.; Grein, C. T.; and Bienstock, D., 1972, *Adsorption of Methane/Ethane Mixtures on Dry Coal at Elevated Pressures*, from Fuel, v. 51, available from the publisher.

**Summary:** Article.

1211. Russell, C.; and Richardson, C. P., 1995, *Treatment of Fruitland Coal Production Water with Ion Exchange Media*, from the proceedings of the 1995 International Unconventional Gas Symposium, Tuscaloosa, Alabama, available as Paper 9550.

**Summary:** Symposium Paper.

1212. Sakashita, Bruce J.; and Seccomb, James C., 1985, *Preliminary Economic Assessment of the Commercial Potential for Deep Coalbed Methane Production from the Red Mountain Unit, Piceance Basin, Colorado*, available from the Gas Technology Institute as GRI-85/0138.

**Summary:** This GRI report discusses a theoretical approach applied to determine the economic potential of methane production from the D Coal Seam at the Red Mountain Unit in the Piceance Basin, Colorado.

1213. Saltsman, R.D.; Uhrin, David C.; and du Breuil, F., 1980, *Survey of Coal Industry Programs for Utilization of Methane from Coal Seams*, available from the Gas Technology Institute as GRI-79/0044.

**Summary:** This is a final report on a survey used to explore the potential for utilization of coal seam natural gas. Discusses the premise that if certain methods of drainage and degasification used by coal mining companies to capture methane become routine, then the investment necessary to make methane collection profitable will be justified.

1214. Sanderson, G. A.; and Berggren, L. W., 1998, *White Paper: Update on Application of § 29 Tax Credit to Coal Seam Gas*, available from the U.S. Environmental Protection Agency.

**Summary:** EPA Report.

1215. Sanderson, G. A.; and Berggren, L. W., 2001, *Recent Developments in the Application of the 29 Tax Credit to Coal Seam Gas*, from the proceedings of the 2001 International Coalbed Methane Symposium, Tuscaloosa, Alabama, available as Paper 0104.

**Summary:** Symposium Paper.

1216. Sanfilipo, J. R., 1999, *Some Speculations on Coal-Rank Anomalies of the South Texas Gulf Province and Adjacent Areas of Mexico and Their Impact on Coal-Bed Methane and Source Rock Potential*, available from the United States Geological Survey as an Open-File Report.

**Summary:** USGS Open-File Report.

1217. Sanfilipo, John R.; Barker, Charles E.; Stanton, Ron W.; Warwick, Peter D.; and Morris, Loyd E., 2000, *A Shallow Coal-bed Methane Show in the Gulf Coast of Texas, Indication of Down-dip Commercial Potential?*, from the proceedings of 2000 Annual Meeting of the American Association of Petroleum Geologists, available from the AAPG.

**Summary:** This AAPG conference document discusses the potential for production of natural gas from coal seams along the Gulf Coast of Texas.

1218. Sargent, A.; Rooney, P. C.; Steward, E.; Van LANDINGHAM, J.; and Seagraves, J., 2000, *New Deep CO<sub>2</sub> Removal Solvent Useful for Natural Gas, Coal Seam Gas, and Refinery Applications*, from the proceedings of the 2000 Annual Oklahoma University Laurance Reid Gas Conditioning Conference, Norman, Oklahoma, available from the University of Oklahoma.

**Summary:** University of Oklahoma Conference Document.

1219. Sato, T., 1981, *Methane Recovery from Coalbeds: Surface and Physical Properties of Western United States Coals*, from an unpublished M.S. Thesis, University of New Mexico, Albuquerque.

**Summary:** Master's Thesis.

1220. Saulsberry, J. L.; Schraufnagel, R. A.; and Jones, A. H., 1992, *Fracture Height Growth and Production from Multiple Reservoirs*, available from the Society of Petroleum Engineers in Reprint Series, 35.

**Summary:** SPE Report.

1221. Saulsberry, J. L.; Spafford, S. D.; Steidl, P. F.; Litzinger, L. A.; Durden, A. H.; Rochester, C. L.; Kuuskraa, V. A.; and Young, G. B. C., 1994, *Effective Completions for Shallow Coal Seams*, available from the Gas Technology Institute as GRI-93/0366.

**Summary:** This GRI topical report discusses research designed to facilitate development of shallow coalbed methane reserves that were bypassed while the deeper seams were explored and developed.

1222. Saulsberry, J. L.; Lambert, S. W.; Wallace, J. A.; Spafford, S. D.; Steidl, P. F., 1995, *Rock Creek Multiple Coal Seams Project*, available from the Gas Technology Institute as GRI-95/0036.

**Summary:** This GRI report summarizes the resource evaluation, reservoir testing, stimulation testing, stimulation design, implementation, diagnostics, water disposal, and production results of coal seam gas wells completed at the Rock Creek site field laboratory.

1223. Saulsberry, J. L.; Schafer, P. S.; and Schraufnager, R. A., eds., 1996, *A Guide to Coalbed Methane Reservoir Engineering*, available from the Society of Petroleum Engineers, also available from the Gas Technology Institute as GRI-94/0397.

**Summary:** This SPE document provides practical methods for the evaluation and development of coal seam natural gas reservoirs.

1224. Sawyer, W. K.; Zuber, M. D.; Kuuskraa, V. A.; and Horner, D. M., 1987, *Using Reservoir Simulation and Field Data to Define Mechanisms Controlling Coalbed Methane Production*, from the proceedings of the 1987 Coalbed Methane Symposium, Tuscaloosa, Alabama, available as Paper 8763.

**Summary:** Symposium Paper.

1225. Sawyer, W. K.; Saulsberry, J. L.; Schraufnager, Richard A.; and Paul, G. W., 1991, *History Match of a Multi-Seam Coalbed Well in the Black Warrior Basin*, available from the publisher, the University of Alabama, College of Continuing Studies.

**Summary:** This conference paper discusses a three-dimensional reservoir simulation study used to history match the first 400 days of gas and water production from a multi-completion well in the Black Warrior Basin.

1226. Saxby, J. D.; and Shibaoka, M., 1986, *Coal and Coal Macerals as Source Rocks for Oil and Gas*, from *Applied Chemistry*, v. 1., available from the publisher.

**Summary:** Article.

1227. Schaible, B., 1999, *Em-Mwd (Electromagnetic-Measuring While Drilling) Expands UBD (Underbalanced Drilling) Applications*, from American Oil & Gas Reporter, v. 42, no. 11, available from the publisher.

**Summary:** Article.

1228. Schaible, Brian, 2002, *BLM Issues Coalbed Methane Studies*, from American Oil & Gas Reporter, v. 45, no. 4, available from the publisher.

**Summary:** Article.

1229. Schatz, J. F.; and Olszewski, A. J., 1993, *Size-Scale Dependence of Mechanical Properties: Application to Coalbed Methane Wells*, from the proceedings of the 1993 International Coalbed Methane Symposium, Birmingham, Alabama, available as Paper 9367.

**Summary:** Symposium Paper.

1230. Schenk, C. J.; Nuccio, V. F.; Flores, R. M.; Johnson, R. C.; Roberts, S. B.; and Collet, T. S., 2001, *Coal-bed Gas Resources of the Rocky Mountain Region*, available from the United States Geological Survey as FS 0110-01.

**Summary:** USGS Fact Sheet.

1231. Schenker, Jeffrey H., 1997, *A Molecular Dynamic Investigation into the Competitive Adsorption of Gas Species on Coal*, available from the University of Wyoming.

**Summary:** Report.

1232. Scholes, P. L.; and Johnston, D., 1993, *Coalbed Methane Applications of Wireline Logs*, available from the American Association of Petroleum Geologists in AAPG Studies in Geology, 38.

**Summary:** AAPG Report.

1233. Schraufnagel, R. A.; Lambert, S. W.; Stubbs, P. B.; Dobscha, F. X.; and Boyer, C. M., II, 1987, *The Rock Creek Field Laboratory - A Project Update*, from the proceedings of the 1987 Coalbed Methane Symposium, Tuscaloosa, Alabama, available as Paper 8722.

**Summary:** Symposium Paper.

1234. Schraufnagel, Richard A.; McBane, Richard A.; and Kuuskraa, Vello A., 1989, *Coalbed Methane*

*Development Faces Technology Gaps*, from Oil & Gas Journal, v. 88, no. 6, available from the publisher.

**Summary:** This journal article examines the major technology, research needs, and problem areas faced by the coal seam natural gas industry.

1235. Schraufnagel, Richard A.; Saulsberry, J. L.; and Lambert, S. W., 1989, *Gas Production from Multiple Wells at Rock Creek*, available from the publisher, the University of Alabama, School of Mines and Energy Development.

**Summary:** This conference paper discusses the Methane from Multiple Coal Seams Project at Rock Creek and its evaluation of the technology required for cost effective production of methane from multiple coal seams through single wellbores.

1236. Schraufnagel, R. A., 1992, *Multiple Seam Completion and Production Experience at Rock Creek*, available from the Society of Petroleum Engineers in Reprint Series, 35.

**Summary:** SPE Report.

1237. Schraufnagel, R. A., 1993, *Coalbed Methane Production*, available from the American Association of Petroleum Geologists in AAPG Studies in Geology, 38.

**Summary:** AAPG Report.

1238. Schraufnagel, R. A.; and McBane, R. A., 1994, *Coalbed Methane - A Decade of Success*, from the proceedings of the 1994 SPE Annual Technical Conference, New Orleans, Louisiana, available from the Society of Petroleum Engineers as SPE 28581.

**Summary:** SPE Conference Paper.

1239. Schroeder, K.; and Ozdemir, E., 2001, *Sequestration of Carbon Dioxide in Coal Seams*, from the proceedings of the National Energy Technology Laboratory First National Conference on Carbon Sequestration, available online at [http://www.netl.doe.gov/publications/proceedings/01/carbon\\_seq/3a4.pdf](http://www.netl.doe.gov/publications/proceedings/01/carbon_seq/3a4.pdf).

**Summary:** This NETL conference document discusses the sequestration of CO<sub>2</sub> in coal seams as a way to mitigate rising levels of CO<sub>2</sub> in the atmosphere.

1240. Schuenemeyer, J. H.; Flores, R. M.; Stricker, G. D.; Ellis, M. S.; Gunther, G. L.; Taber, T. Y.; and Ochs, A. M., 1997, *A Method to Estimate the Uncertainty of Coal Resources*, available from the publisher, the Geological Society of America in Abstracts with Programs - Geological Society of

America, 29 (6).

**Summary:** GSA Conference Document.

1241. Schultz, K., 1995, *A Comprehensive Assessment of the Potential to Reduce Methane Emissions from U. S. Coal Mines*, from the proceedings of the 1995 International Unconventional Gas Symposium, Tuscaloosa, Alabama, available as Paper 9511.

**Summary:** Symposium Paper.

1242. Schultz, K., 1997, *U. S. Environmental Protection Agency's Promotion of Coalbed Methane*, from the proceedings of the 1997 International Coalbed Methane Symposium, Tuscaloosa, Alabama, available as Paper 9763.

**Summary:** Symposium Paper.

1243. Schultz, K. H., 1999, *International Finance and Coal Mine Methane Projects*, from the proceedings of the 1999 International Coalbed Methane Symposium, Tuscaloosa, Alabama, available from the University of Alabama.

**Summary:** Symposium Paper.

1244. Schwerer, F. C., 1986, *Development of Coal-Gas Production Simulators and Mathematical Models for Well-Test Strategies*, available from the Gas Technology Institute as GRI-86/0328.

**Summary:** This GRI report discusses computerized models that were developed to simulate the transient two-phase flow of methane gas and/or water through coal seams.

1245. Schwochow, Stephen D., 1990, *Cumulative Bibliography and Index of the Quarterly Review of Methane from Coal Seams Technology Volumes 1 (1983) Through 7 (1989)*, from Quarterly Review of Methane from Coal Seams Technology, v. 8, no. 1., available from the Gas Technology Institute as GRI-90/0381-0001.

**Summary:** Bibliography of information on natural gas from coal seams.

1246. Schwochow, Stephen D., 1991, *Bibliography and Index of the Quarterly Review of Methane from Coal Seams Technology Volume 8 (1990)*, available from the Gas Technology Institute as GRI-91/0486.

**Summary:** Bibliography of information on coal seam natural gas.

1247. Schwochow, S. D.; Murray, D. K.; and Fahy, M. F., 1991, *Coalbed Methane of Western North America*, available from the Rocky Mountain Association of Geologists.

**Summary:** RMAG Publication.

1248. Schwochow, Stephen D., 1992, *Bibliography and Index of the Quarterly Review of Methane from Coal Seams Technology Volume 9 (1991)*, available from the Gas Technology Institute as GRI-92/0613.

**Summary:** Bibliography of information on natural gas from coal seams.

1249. Schwochow, Stephen D., 1993, *Bibliography and Index of the Quarterly Review of Methane from Coal Seams Technology Volume 10 (1992)*, available from the Gas Technology Institute as GRI-93/0508.

**Summary:** Bibliography of information on natural gas from coal seams.

1250. Schwochow, S. D.; and Stevens, S. H., 1993, *Coalbed Methane - State of the Industry*, from Quarterly Review of Coal Seams Technology, available from the publisher.

**Summary:** Article.

1251. Schwochow, S. D.; and Stevens, S. H., 1993, *Coal-seam Water: Production, Treatment, and Disposal*, from Quarterly Review of Methane from Coal Seams Technology, v. 11, no. 2, available from the publisher.

**Summary:** Article.

1252. Schwochow, S. D., 1999, *Potential Supply of Natural Gas in the United States; Report of the Potential Gas Committee (December 31, 1998)*.

**Summary:** Report.

1253. Schwochow, S. D.; and Nuccio, V. F., 2002, *Coalbed Methane of North America, II*, available from the Rocky Mountain Association of Geologists.

**Summary:** RMAG Publication.

1254. Schwoebel, J. J., 1986, *Coalbed Methane: Conversion of a Liability to an Asset*, from the proceedings of the 1986 SME Annual Meeting, New Orleans, Louisiana, available from the Society of



Mining Engineers as Preprint Number 86-16.

**Summary:** SME Meeting Paper.

1255. Schwoebel, J. J.; Logan, T. L.; and Horner, D. M., 1987, *Deep Coal Seam Project - Advances Made in Coalbed Gas Recovery from Deep Cretaceous Coal Reservoirs, Piceance Basin*, from the proceedings of the 1987 Coalbed Methane Symposium, Tuscaloosa, Alabama, available as Paper 8745.

**Summary:** Symposium Paper.

1256. Schwoebel, J. J.; Kravits, S.; Zambrano A.; and Gonzalez, F., 1993, *Design, Installation and Effectiveness of a Degasification System at the Pasta de Conchos Mine, Nueva Rosita, Coahuila, Mexico*, from the proceedings of the 1993 International Coalbed Methane Symposium, Birmingham, Alabama, available as Paper 9369.

**Summary:** Symposium Paper.

1257. Scott, A. R.; Kaiser, W. R.; and Ayers, W. B., Jr., 1991, *Composition, Distribution, and Origin of Fruitland Formation and Pictured Cliffs Sandstone Gases, San Juan Basin, Colorado and New Mexico*, available from the Rocky Mountain Association of Geologists in Coalbed Methane of Western North America.

**Summary:** RMAG Report.

1258. Scott, Andrew R.; and Kaiser, W. R., 1991, *Relation Between Basin Hydrology and Fruitland Gas Composition, San Juan Basin, Colorado and New Mexico*, from Quarterly Review of Methane from Coal Seams Technology, v. 9, no. 1, available from the publisher.

**Summary:** Article

1259. Scott, Andrew R.; Ambrose, William A., 1992, *Thermal Maturity and Coalbed Methane Potential of the Greater Green River, Piceance, Powder River, and Raton Basins*, published by the American Association of Petroleum Geologists and the Society of Economic Paleontologists and Mineralogists, available from the AAPG.

**Summary:** AAPG / SEPM Report.

1260. Scott, A. R., 1994, *Composition of Coalbed Gases*, from In Situ, v. 18, available from the publisher.

**Summary:** Article.

1261. Scott, A. R., 1994, *Thermogenic and Secondary Biogenic Gases, San Juan Basin, Colorado and New Mexico - Implications for Coalbed Gas Producibility*, available from the American Association of Petroleum Geologists in AAPG Bulletin, v. 78, no. 8.

**Summary:** AAPG Bulletin.

1262. Scott, A. R.; and Kaiser, W. R., 1995, *Hydrogeologic Factors Affecting Dynamic Open-Hole Cavity Completions in the San Juan Basin, USA*, from the proceedings of the 1995 International Unconventional Gas Symposium, Tuscaloosa, Alabama, available as Paper 9510.

**Summary:** Symposium Paper.

1263. Scott, A. R., 1995, *Limitations and Benefits of Microbially Enhanced Coalbed Methane*, from the proceedings of the 1995 International Unconventional Gas Symposium, Tuscaloosa, Alabama, available as Paper 9509.

**Summary:** Symposium Paper.

1264. Scott, A. R.; Zhou, N.; and Levine, J. R., 1995, *A Modified Approach to Estimating Coal and Coal Gas Resources: Examples from the Sand Wash Basin, Colorado*, available from the American Association of Petroleum Geologists in AAPG Bulletin, v. 79.

**Summary:** AAPG Report.

1265. Scott, A. R.; and Kaiser, W. R., 1996, *Factors Affecting Gas-content Distribution in Coal Beds: A Review*, from proceedings of the 1996 AAPG Rocky Mountain Section Meeting, available from the American Association of Petroleum Geologists.

**Summary:** AAPG Conference Document.

1266. Scott, Andrew R., 1997, *Bacterially Mediated Reactions in Coal Beds*, available from the publisher, the Geological Society of America.

**Summary:** GSA Report.

1267. Scott, A. R.; Nance, H. S.; and Beltran, M. Z., 1997, *Heterogeneity of Water and Coal Gas Production in the Northern San Juan Basin, Colorado and New Mexico*, from the International Coalbed Symposium, available as Paper 9739.

**Summary:** Symposium Document.

1268. Scott, A. R., 1997, *Timing of Cleat Development in Coal Beds*, available from the American Association of Petroleum Geologists in AAPG Annual Convention Official Program, v. 6.

**Summary:** AAPG Convention Document.

1269. Scott, Andrew R.; Tyler, Roger; and Clough, James G., 1998, *Exploration for Coalbed Methane in Frontier Regions Using Limited Data*, published by the American Association of Petroleum Geologists and the Society of Economic Paleontologists and Mineralogists, available from the AAPG.

**Summary:** AAPG / SEPM Report.

1270. Scott, A. R., 1999, *Developing a Coalbed Methane Producibility Model for the Texas Gulf Coast Coals*, available from the South Texas Geological Society in Bulletin of the South Texas Geological Society, v. 40.

**Summary:** South Texas Geological Society Report.

1271. Scott, A. R.; and Nance, H. S., 1999, *Factors Affecting Geochemical and Production Heterogeneity in Coal Beds*, from the 1999 Annual AAPG-DEG-DPA-EMD-SEPM Convention, San Antonio, Texas, available from the American Association of Petroleum Geologists.

**Summary:** AAPG Convention Report.

1272. Scott, A. R., 1999, *Improving Coal Gas Recovery with Microbially Enhanced Coalbed Methane*, available from Kluwer Academic Publishers, Boston.

**Summary:** Report.

1273. Scott, A. R.; and Tyler, R., 2000, *Evaluating Coalbed Methane Potential in Texas*, available from the American Association of Petroleum Geologists in AAPG Bulletin, v. 84, no. 10.

**Summary:** AAPG Bulletin.

1274. Scott, A. R., 2001, *Coal and Coalbed Methane Resources of Texas*, available from the American Association of Petroleum Geologists in AAPG Bulletin, v. 85.

**Summary:** AAPG Bulletin.

1275. Sedam, A. C.; and Stein, R. B., 1970, *Saline Ground-Water Resources of Ohio*, available from the United States Geological Survey as Hydrologic Investigations Atlas HA-366.

**Summary:** USGS Map.

1276. Seidle, J. P.; and McAnear, J. F., 1995, *Pressure Falloff Testing of Enhanced Coalbed Methane Pilot Injection Wells*, paper presented at the 1995 SPE Annual Technical Conference and Exhibition, available from the Society of Petroleum Engineers as SPE Paper 30578.

**Summary:** This SPE paper discusses pressure falloff tests performed on enhanced coal seam natural gas recovery pilot in the San Juan Basin. The tests were performed to determine effective permeability to gas, wellbore skin and the average reservoir pressure.

1277. Seidle, J. P., 1999, *A Modified P/Z Method for Coal Wells*, from the proceedings of the 1999 SPE Rocky Mountain Regional Meeting, Gillette, Wyoming, available from the Society of Petroleum Engineers as SPE 55605.

**Summary:** SPE Meeting Paper.

1278. Seidle, J. P., 2000, *Reservoir-Engineering Aspects of CO<sub>2</sub> Sequestration in Coals*, from Journal of Petroleum Technology, v. 52, no. 4, available from the Society of Petroleum Engineers as SPE 59788.

**Summary:** Article.

1279. Seidle, J. P., 2002, *Lessons Learned, Lessons Lost - Review of Selected Coalbed Methane Pilots*, available from the Rocky Mountain Association of Geologists in Coalbed Methane of North America, II.

**Summary:** RMAG Report.

1280. Selden, R. F., 1934, *The Occurrence of Gases in Coals*, U.S. Bureau of Mines Report of Investigations 3233, available from the National Technical Information Service.

**Summary:** USBM Report.

1281. Semmelbeck, M. E.; and Lee, W. J., 1992, *Well Test Requirements for Evaluation of Coalbed Methane Development Potential*, available from the Society of Petroleum Engineers in Reprint Series, 35.

**Summary:** SPE Report.

1282. Sergeev, I. V.; and Dikolenko, E. Y., 1995, *Methods for Forecasting and Reducing Gas Emissions in Mine Workings: Improving the Coal Mining Safety*, from the proceedings of the 1995

International Unconventional Gas Symposium, Tuscaloosa, Alabama, available as Paper 9543.

**Summary:** Symposium Paper.

1283. Serov, V. I., 1995, *Economical Aspects of Coalbed Methane Extraction and Utilization by Coal Mines in the CIS*, from the proceedings of the 1995 International Unconventional Gas Symposium, Tuscaloosa, Alabama, available as Paper 9542.

**Summary:** Symposium Paper.

1284. Sharma, D. D., 1999, *Strategy for Development of Hydrocarbon Gas Resources of Petroliferous and Coal Basins in India*, from the proceedings of the 1999 Indian Oil Corporation Ltd. Petroleum Conference, New Delhi, India, available in Proceedings, v. 5.

**Summary:** Conference Paper.

1285. Shepard, Thomas E.; O'Neil, Patrick E.; Harris, Steven C.; and McGregor Stuart W., 1993, *Effects of Coalbed Methane Development on the Water-Quality and Fish and Benthic Invertebrate Communities of the Big Sandy Creek Drainage System, Alabama*, available from the Geological Survey of Alabama as Circular 171.

**Summary:** Evaluates the quality and effects of coal seam natural gas produced water discharged into the Big Sandy Creek of Alabama. Compares these waters with those from other coal seam natural gas fields in Alabama.

1286. Shi, J. Q.; Durucan, S.; and Daltaban, T. S., 1997, *Numerical Modelling of Openhole Cavity Completions in Coalbed Methane Wells*, from the proceedings of the 1997 International Coalbed Methane Symposium, Tuscaloosa, Alabama, available as Paper 9747.

**Summary:** Symposium Paper.

1287. Shi, J. Q.; and Durucan, S., 1999, *Numerical Analysis of the Effect of Pore Pressure Depletion on Productivity of Horizontal Coalbed Methane Wells*, from the proceedings of the 1999 International Coalbed Methane Symposium, Tuscaloosa, Alabama, available from the University of Alabama.

**Summary:** Symposium Paper.

1288. Shi, J. Q.; and Durucan, S., 2001, *Application of Conventional Oil Reservoir Productivity Equations to Horizontal Coalbed Methane Wells*, from the proceedings of the International Coalbed Methane Symposium, Tuscaloosa, Alabama, available as Paper 134.

**Summary:** Symposium Paper.

1289. Shi, J. Q.; and Durucan, S., 2001, *Identifying the Key Factors Controlling Openhole Cavity Completions at the San Juan Basin - A Numerical Study*, from the proceedings of the International Coalbed Methane Symposium, Tuscaloosa, Alabama, available as Paper 135.

**Summary:** Symposium Paper.

1290. Shi, J. Q.; Durucan, S.; and Sinka, I. C., 2002, *Key Parameters Controlling Coalbed Methane Cavity Well Performance*, from International Journal of Coal Geology, v. 49, available from the publisher.

**Summary:** Article.

1291. Shirley, K., 1999, *Exceptional Economics, Potential Drive Coalbed Methane Plays*, from American Oil & Gas Reporter, v. 42, no. 7, available from the publisher.

**Summary:** Article.

1292. Shirley, K., 2000, *Coalbed Methane Comes of Age*, available from the American Association of Petroleum Geologists in AAPG Explorer, v. 21.

**Summary:** AAPG Report.

1293. Shirley, K., 2000, *“Weekend Work” Yields Gas Field*, available from the American Association of Petroleum Geologists in AAPG Explorer, v. 21.

**Summary:** AAPG Report.

1294. Shirley, K., 2000, *Wyoming Enjoys Coal Gas Play*, available from the American Association of Petroleum Geologists in AAPG Explorer, v. 21, no. 4.

**Summary:** AAPG Report.

1295. Shirley, Kathy, 2001, *Maverick Has Potential Chat Sparks Texas Coal Gas Play*, available from the American Association of Petroleum Geologists in AAPG Explorer, v. 22, no. 11.

**Summary:** AAPG Report.

1296. Shirley, K., 2002, *Operators Continue to Expand Coalbed Methane's Geographic Diversity*, from American Oil & Gas Reporter, v. 45, no. 3, available from the publisher.

**Summary:** Article.

1297. Siegel, M. M.; James, W. M.; Mason, R. Z.; Gash, B. W.; and Barone, Saverio Peter, 1985, *Economic Evaluation of SNG and Methanol Using Underground Coal Gasification*, available from the publisher, Government Institutes, Inc., Rockville, Maryland.

**Summary:** This conference paper discusses an economic analysis that was conducted for substitute natural gas (SNG) production from deep coal in the Powder River Basin of Wyoming. Results are presented in tables.

1298. Simmons, B. F., 1992, *Treatment and Disposal of Wastewaters Produced with Coalbed Methane by Reverse Osmosis*, available from the publisher, Plenum Press.

**Summary:** Report.

1299. Simmons, B. F., 2000, *Coalbed Methane in Wyoming*, available from the publisher, the Wyoming State Geological Survey.

**Summary:** WSGS Report.

1300. Simpson, D.; and Jensen, J., 2000, *Vented Gas from Wellsite Control Equipment*, from the proceedings of the 2000 SPE Health, Safety & Environment International Conference, Stavanger, Norway, available from the Society of Petroleum Engineers as SPE 61030.

**Summary:** SPE Conference Paper.

1301. Sinclair, J. F., 1999, *Geologic Controls on the Nora Coalbed Methane Field, Southwest Virginia*, from the proceedings of the 1999 GSA Annual Southeast Section Meeting, Athens, Georgia, available from the Geological Society of America in Abstract with Programs, v. 31, no. 3.

**Summary:** GSA Meeting Paper.

1302. Sinclair, K. G.; and Cranstone, J. R., 1997, *Canadian Coalbed Methane: The Birth of an Industry*, from the proceedings of the 1997 International Coalbed Methane Symposium, Tuscaloosa, Alabama, available as Paper 9701.

**Summary:** Symposium Paper.

1303. Sinha, K.P.; Bell, G. J.; Odette, B. B.; McLennan, J. D.; and Jones, A. H., 1990, *Coalbed Methane Production and Stimulation Database - COMPAS II: Documentation and User's Manual*, available from the Gas Technology Institute as GRI-90/0119.

**Summary:** This GRI topical report discusses the COMPAS II, a microcomputer program that provides information on oil and gas wells.

1304. Sinka, I. C.; Durucan, S.; Marsden, J. R.; and Daltaban, T. S., 1997, *A Laboratory Investigation Into the Mechanism of Openhole Cavity Completions in Coalbed Methane Wells*, from the proceedings of the 1997 International Coalbed Methane Symposium, Tuscaloosa, Alabama, available as Paper 9748.

**Summary:** Symposium Paper.

1305. Skipper, L., 1999, *Petroleum Resources of Canada for the 21st Century*, available from the American Association of Petroleum Geologists in *AAPG Bulletin*, v. 83.

**Summary:** AAPG Report.

1306. Smith, D. M.; and Williams, F. L., 1984, *Diffusion Models for Gas Production from Coals - Application to Methane Content Determination*, from *Fuel*, v. 63, available from the publisher.

**Summary:** Article.

1307. Smith, D. M.; and Williams, F. L., 1984, *Diffusion Models for Gas Production from Coals - Determination of Diffusion Parameters*, from *Fuel*, v. 63, available from the publisher.

**Summary:** Article.

1308. Smith, D. M.; and Williams, F. L., 1984, *Direct Method of Determining the Ethane Content of Coal: A Modification*, from *Fuel*, v. 63, available from the publisher.

**Summary:** Article.

1309. Smith, T. N., 1995, *Coalbed Methane Potential for Alaska and Drilling Results for the Upper Cook Inlet Basin*, from the proceedings of the 1995 International Unconventional Gas Symposium, Tuscaloosa, Alabama, available as Paper 9501.

**Summary:** Symposium Paper.



1310. Snyder, G. T.; Fehn, U.; Riese, W. C.; Franks, S. G.; and Moran, J. E., 2000, *Paleohydrology of a Coal-Bed Methane Reservoir: I-129 and CI-36 Results for the Fruitland Formation, CO*, from the 2000 GSA Annual Meeting, Reno, Nevada, available from the Geological Society of America in Abstract with Programs, v. 32, no. 7.

**Summary:** GSA Meeting Paper.

1311. Society of Petroleum Engineers, 1992, *Coalbed Methane*, available from the Society of Petroleum Engineers in Reprint Series, 35

**Summary:** SPE Report.

1312. Soeder, D. J., 1991, *The Effects of Overburden Stress on Coalbed Methane Production*, available from the publisher, Techbooks, Fairfax, VA, in Geology in Coal Resource Utilization.

**Summary:** Report.

1313. Soliman, M. Y.; Hunt, J. L.; McDaniel, B.; and Lee, W. S., 1989, *Design and Calculation of Fracture Parameters-Applications to Coalbeds*, from the proceedings of the 1989 Coalbed Methane Symposium, Tuscaloosa, Alabama, available as Paper 8995.

**Summary:** Symposium Paper.

1314. Sööt, P. M., 1988, *Non-conventional Fuel Tax Credit*, available from the Rocky Mountain Association of Geologists in Rocky Mountain Association of Geologists Guidebook.

**Summary:** RMAG Report.

1315. Sööt, P., 1989, *Horizontal Well Coalbed Methane Production Relative to Cleat Orientation*, from the proceedings of the 1989 Coalbed Methane Symposium, Tuscaloosa, Alabama, available as Paper 8943.

**Summary:** Symposium Paper.

1316. Sööt, P., 1991, *Tax Incentives Spur Development of Coalbed Methane*, from Oil & Gas Journal, June 1991, available from the publisher.

**Summary:** Article.

1317. Sööt, P. M., 1991, *Western United States Coalbed Methane Gas Content Correlations*, available

from the Rocky Mountain Association of Geologists, in Coalbed Methane of Western North America.

**Summary:** RMAG Report.

1318. Sööt, Peet M., 2001, *Integrated Technologies for Coal Mine Methane Utilization*, from the proceedings of the 2001 International Coalbed Methane Symposium, Tuscaloosa, Alabama, available as Paper 0101.

**Summary:** Symposium Paper.

1319. Spafford, S. D.; and Stubbs, P. B., 1989, *Reservoir Pressure Profiles and Desorption Estimates for the Mary Lee Coal Group Based on Monitor Well Data at the Rock Creek Project*, from the proceedings of the 1989 Coalbed Methane Symposium, Tuscaloosa, Alabama, available as Paper 8962.

**Summary:** Symposium Paper.

1320. Spafford, S. D., 1991, *Stimulating Multiple Coal Seams at Rock Creek with Access Restricted to a Single Seam*, from the proceedings of the 1991 Coalbed Methane Symposium, Tuscaloosa, Alabama, available from the University of Alabama.

**Summary:** Symposium Paper.

1321. Spafford, S. D.; Dobscha, F. X.; Durden, A. H.; Hollub, V. A.; McKinnon, C. L.; Saulsberry, J. L.; Steidl, P. F.; and Stubbs, P. B., 1992, *1.1.4 Coalbed Methane Multiple Coal Seam Project 305. Rock Creek Methane from Multiple Coal Seams Completion Project*, available from the Gas Technology Institute as GRI-92/0257.

**Summary:** This report discusses the 1991 results of the Coalbed Methane Multiple Coal Seam Project.

1322. Spafford, S. D.; Saulsberry, J. L.; and Schraufnagel, R. A., 1993, *Field Verification of Fracture Height Growth Associated with a Restricted-Access Completion*, from the proceedings of the 1993 International Coalbed Methane Symposium, Birmingham, Alabama, available from the University of Alabama.

**Summary:** Symposium Paper.

1323. Sparks, D. P.; Lambert, S. W.; and McLendon, T. H., 1993, *Coalbed Gas Well Flow Performance Controls, Cedar Cove Area, Warrior Basin, U.S.A.*, from the proceedings of the 1993 International Coalbed Methane Symposium, Birmingham, Alabama, available as Paper 9376.

**Summary:** Symposium Paper.

1324. Springer, P. S.; Hugman, R. H.; Costinett, M. J.; and Vidas, E. H., 1999, *Unconventional Gas Field, Reservoir, and Completion Analysis of the Continental United States - 1998 Update. Project Summary*, available from the Gas Technology Institute as GRI-98/0364.1.

**Summary:** This GRI report discusses the database developed that documents tight gas, coalbed methane, and shale gas production and activity for 263 basin and formation categories.

1325. St., G. J. D.; and Barakat, M. A., 2001, *The Change in Effective Stress Associated with Shrinkage from Gas Desorption in Coal*, in Geotechnical and Environmental Issues Related to Coal Mining, available from the publisher, Elsevier, Amsterdam.

**Summary:** Report.

1326. Stahl, R. M.; and Clark, P. E., 1991, *Fluid Loss During the Fracturing of Coalbed Methane Wells*, from the proceedings of the 1991 International Coalbed Methane Symposium, Tuscaloosa, Alabama, available from the University of Alabama.

**Summary:** Symposium Paper.

1327. Stanton, Ronald C., 1989, *Sampling of Coal Beds for Analysis*, available from the United States Geological Survey in B 1823.

**Summary:** USGS Report.

1328. Stanton, R.; Flores, R.; Warwick, P. D.; Gluskoter, H.; and Stricker, G. D, 2001, *Coal Bed Sequestration of Carbon Dioxide*, from the National Energy Technology Laboratory First National Conference on Carbon Sequestration, available online from the National Energy Technology Laboratory at [http://www.netl.doe.gov/publications/proceedings/01/carbon\\_seq/3a3.pdf](http://www.netl.doe.gov/publications/proceedings/01/carbon_seq/3a3.pdf).

**Summary:** Discusses the USGS project, "Assessment of Geologic Reservoirs for Carbon Dioxide Sequestration".

1329. Staub, J. R., 1999, *Reservoir Sequences in the Coal Beds of Southern West Virginia*, from the proceedings of the 1999 International Coalbed Methane Symposium, Tuscaloosa, Alabama, available from the University of Alabama.

**Summary:** Symposium Paper.

1330. Staub, J. R., 2000, *A Repeating Coal-Bed Sequence in the Central Appalachian Basin*, from the proceedings of the 2000 AAPG-SEPM Annual Convention, New Orleans, Louisiana, available from the American Association of Petroleum Geologists.

**Summary:** AAPG Convention Paper.

1331. Staub, J. R., 2002, *Marine Flooding Events and Coal Bed Sequence Architecture in Southern West Virginia*, from International Journal of Coal Geology, v. 49, no. 2-3, available from the publisher.

**Summary:** Article.

1332. Stayton, R. J., 2002, *Horizontal Wells Boost CBM Recovery*, from American Oil & Gas Reporter, v. 45, no. 8, available from the publisher.

**Summary:** Article.

1333. Steidl, P. F., 1991, *Inspections of Induced Fractures Intercepted by Mining in the Warrior Basin, Alabama*, available from the University of Alabama.

**Summary:** Conference paper discusses a study of hydraulic fractures in coalbeds. Project focused on 13 wells where induced fractures were intercepted by mining in the Warrior Basin.

1334. Steidl, P. F., 1991, *Observations of Induced Fractures Intercepted by Mining in the Warrior Basin, Alabama. Rock Creek Methane from Multiple Coal Seams Completion Project*, available from the Gas Technology Institute as GRI-91/0327.

**Summary:** This report presents data on the inspection of fractures from 13 wells that were intercepted by mining in the Warrior Basin in Alabama.

1335. Steidl, P. F., 1993, *Evaluation of Induced Fractures Intercepted by Mining*, from the proceedings of the 1993 International Coalbed Methane Symposium, Birmingham, Alabama, available as Paper 9377.

**Summary:** Symposium Paper.

1336. Steidl, P. F.; Ferguson, P.; Litzinger, L. A.; Brande, S.; Ponstein, J.; and Higdon, J., 1997, *Evaluation of Coal Particles from the Black Warrior Basin of Alabama - Application of Digital Image Analysis*, from the proceedings of the 1997 International Coalbed Methane Symposium, Tuscaloosa, Alabama, available as Paper 9730.

**Summary:** Symposium Paper.

1337. Stevens, S.H.; Lombardi, T.E.; Kelso, B.S.; and Coates, J.M., 1992, *Geologic Assessment of Natural Gas from Coal Seams in the Raton and Vermejo Formation, Raton Basin*, available from the Gas Technology Institute as GRI-92/0345.

**Summary:** This report assesses the coal seam natural gas resources of the Raton Basin.

1338. Stevens, S. H.; Kelso, B. S.; Lombardi, T. E.; and Coates, J. M., 1993, *Raton Basin Assessment of Coalbed Methane Resources*, from Quarterly Review of Methane from Coal Seams Technology, v. 10, no. 3, available from the publisher.

**Summary:** Report.

1339. Stevens, S. H.; Kuuskraa, V. A.; Schraufnagel, R. A., 1996, *Technology Spurs Growth of U.S. Coalbed Methane*, from Oil & Gas Journal, January 1996, available from the publisher.

**Summary:** Article.

1340. Stevens, S. H.; Spector, D.; and Reimer, P., 1998, *Enhanced Coalbed Methane Recovery Using CO<sub>2</sub> Injection: Worldwide Resource and CO<sub>2</sub> Sequestration Potential*, paper presented at the 1998 International Oil and Gas Conference and Exhibition, available from the Society of Petroleum Engineers as Paper 48881.

**Summary:** This paper discusses the analysis of production operations from the first carbon dioxide enhanced coal seam natural gas pilot. The paper asserts that the San Juan Basin test well shows that injection of carbon dioxide into deep coal seams for enhancement of coal seam natural gas recovery and the sequestration of greenhouse gas is technically and economically feasible.

1341. Stevens, S. H.; Pekot, L.; and Schoeling, L., 1999, *CO<sub>2</sub> Injection for Enhanced Coalbed Methane Recovery: Project Screening and Design*, from the proceedings of the 1999 International Coalbed Methane Symposium, Tuscaloosa, Alabama, available from the University of Alabama.

**Summary:** Symposium Paper.

1342. Stevens, S. H.; Kuuskraa, V. A.; Gale, J. J.; and Beecy, D., 2000, *CO<sub>2</sub> Injection and Sequestration in Depleted Oil and Gas Fields and Deep Coal Seams; Worldwide Potential and Costs*, from the proceedings of the 2000 AAPG International Conference and Exhibition, available from the American Association of Petroleum Geologists.

**Summary:** AAPG Conference Report.

1343. Stevenson, M. D.; Pinczewski, W. V.; and Downey, R. A., 1993, *Economic Evaluation of Nitrogen*

*Injection for Coalseam Gas Recovery*, from the proceedings of the 1993 SPE Gas Technology Symposium, Calgary, Canada, available from the Society of Petroleum Engineers as SPE 26199.

**Summary:** This SPE symposium paper presents the results of a preliminary economic evaluation of the nitrogen injection process for potential application to the Fruitland Formation in the San Juan basin.

1344. Stevenson, R., 1999, *Thoresby Colliery Outburst, A Lesson Learned*, from International Mining and Minerals, v. 2, available from the publisher.

**Summary:** Article.

1345. Stoeckinger, W. T.; and Brady, L. L., 1989, *Coalbed Methane Potential in Eastern Kansas*, available from the Kansas Geological Survey.

**Summary:** KGS Report.

1346. Stoeckinger, W. T., 1989, *Coal-bed Methane Production in Eastern Kansas: Its Potential and Restraints*, available from the American Association of Petroleum Geologists in AAPG Bulletin, v. 73.

**Summary:** AAPG Bulletin.

1347. Stoeckinger, W. T., 1989, *Methane from Coal in Southeastern Kansas: The Rebirth of an Old Industry*, from the proceedings of the 1989 Coalbed Methane Symposium, available as Paper 8964.

**Summary:** Symposium Paper.

1348. Stoeckinger, W. T., 1990, *Kansas Coalbed Methane Comes on Stream*, from Oil & Gas Journal, v. 88, no. 23, available from the publisher.

**Summary:** Article.

1349. Stoeckinger, W. T., 1991, *Methods to Measure Directly the Gas Content of Coals*, available from the publisher, the Kansas Geological Survey in Open-File Report 91-52.

**Summary:** KGS Open-File Report.

1350. Stoeckinger, W. T., 1992, *Coalbed Methane Production Base Established in Southeast Kansas*, from Oil & Gas Journal, v. 90, no. 15, available from the publisher.

**Summary:** Article.

1351. Stott, J., 2001, *Canadian Coalbed Methane Activity Intensifies*, from Oil & Gas Journal, v. 99, no. 47, available from the publisher.

**Summary:** Article.

1352. Strategic Research Institute, 2002, *3rd Annual Coalbed and Coal Mine Methane Conference*, Denver, Colorado, proceedings available from the Strategic Research Institute.

**Summary:** Strategic Research Institute Conference Document.

1353. Strategic Research Institute, 2002, *CBM Water Management Strategies*, from the proceedings of the 2002 Durango, Colorado, conference, available from the Strategic Research Institute.

**Summary:** Strategic Research Institute Conference Document.

1354. Stremel, Kristine, *Coming out of the Closet. Operators Drilling for Natural Gas in Coal Seams Aren't Kooky. They're Hunting Elephants - and Finding Them.*

**Summary:** Article

1355. Strever, M. T., 1979, *Methane Drainage Plan Using Horizontal Holes at the Hawk's Nest East Mine, Paonia, Colorado*, available from the Colorado Geological Survey as Open-File Report 80-7.

**Summary:** Examines drilling, completion, pipe size, spacing, and recovery of methane at the Hawk's Nest East Mine in Colorado.

1356. Stricker, G. D., 1983, *Coal Occurrences, Quality, and Resource Assessment, National Petroleum Reserve in Alaska, U.S. Geological Survey Polar Research Symposium; Abstracts with Program*, available from the United States Geological Survey as C 0911

**Summary:** USGS Conference Document.

1357. Stricker, Gary D.; and Ellis, Margaret S., 1994, *Laramide Tectonism and Paleogeography; Their Effects on Quality and Hazardous Air Pollutant Trace Element Trends in Rocky Mountain Province Paleocene Coals*, from Annual Meeting of the Society of Organic Petrology. Abstracts and Program, 11, available from the publisher, the Society of Organic Petrology.

**Summary:** Society of Organic Petrology Conference Document.

1358. Stricker, G. D.; and Ellis, M. S., 1999, *Coal Quality and Geochemistry, Greater Green River Basin, Wyoming, 1999 Resource Assessment of Selected Tertiary Coal Beds and Zones in the Northern Rocky Mountains and Great Plains Region*, from the United States Geological Survey in P 1625-A.

**Summary:** USGS Professional Paper.

1359. Stricker, G. D.; and Ellis, M. S., 1999, *Coal Quality and Geochemistry, Hanna and Carbon Basins, Wyoming, 1999 Resource Assessment of Selected Tertiary Coal Beds and Zones in the Northern Rocky Mountains and Great Plains Region*, from the United States Geological Survey in P 1625-A.

**Summary:** USGS Professional Paper.

1360. Stricker, G. D.; and Flores, R. M., 2000, *Powder River Basin and Williston Basin Coal Resource Assessment and Their Relationship to Coalbed Methane Potential*, from the proceedings of a 1999 meeting of the Society of Mining, Metallurgy, and Exploration, Inc., Salt Lake City.

**Summary:** Society of Mining, Metallurgy, and Exploration Conference Document.

1361. Stricker, G. D.; Flores, R. M.; and Ochs, A. M., 2000, *Powder River Basin Coalbed Methane; The USGS Role in Investigating This Ultimate Clean Coal By-production*, from the proceedings of the 25th International Technical Conference on Coal Utilization and Fuel Systems, Clearwater, Florida.

**Summary:** Conference Document.

1362. Stricker, G. D.; Flores, R. M.; and McGarry, D. E., 2001, *Coalbed Methane Studies on Federal Lands in the Powder River Basin and Other Areas in Wyoming*, from the proceedings of the 2001 Meeting of the Geological Society of America, Boston, Massachusetts

**Summary:** GSA Conference Document.

1363. Stuart, A. D.; Mahoney, M. R.; and Danell, R. E., 1997, *Developments in Methane Drainage for Improved Coal Mining Safety and Environmental Performance*, from the proceedings of the 1997 International Coalbed Methane Symposium, Tuscaloosa, Alabama, available as Paper 9771.

**Summary:** Symposium Paper.

1364. Stuhel, S., 1990, *Introduction to Coal Sampling Techniques for the Petroleum Industry*, available from the Alberta Research Council, Coalbed Methane Seminar Series in Information Series 11.



**Summary:** Alberta Research Council Report.

1365. Su, X; Feng, Y.; Chen, J.; and Pan, J., 2001, *The Annealing Mechanisms of Cleats in Coal*, from the proceedings of the 2001 International Coalbed Methane Symposium, Tuscaloosa, Alabama, available as Paper 0130.

**Summary:** Symposium Paper.

1366. Sullivan, D.; Mills, R.; and McNider, T., 1999, *Quality Gas from Gob Wells Through Interactive Well Operating Practices*, from the proceedings of the 1999 International Coalbed Methane Symposium, Tuscaloosa, Alabama, available from the University of Alabama.

**Summary:** Symposium Paper.

1367. Sun, M.; and Fan, Z., 2000, *China's Coalbed Methane Industry Development Can Benefit from U. S. Example*, from Oil & Gas Journal, v. 98, no. 23, available from the publisher.

**Summary:** Article.

1368. Svenster, P. G., 1959, *Diffusion of Gases Through Coal*, from Fuel, v. 38, available from the publisher.

**Summary:** Article.

1369. Swinchatt, J. P., 1994, *The Future of Energy Gases*, from the United States Geological Survey as OF 94-0642.

**Summary:** USGS Report.

1370. Sykes, W. W., 1989, *Gathering Systems Concepts-Planning, Design and Construction*, from the proceedings of the 1989 Coalbed Methane Symposium, Tuscaloosa, Alabama, available as Paper 8975.

**Summary:** Symposium Paper.

1371. TRW, 1977, *Methane Produced from Coalbeds, Systems Studies of Energy Conservation*, available from the United States Department of Energy.

**Summary:** DOE Contracted Study.

1372. TRW, 1980, *Summary of Geologic Features of Selected Coal-Bearing Areas of the United States*, available from the Gas Technology Institute as GRI-80/0085.

**Summary:** This GRI-sponsored report summarizes the geologic features, the basic coal characteristics, and the extent of coal seam gas resources in the 10 major coal-bearing basins and regions of the United States.

1373. Tabet, D. E.; and Quick, J. C., 1999, *Extensions of the Hams Fork Coal Region, Summit County, Utah; Potential for Coalbed Gas*, available from the Utah Geological Association in Geology of Northern Utah and Vicinity, v. 27.

**Summary:** Utah Geological Association Report.

1374. Tailakov, O. V.; Poleshikov, G. Y.; Bykov, A. A.; Abramov, I. L.; Panchisheva, T. A.; and Sinelikova, A. V., 1999, *Economical and Ecological Assessment of Coalmine Methane Recovery and Utilization Projects in Kuznetsk Coal Basin of Russia*, from the proceedings of the 1999 International Coalbed Methane Symposium, Tuscaloosa, Alabama, available from the University of Alabama.

**Summary:** Symposium Paper.

1375. Takahashi, K. I., 2001, *U. S. Geological Survey Coalbed Methane Field Conference*, from the United States Geological Survey as OF 01-0235.

**Summary:** USGS Open File Report.

1376. Takla, G.; and Vavrusak, Z., 1999, *Coal Seam Gas Emissions from Ostrava-Karvina Collieries in the Czech Republic During Mining and After Mines Closure*, from Coalbed Methane: Scientific, Environmental and Economic Evaluation, available from the publisher.

**Summary:** Report.

1377. Tang, Y.; Jenden, P. D.; Nigrini, A.; and Teerman, S. C., 1996, *Modeling Early Methane Generation in Coal*, from Energy and Fuels, v. 10, available from the publisher.

**Summary:** Article.

1378. Tao, M.; Xu, Y.; Cheng, J.; and Shen, P., 1999, *The Tectonic Setting, Typical Gas Pools and Exploration Direction of Coal-Type Gas Provinces*, from Acta Sedimentologica Sinica, v. 17, available from the publisher.

**Summary:** Article.

1379. Tarabbia, P. J.; Warren, J. K.; and Gamson, P. D., 1995, *Secondary Mineralization and Its Effect on Coal Permeability*, from the proceedings of the 1995 International Unconventional Gas Symposium, Tuscaloosa, Alabama, available as Paper 9535.

**Summary:** Symposium Paper.

1380. Taurus Exploration, Inc., 1992, *Overview of GRI Research at the Rock Creek Site, Black Warrior Basin. Overview of GRI Research at Rock Creek: Eight Years of Cooperative Research, Coalbed Methane Shortcourse, Abingdon, Virginia, October 23, 1992*, available from the Gas Technology Institute as GRI-92/0581.

**Summary:** This report presents an overview of a workshop on coal seam gas exploration and production in the Black Warrior basin.

1381. Taurus Exploration, Inc., 1992, *Overview of GRI Research at the Rock Creek Site, Black Warrior Basin. Overview of GRI Research at Rock Creek: Eight Years of Cooperative Research, Coalbed Methane Shortcourse, Birmingham, Alabama, October 21, 1992*, available from the Gas Technology Institute as GRI-92/0580.

**Summary:** This report presents an overview of a workshop on coal seam gas exploration and production in the Black Warrior basin.

1382. Tedesco, Steven A., 1992, *Coalbed Methane Potential Assessed in Forest City Basin*, from Oil & Gas Journal, February 10, 1992, available from the publisher.

**Summary:** Article.

1383. Tedesco, S. A., 1999, *Forest City Basin Coal-bed Methane Potential, Northeastern Kansas and Western Missouri*, from the proceedings of the 1999 AAPG Rocky Mountain Section Meeting, Bozeman, Montana, available from the American Association of Petroleum Geologists in AAPG Bulletin, v. 83, no. 7.

**Summary:** AAPG Report.

1384. Telle, W. R.; Thompson, D. A.; Lottman, L. K.; and Malone, P. G., 1987, *Preliminary Burial - Thermal History Investigations of the Black Warrior Basin: Implications for Coalbed Methane and Conventional Hydrocarbon Development*, from the proceedings of the 1987 Coalbed Methane Symposium, Tuscaloosa, Alabama, available as Paper 8713.

**Summary:** Symposium Paper.

1385. Telle, W. R.; and Thompson, D. A., 1987, *Preliminary Characterization of the Coalbed Methane Potential of the Cahaba Coal Field, Central Alabama*, from the proceedings of the 1987 Coalbed Methane Symposium, Tuscaloosa, Alabama, available as Paper 8733.

**Summary:** Symposium Paper.

1386. Telle, W. R.; and Thompson, D. A., 1989, *Coalbed Methane Development Prospects in Southern Tuscaloosa County, Alabama*, from the proceedings of the 1989 Coalbed Methane Symposium, Tuscaloosa, Alabama, available as Paper 8966.

**Summary:** Symposium Paper.

1387. Terra Tek Holdings, Inc.; and Resource Enterprises, Inc., 1994, *Western Cretaceous Coal Seam Project: Summary of the Amoco Barnes #21 Pressure Interference Data Analysis*, available from the Gas Technology Institute as GRI-94/0518.

**Summary:** This GRI-sponsored report discusses the bottomhole pressure data obtained from an observation well during cavity completion of a coal seam gas well.

1388. Tewalt, S. J.; Bauer, M. A.; Mathew, D.; Roberts, M. P.; Ayers, W. B., Jr.; Barnes, J. W.; and Kaiser, W. R., 1983, *Estimation of Coal Resources in Texas Gulf Coast, Ohio Northern Appalachian, and Wyoming Powder River Basins: A Comparison of Statistical Approaches*, available from the publisher, the University of Texas.

**Summary:** University of Texas Report.

1389. Tewalt, S. J.; and Halili, N. E., 1994, *Arsenic in the Coal Beds and Surface Waters of the Warrior Basin, Western Alabama*, from the proceedings of the Eleventh Annual International Pittsburgh Coal Conference, available as v. 2.

**Summary:** Conference Document.

1390. Thielemann, T.; Luecke, A.; Schleser, G. H.; and Littke, R., 2000, *Methane Exchange Between Coal-Bearing Basins and the Atmosphere; The Ruhr Basin and the Lower Rhine Embayment, Germany*, from the proceedings of the 2000 International Meeting of Organic Geochemistry, in Advances in Organic Geochemistry.

**Summary:** Paper.

1391. Thielemann, T.; Krooss, B. M.; Littke, R.; and Welte, D. H., 2001, *Does Coal Mining Induce Methane Emissions Through the Lithosphere/Atmosphere Boundary in the Ruhr Basin*,

Germany?, from Journal of Geochemical Exploration, v. 74, available from the publisher.

**Summary:** Article.

1392. Thimons, B.; and Kissell, F. N., 1973, *Diffusion of Methane Through Coal*, from Fuel, v. 52, available from the publisher.

**Summary:** Article.

1393. Thomas, Keith T., 2002, *Collected Studies: Coal Seam Natural Gas; Also Known as Coalbed Methane*, available from the Interstate Oil and Gas Compact Commission.

**Summary:** This IOGCC / U. S. Environmental Protection Agency / U. S. Department of Energy publication is a bibliography of coal seam gas publications. Contains 922 listings.

1394. Thomas, Keith T., 2002, *Natural Gas From Coal Seams: A Compilation of Coal Bed Methane Studies*, available from the Interstate Oil and Gas Compact Commission.

**Summary:** This IOGCC publication is a bibliography of coal seam gas publications. Contains 245 listings.

1395. Thomasson, M. Ray; and Meissner, Fred F., 2001, *US Rockies 'Discoveries': Analogs for the Future*, from Oil & Gas Journal, v. 99, no. 48, available from the publisher.

**Summary:** Article.

1396. Thompson., Dan A.; and Telle Whiteny R., 1987, *Coalbed Methane in the Black Warrior Basin, Alabama - Geology, Resources and Development*, from Quarterly Review of Methane from Coal Seams Technology, v. 4, no. 3, available from the publisher.

**Summary:** Article.

1397. Thompson, D. L., 2000, *Bighorn Gas Gathering Adding Value Through Synergy*, from the proceedings of the 2000 GPA Annual Convention, Atlanta Georgia, available from the Gas Processors Association.

**Summary:** Gas Processors Association Convention Paper.

1398. Throne, 2001, *Coalbed Methane Surface Issues*, from the proceedings of the 2001 AAPL Annual Meeting and Conference, Salt Lake City, Utah, available from the American Association of Petroleum

Landmen.

**Summary:** American Association of Petroleum Landmen Conference Paper.

1399. Thungsuntonkhun, W. and Engler, T., 2001, *Well Deliverability of Undersaturated Coalbed Reservoir*, from the proceedings of the 2001 SPE Rocky Mountain Petroleum Technology Conference, Keystone, Colorado, available from the Society of Petroleum Engineers as SPE 71068.

**Summary:** SPE Conference Paper.

1400. Tietge, Joseph E.; Mount, David R.; and Gulley, David D., 1994, *GRI Freshwater STR Model and Computer Program: Overview, Validation, and Application*, available from the Gas Technology Institute as GRI-94/0369.

**Summary:** Report on the development of a toxicity database from which predictive ion toxicity models could be created. These models would be used in the evaluation of options for meeting permit toxicity limits regulated by the National Pollutant Discharge Elimination System (NPDES).

1401. Ting, F. T. C.; and Wang, P. B., 1984, *Coal Anisotropism and Its Relationship to Methane Concentration in Coal*, available from the American Association of Petroleum Geologists in AAPG Bulletin, v. 68.

**Summary:** AAPG Bulletin.

1402. Ting, F. T. C., 1987, *Original Anisotropism and Its Relationship with Some Physical and Chemical Properties of Coal*, from Organic Chemistry, v. 11, available from the publisher.

**Summary:** Article.

1403. Towse, Donald, 1983, *Feasibility Study: Vertical Fracturing in Directionally Drilled Wells*, available from the Gas Technology Institute as GRI-83/0047.

**Summary:** This GRI report discusses computer reservoir simulations that were used to examine the technical problems and costs for turning a vertical well to the horizontal at the pay zone and then propagating hydraulic fractures from the horizontal portion.

1404. Tremain, C. M., 1980, *The Coalbed Methane Potential of the Raton Basin, Colorado*, available from the Colorado Geological Survey as Open-File Report 80-4.

**Summary:** CGS Open-File Report.

1405. Tremain, Carol M.; and Toomey, James, 1983, *Coal Bed Methane Desorption Data*, available from the Colorado Geological Survey.

**Summary:** CGS Report.

1406. Tremain, C. M.; et al, 1983, *The Coal Bed Methane Resources of Colorado*, available from the Colorado Geological Survey in Map Series 19.

**Summary:** CGS Maps.

1407. Tremain, C. M., 1990, *Coalbed Methane Development in Colorado, September 1990*, available from the Colorado Geological Survey in Information Series 32.

**Summary:** CGS Report.

1408. Tremain, C. M.; Laubach, S. E.; and Whitehead, N. H., III, 1991, *Coal Fracture (Cleat) Patterns in Upper Cretaceous Fruitland Formation, San Juan Basin, Colorado and New Mexico - Implications for Coalbed Methane Exploration and Development*, available from the Rocky Mountain Association of Geologists in Coalbed Methane of Western North America.

**Summary:** RMAG Report.

1409. Tremain, C. M.; Laubach, S. E.; and Whitehead, N. H., III, 1994, *Coal Fracture (Cleat) Patterns in Upper Cretaceous Fruitland Formation Coal Seams, San Juan Basin*, available from the publisher, the New Mexico Bureau of Mines and Mineral Resources in Bulletin 146.

**Summary:** New Mexico Bureau of Mines and Mineral Resources Report.

1410. Trent, Virgil, A., 1985, *Summary of Results of the Coal Resource Occurrence and Coal Development Potential Mapping Program in Part of the Powder River Basin, Montana and Wyoming*, from the United States Geological Survey as OF 85-0621.

**Summary:** USGS Report / Map.

1411. Triolo, M.; Ogbe, D. O.; and Lawal, A. S., 1999, *Consideration for Water Disposal and Management in the Development of Coalbed Methane Resources in Rural Alaska*, from the proceedings of the 1999 CSPG / CIM Joint Convention, Calgary, Canada, available from the Canadian Study of Parliament Group or the Canadian Institute of Mining, Metallurgy and Petroleum in Proceedings, v. 2a.

**Summary:** CSPG / CIM Convention Paper.

1412. Tsay, F. S.; and Chen, J. C., 1987, *A Simulation Study on the Effect of Well Spacing and Well Pattern on Coalbed Methane Recovery and Gas Emission in Longwall Mining*, from the proceedings of the 1987 Coalbed Methane Symposium, Tuscaloosa, Alabama, available as Paper 8754.

**Summary:** Symposium Paper.

1413. Tyler, Noel, director, *Development and Evaluation of a Basin-Scale Coalbed Methane Producibility Model*, available online from the Gas Technology Institute.

**Summary:** Report on the development of a model for evaluating coal seam natural gas potential in frontier basins, or for finding “sweet spots” in basins with established production.

1414. Tyler, Roger; Ambrose, W.A.; Scott, A.R.; and Kaiser, W.R., 1991, *Coalbed Methane Potential of the Greater Green River, Piceance, Powder River, and Raton Basins*, available from the Gas Technology Institute as GRI-91/0315.

**Summary:** This report discusses an evaluation of coal seam natural gas potential of four basins in the western United States. The evaluation was done in the context of characteristics identified in the San Juan Basin.

1415. Tyler, Roger; Laubach, S. E.; Ambrose, W. A.; Grout, M. A.; and Tremain, C. M., 1992, *Face-Cleat Patterns in Rocky Mountain Foreland Basins, Western United States; Permeability Indicators for Coalbed Methane*, available from the American Association of Petroleum Geologists in [AAPG Bulletin](#), 76(8).

**Summary:** AAPG Conference Document.

1416. Tyler, R. N.; Zhou, N.; McMurray, R. G.; Jackson, M. L. W.; and Tremain, C. M., 1992, *Selected References Related to Coalbed Methane in the Greater Green River, Piceance, Powder River, Raton, and San Juan Basins*, available from the Colorado Geological Survey in Information Series 35.

**Summary:** CGS Publication.

1417. Tyler, R.; Laubach, S. E.; Ambrose, W. A.; Tremain, C. M.; and Grout, M. A., 1993, *Coal Fracture Patterns in the Foreland of the Cordilleran Thrust Belt, Western United States*, from the proceedings of the 1993 International Coalbed Methane Symposium, Birmingham, Alabama, available as Paper 9379.

**Summary:** Symposium Paper.



1418. Tyler, Roger; Kaiser, William R.; Scott, Andrew R.; Hamilton, Douglas S.; McMurry, Ronald G.; and Zhou, Naijiang, 1994, *Geologic and Hydrologic Assessment of Natural Gas from Coal Seams in the Mesaverde Group and Fort Union Formation, Greater Green River Basin, Wyoming and Colorado*, available from the Gas Technology Institute as GRI-93/0320.

**Summary:** Review of coal seam natural gas potential in the Greater Green River Basin in Wyoming and Colorado. Reports on recent production that has resulted in little gas and large volumes of water.

1419. Tyler, R.; Kaiser, W. R.; Scott, A. R.; and Hamilton, D. S., 1995, *Coalbed Gas Potential of the Greater Green River Basin, Southwest Wyoming and Northwest Colorado*, from the proceedings of the 1995 International Unconventional Gas Symposium, Tuscaloosa, Alabama, available as Paper 9502.

**Summary:** Symposium Paper.

1420. Tyler, R.; Scott, A. R.; and Kaiser, W. R., 1999, *Defining Coalbed Methane Exploration Fairways; An Example from the Piceance Basin, Rocky Mountain Foreland, Western United States*, from *Coalbed Methane: Scientific, Environmental and Economic Evaluation*, available from the publisher.

**Summary:** Report.

1421. Tyler, R.; Kaiser, W. R.; Scott, A. R.; Hamilton, D. S.; and Ambrose, W. A., 1995, *Geologic and Hydrologic Assessment of Natural Gas from Coal: Greater Green River, Piceance, Powder River, and Raton Basins, Western United States*, available online from the Texas University, Bureau of Economic Geology as Report of Investigations No. 228 at <http://www.beg.utexas.edu/mainweb/publications/abstracts/pubs-1995.html>.

**Summary:** Texas University Bureau of Economic Geology Report.

1422. Tyler, Roger; Kaiser, William R.; McMurry, Ronald G.; Nance, H. Seay; Scott, Andrew R.; and Zhou, Naijiang, 1995, *Geologic Characterization and Coalbed Methane Occurrence: Williams Fork Formation, Piceance Basin, Northwest Colorado*, available from the Gas Technology Institute as GRI-94/0456.

**Summary:** This report focuses on the refinement and validation aspects of a coal seam natural gas producibility model.

1423. Tyler, Roger; Scott, Andrew R.; Kaiser, William R.; Nance, H. Seay; McMurry, Ronald G.; Tremain Carol M.; and Mavor, Matt J., 1996, *Geologic and Hydrologic Controls Critical to Coalbed Methane Producibility and Resource Assessment: Williams Fork Formation, Piceance Basin, Colorado*, available from the Gas Technology Institute as GRI-95/0532.

**Summary:** Report on the development of the third portion of a Gas Research Institute coal seam natural gas producibility model. Compares the geologic and hydrologic settings of the Piceance, San Juan and Sand Wash basins. This report also reviews the key geologic and hydrologic controls on producibility.

1424. Tyler, R.; Scott, A. R.; Kaiser, W. R.; and McMurray, R. G., 1997, *The Application of a Coalbed Methane Producibility Model in Defining Coalbed Methane Exploration Fairways and Sweet Spots: Examples from the San Juan, Sand Wash, and Piceance Basins*, available from the publisher, the Bureau of Economic Geology, Austin, Texas, as Report of Investigations 244.

**Summary:** Bureau of Economic Geology Report.

1425. Tyler, R.; Scott, A. R., 1997, *Defining Coalbed Gas Exploration Fairways in Low Permeability, Hydrocarbon Overpressured Basins: An Example from the Piceance Basin, Northwest Colorado*, from the proceedings of the International Coalbed Methane Symposium, available as Paper 9717.

**Summary:** Symposium Paper.

1426. Tyler, R.; Kaiser, W. R.; Scott, A. R.; and Hamilton, D. S., 1997, *The Potential for Coalbed Gas Exploration and Production in the Greater Green River Basin, Southwest Wyoming and Northwest Colorado*, from *The Mountain Geologist*, v. 34, no. 1, available from the publisher.

**Summary:** Article.

1427. Tyler, R.; Scott, A. R.; and Kaiser, W. R., 1999, *Defining Coalbed Methane Exploration Fairways: An Example from the Piceance Basin, Rocky Mountain Foreland, Western United States*, available from Kluwer Academic Publishers, Boston.

**Summary:** Report.

1428. Tyler, R.; and Hamilton, D. S., 2000, *Application of Genetic Sequence Stratigraphy in Defining Coalbed-Gas Exploration Fairways: Examples from Williams Fork Formation, Sand Wash and Piceance*, from the proceedings of the 2000 AAPG - SEPM Annual Convention, New Orleans, Louisiana, available from the American Association of Petroleum Geologists.

**Summary:** AAPG - SEPM Convention Report.

1429. United States Geological Survey, 1973, *State of Kentucky, 1:500,000 Topographic Map*, available from the United States Geological Survey.

**Summary:** USGS Map.

1430. United States Geological Survey, 1984, *Hydrologic Events, Selected Water-Quality Trends, and Ground-Water Resources*, available from the United States Geological Survey as Water Supply Paper 2275.

**Summary:** USGS Paper.

1431. United States Geological Survey, 1995, *1995 National Assessment of United States Oil and Gas Resources*, available from the United States Geological Survey as C 1118.

**Summary:** USGS Report.

1432. United States Geological Survey, Central Region Energy Resources Team, 1999, *Coalbed Methane Project*, available from the United States Geological Survey.

**Summary:** USGS, Central Region Energy Resources Team Report.

1433. United States Geological Survey, Central Region Energy Resources Team, 2000, *Preliminary Gulf Coast Coalbed Methane Exploration Maps: Depths to Wilcox, Apparent Wilcox Thickness and Vitrinite Reflectance*, available from the United States Geological Survey.

**Summary:** USGS, Central Region Energy Resources Team Report / Maps.

1434. Urosevic, M.; Evans, B. J.; and Cocker, J. D., 2000, *The Prediction of Sweet-Spots Using 2-D Seismic Data*, from the proceedings of the 2000 AAPG International Conference, Bali, Indonesia, available from the American Association of Petroleum Geologists in AAPG Bulletin, v. 84, no. 9.

**Summary:** AAPG Conference Report.

1435. Van Bergen, F.; Pagnier, H. J. M.; Schreurs, H. C. E.; Paaij, A. P. C.; Hamelinck, C. N.; Wolf, H. A. A.; Barzandji, O. H.; Jansen, D.; and Ruijg, G. J., 2001, *Inventory of the Potential for Enhanced Coalbed Methane Production With Carbon Dioxide Disposal in the Netherlands*, from the proceedings of the International Coalbed Methane Symposium, Tuscaloosa, Alabama, available as Paper 117.

**Summary:** Symposium Paper.

1436. Van Loenen, Richard E.; and Gibbons, Anthony B., 1991, *Assessment of Undiscovered Resources of Coalbed Methane in Nine Wyoming BLM Wilderness Study Areas*, available from the United

States Geological Survey as OF 91-0590.

**Summary:** USGS Report.

1437. Van Voast, Wayne A., 1991, *Fracture Patterns in Coal in the Western United States; Observations and Implications for Development of Coalbed Methane Resources*, available from the Geological Society of America.

**Summary:** GSA Report.

1438. Van Voast, W. A., 1991, *Hydrogeologic Aspects of Coal-bed Methane Occurrence, Powder River Basin*, available from the American Association of Petroleum Geologists in AAPG Bulletin, v. 75.

**Summary:** AAPG Report.

1439. Vasyuchkov, Y. F., 2000, *Utilization of Coalbed Methane as Reserving Process for Saving of Petroleum and Gaseous Fuels*.

**Summary:** Article.

1440. Vessey, S. J.; and Bustin, R. M., 1999, *Coalbed Methane Characteristics of the Mist Mountain Formation, Southern Canadian Cordillera: Effect of Shearing and Oxidation*, available from Kluwer Academic Publishers, Boston.

**Summary:** Report.

1441. Veil, John A., 2002, *Regulatory Issues Affecting Management of Produced Water from Coal Bed Methane Wells*, prepared by the Argonne National Laboratory for the DOE Office of Fossil Energy. For availability of paper, contact John A. Veil at the Argonne National Laboratory.

**Summary:** Describes existing national discharge regulations, current methods for managing coal seam natural gas produced water, current discharge permitting process, and how the increasing volume of discharged water due to increased coal seam natural gas development will affect the process.

1442. Vines, C. D.; Reeves, S. R.; and Worm, D., 1987, *Production Operations at the TEAM Project, Oak Grove, Alabama*, from the proceedings of the 1987 Coalbed Methane Symposium, Tuscaloosa, Alabama, available as Paper 8761.

**Summary:** Symposium Paper.

1443. Vo, D. T.; Ohaeri, C. U.; and Montoya, G. L., 1991, *Pressure Buildup Analysis of Early-Time Data from Coalbed Methane Wells in the Rincon Unit, San Juan Basin, New Mexico*, from the proceedings of the 1991 SPE Annual Technical Conference, Dallas, Texas, available from the Society of Petroleum Engineers as SPE 22684.

**Summary:** SPE Conference Paper.

1444. Von Schonfeldt, H., 1981, *Methane Drainage in Advance of Mining Through Horizontal Boreholes*, for TRW Energy Systems Group by Occidental Research Corporation.

**Summary:** Contracted Report.

1445. Vorkink, William P.; and Lee, Milton L., 1992, *Chemical Characterization of Thermal Maturity in Coals Using High Resolution Chromatographic Methods*, available from the Gas Technology Institute as GRI-92/0043.

**Summary:** This GRI-sponsored report discusses a study that characterizes the structural changes in the progressive stages of coal thermal maturation.

1446. Vorkink, William P.; and Lee, Milton L., 1993, *Appraisal of Heavy Hydrocarbons in Coal Seam Gas Reservoirs*, available from the Gas Technology Institute as GRI-92/0501.

**Summary:** This report discusses a study that examined the content and composition of heavy hydrocarbon constituents in coal seam reservoirs.

1447. Wandry, Craig J.; Law, Ben E.; Spencer, Charles W.; and Barker, Charles E., 2000, *Oil, Gas, and Coal-bed Methane Resources*, available from the United States Geological Survey in P 1610.

**Summary:** USGS Professional Paper.

1448. Wang, H.; Zhang, J.; Liu, H.; and Li, J., 1999, *Analysis of Coalbed Methane Preservation Conditions*, from the proceedings of the 1999 International Coalbed Methane Symposium, Tuscaloosa, Alabama, available from the University of Alabama.

**Summary:** Symposium Paper.

1449. Wang, S.; and Zhang, S., 1999, *Booming Coalbed Methane Industry in China*, from the proceedings of the 1999 International Coalbed Methane Symposium, Tuscaloosa, Alabama, available from the University of Alabama.

**Summary:** Symposium Paper.

1450. Wang, S.; Duan, L.; Chen, Z.; Zhang, M.; and Zhang, S., 1999, *Research into Coalbed Methane Pool Trap and Its Significance; An Example of Carboniferous-Permian Coalbed Methane Pool Trap in North China*, from Earth Science, Journal of China University of Geoscience, v. 24.

**Summary:** Report.

1451. Wang, X., 1999, *The Consideration and Choice on Exploiting Energy Source*, from Chinese Science Bulletin, v. 44, available from the publisher.

**Summary:** Report.

1452. Wanty, Richard B.; Folger, Peter F.; and Briggs, Paul H., 1993, *Ground-water Chemistry of the Coal-Bearing Upper Cretaceous Mesaverde Formation, Wind River Reservation, Wyoming*, from 1993 meeting of the Wyoming Geological Association, available from the Wyoming Geological Association.

**Summary:** WGA Symposium Document.

1453. Wanty, Richard B., *USGS Research on Saline Waters Co-Produced With Energy Resources*, available online from the United States Geological Survey as Fact Sheet FS-003-97.

**Summary:** USGS Fact Sheet that discusses the water co-produced with oil and gas in the oilfields of the United States.

1454. Ward, C. R.; Crouch, A.; and Cohen, D. R., 2001, *Identification of Potential for Methane Ignition by Rock Friction in Australian Coal Mines*, from International Journal of Coal Geology, v. 45, no. 2-3, available from the publisher.

**Summary:** Article.

1455. Warwick, P. D.; SanFilipo, J. R.; Barker, Charles E.; and Morris, L. E., 1999, *Coal-bed Methane in the Gulf Coastal Plain; A New Frontier?*, from the proceedings of the 1999 GSA Annual Meeting, Denver, Colorado, available from the Geological Society of America in Abstract with Programs, v. 31, no. 7.

**Summary:** This GSA conference document discusses the potential for production of natural gas from coal seams along the Gulf Coastal Plain.

1456. Warwick, P. D.; Augourg, C. E.; and Willett, J. C., 1999, *Tertiary Coals in South Texas; Anomalous Cannel-Like Coals of Webb County (Claibourn Group, Eocene) and Lignites of Atascosa County (Jackson Group, Eocene); Geologic Setting, Character, Source-Rock and Coal-Bed*

*Methane Potential*, available from the United States Geological Survey as an Open-File Report.

**Summary:** USGS Open File Report.

1457. Warwick, P. D.; Barker, C. E.; SanFilipo, J. R.; and Biewick, L. R. H., 2000, *Preliminary Evaluation of the Coalbed Methane Resources of the Gulf Coastal Plain*, available online from the United States Geological Survey as Open File Report 00-143.

**Summary:** USGS Open File Report that illustrates the location and geology of coalbeds in the Gulf Coastal Plain and their potential for coal seam natural gas production.

1458. Warwick, Peter D.; Barker, C. E.; SanFilipo, John R.; and Morris, L. E., 2000, *Preliminary Results from Coal-bed Methane Drilling in Panola County, Texas*, available the United States Geological Survey as OF 00-0048.

**Summary:** USGS Open File Report.

1459. Warwick, P. D.; Barker, C. E.; SanFilipo, J. R., 2002, *Preliminary Evaluation of the Coalbed Methane Potential of the Gulf Coastal Plain, USA and Mexico*, available from the Rocky Mountain Association of Geologists in Coalbed Methane of North America, II.

**Summary:** RMAG Report.

1460. Way, S. C.; McKee, C. R.; Bell, G. J.; and Brandenburg, C. R., 1983, *Role of Hydrology in the Production of Methane from Coal Seams*, from Quarterly Review of Methane from Coal Seams Technology, available from the publisher.

**Summary:** Article.

1461. Weaver, J. N.; Gruber, J. R., Jr., 1993, *Coal and Coal Bed Methane Resources of the Absaroka - Beartooth Study Area*, available from the United States Geological Survey as OF 93-0207.

**Summary:** USGS Report.

1462. Weida, S. D.; Reeves, S.; and Young, G. B. C., 1997, *Optimizing Coalbed Methane Cavity Completion Operations with the Application of a New Discrete Element Model*, from the proceedings of the 1997 International Coalbed Methane Symposium, Tuscaloosa, Alabama, available as Paper 9768.

**Summary:** Symposium Paper.

1463. Weishauptove, Z.; Medek, J.; and Nmec, J., 1999, *Decrease of Desorption Intensity of Coalbed Methane Due to Hydraulic Fracturing*, in Coalbed Methane, Scientific, Environmental and Economic Evaluation, available from Kluwer Academic Publishers, Boston, Massachusetts.

**Summary:** Report.

1464. Westinghouse Electric Company, 1978, *Coalbed Methane Extraction and Utilization*, from 7th Monthly Progress Report to the United States Department of Energy.

**Summary:** DOE Contracted Study.

1465. Westman, Glenn H.; and Parish, Lovell M., 1981, *The Coal Bed Methane Potential of the Sand Wash Basin, Green River Coal Region, Colorado*, available from the publisher, the Colorado Geological Survey.

**Summary:** CGS Report.

1466. Wheat, R. W., 1999, *Coalbed Methane Potential, Core and Pilot Program, Illinois Basin*, available from the American Association of Petroleum Geologists in AAPG Bulletin, v. 83.

**Summary:** AAPG Bulletin.

1467. Wheaton, J. R.; and Lovelace, B. K., *Hydrologic Issues Associated with Coal-Bed Methane Development in Montana*, Reclamation Research Unit.

**Summary:** Report.

1468. Wicks, D. E.; McFall, K. S.; Zuber, M. D.; and Schraufnagel, R. A., 1987, *An Analysis of the Coalbed Methane Resources of the Warrior Basin, Alabama*, from the proceedings of the 1987 Coalbed Methane Symposium, Tuscaloosa, Alabama, available as Paper 8732.

**Summary:** Symposium Document.

1469. Wicks, D. E.; and Zuber, M. D., 1989, *A Strategy for Coalbed Methane Production Development, Part II*, from the proceedings of the 1989 Coalbed Methane Symposium, Tuscaloosa, Alabama, available as Paper 8912.

**Summary:** Symposium Document.

1470. Wieczner, Bilha; and Irvin, Marcia, 1989, *Coalbed Methane Development in Alabama: A*



*Bibliography*, available from the Gas Technology Institute as GRI-89/0343.

**Summary:** Bibliography that contains listings of reports on coal seam natural gas development in Alabama. Publication dates range from 1890 through 1989.

1471. Williams, Peggy, 1998, *Coalbed Methane*, from The Oil & Gas Investor, available from the publisher.

**Summary:** Article.

1472. Williams, Peggy, 2002, *CBM in the Piceance Basin*, from The Oil & Gas Investor, v, 22, no. 4, available from the publisher.

**Summary:** Article.

1473. Williams, Peggy, 2002, *Coalbed Methane in the Cherokee Basin*, from The Oil & Gas Investor, v, 22, no. 2, available from the publisher.

**Summary:** Article.

1474. Willis, C., 1978, *Rocky Mountain Coal Seams Call for Special Drilling Techniques*, from The Oil & Gas Journal, July 10, 1978, available from the publisher.

**Summary:** Article.

1475. Willis, R. M.; Wright, T. B.; Buharali, A. M.; and Ely, J. W., 1987, *Monitoring and Analysis of Coal-Bed Fracturing Operations Using the GRI Mobile Test and Control Facility*, from the proceedings of the 1987 Coalbed Methane Symposium, Tuscaloosa, Alabama, available as Paper 8765.

**Summary:** Symposium Paper.

1476. Winston, R. B., 1990, *Preliminary Report on Coal Quality Trends in Upper Pottsville Formation Coal Groups and Their Relationships to Coal Resource Development, Coalbed Methane Occurrence, and Geologic History in the Warrior Coal Basin, Alabama*, available from the Geological Survey of Alabama as Circular 152.

**Summary:** Geological Survey of Alabama Circular.

1477. Winston, R. B., 1990, *Vitrinite Reflectance of Alabama's Bituminous Coal*, available from the Geological Survey of Alabama as Circular 139.

**Summary:** Geological Survey of Alabama Circular.

1478. Wold, M. B.; and Jeffrey, R. G. A., 1999, *A Comparison of Coal Seam Directional Permeability as Measured in Laboratory Core Tests and in Well Interference Tests*, from the proceedings of the 1999 SPE Rocky Mountain Regional Meeting, Gillette, Wyoming, available from the Society of Petroleum Engineers as SPE 55598.

**Summary:** SPE Meeting Paper.

1479. Wolf, K. H. A. A.; Hettema, M. H. H.; van Tongeren, P. C. H.; and Schreurs, H. C. E., 1997, *Enhancement of Coalbed Methane Production of Deep Coal Seams with the Aid of Underground Coal Gasification*, from the proceedings of the 1997 International Coalbed Methane Symposium, Tuscaloosa, Alabama, available as Paper 9725.

**Summary:** Symposium Paper.

1480. Wolf, H. H. A. A.; Hijman, R.; Barzandji, O. H.; and Bruining, J., 1999, *Laboratory Experiments and Simulations on the Environmentally Friendly Improvement of Coalbed Methane Production by Carbon Dioxide Injection*, from the proceedings of the 1999 International Coalbed Methane Symposium, Tuscaloosa, Alabama, available from the University of Alabama.

**Summary:** Symposium Paper.

1481. Wolf, K.; Ephraim, R.; Bertheux, W.; and Bruining, J., 2001, *Coal Cleat Classification and Permeability Estimation by Image Analysis on Cores and Drilling Cuttings*, from the proceedings of the International Coalbed Methane Symposium, Tuscaloosa, Alabama, available as Paper 102.

**Summary:** Symposium Paper.

1482. Wong, S.; Gunter, W. D.; and Mavor, M. J., 2000, *Economics of CO<sub>2</sub> Sequestration in Coalbed Methane Reservoirs*, from the proceedings of the 2000 SPE / Canadian Energy Research Institute Gas Technology Symposium, Calgary, Canada, available from the Society of Petroleum Engineers as SPE 59785.

**Summary:** Symposium Paper.

1483. Wong, S.; MacLeod, K.; Wold, M.; Gunter, W. D.; Mavor, M. J.; and Gale, J., 2001, *CO<sub>2</sub> - Enhanced Coalbed Methane Recovery Demonstrations Pilot - A Case for Australia*, from the proceedings of the International Coalbed Methane Symposium, Tuscaloosa, Alabama, available as Paper 148.

**Summary:** Symposium Paper.

1484. Wood, M. D.; and Wright, C. A., 1987, *Real-Time Tiltmeter Monitoring of Hydraulic Fracture Propagation in Coal*, from the proceedings of the 1987 Coalbed Methane Symposium, Tuscaloosa, Alabama, available as Paper 8724.

**Summary:** Symposium Paper.

1485. Woods, T. J., 1987, *The Outlook for Gas Supply: The Role of Coal-Bed Methane*, from the proceedings of the 1987 Coalbed Methane Symposium, Tuscaloosa, Alabama, available as Paper 8702.

**Summary:** Symposium Paper.

1486. Woodward, N.; York, M.; and Benson, S., 2000, *An R&D Roadmap for Carbon Sequestration in Geologic Formations*, from the proceedings of the 2000 AAPG - SEPM Annual Convention, New Orleans, Louisiana, available from the American Association of Petroleum Geologists.

**Summary:** AAPG Convention Report.

1487. Wray, L. L., 2000, *Raster Image Correlations of Surface and Sub-Surface Late Cretaceous Fruitland Formation Coals in the Northern San Juan Basin, La Plata County, Colorado*, from the 2000 AAPG Rocky Mountain Section Meeting, Albuquerque, New Mexico, available from the American Association of Petroleum Geologists in AAPG Bulletin, v. 84, no. 8.

**Summary:** AAPG Report.

1488. Wray, Laura L.; Koenig, Nicole V.; and Seidle, John P., 2001, *Can Coalbed Methane and Aquifer Development Co-Exist? Examining the Two Resources in the Denver Basin of Colorado*, available from the Rocky Mountain Association of Geologists in RMAG Outcrop, v. 50, no. 12.

**Summary:** AAPG Report.

1489. Wray, L. L.; and Koenig, N. V., 2001, *The Coalbed Methane Potential in the Upper Cretaceous to Early Tertiary Laramie and Denver Formations, Denver Basin, Colorado*, available from the Colorado Geological Survey on CD-ROM.

**Summary:** This CGS report provides geologic information on the coal seam natural gas resources of the Denver Basin.

1490. Wray, Laura L., *Geologic Mapping and Subsurface Well Log Correlations of the Late Cretaceous Fruitland Formation Coal Beds and Carbonaceous Shales – the Stratigraphic Mapping Component of the 3M Project, San Juan Basin, La Plata County, Colorado*, available online from the Colorado Oil and Gas Conservation Commission.

**Summary:** Documents the distribution of mappable Cretaceous Fruitland Formation Coals of the San Juan Basin and provides a grid of correlated subsurface cross sections in La Plata County, Colorado.

1491. Wright, C. A., 1992, *Effective Design, Real-Data Analysis, and Post-Job Evaluation of Hydraulic Fracturing Treatments*, from Quarterly Review of Methane from Coal Seams Technology, July, available from the publisher.

**Summary:** Article.

1492. Wyman, R. E., 1984, *Gas Resources in Elsworth Coal Seams*, available from the publisher, the Canadian Society of Petroleum Geologists in Canadian Society of Petroleum Geologists Memoirs, 38.

**Summary:** Canadian Society of Petroleum Geologists Report.

1493. Wyoming Department of Environmental Quality, Water Quality Division, 2000, *Antidegradation Review, Analysis and Findings: Concentrations of Barium in the Surface Waters in Northeastern Wyoming Related to Discharges of Coal Bed Methane Produced Water*, available from the Water Quality Division, Wyoming Department of Environmental Quality.

**Summary:** Wyoming DEQ Report.

1494. Wyoming Geological Association, 1981, *Powder River Basin Oil and Gas Fields*, available from the Wyoming Geological Association.

**Summary:** WGA Report.

1495. Wyoming Geological Association, 2000, *Coalbed Methane & Tertiary Geology, Powder River Basin*, from the 50th Field Conference, available from the Wyoming Geological Association.

**Summary:** WGA Guidebook

1496. Wyoming Oil & Gas Conservation Commission, 2000, *Coal Bed Methane Wells*, available from the Wyoming Oil & Gas Conservation Commission.

**Summary:** WOGCC Report.

1497. Wyoming State Geological Survey, 1998, *Coalbed Methane Map*, available from the Wyoming State Geological Survey.

**Summary:** WSGS Map.

1498. Wyoming State Geological Survey, 1999, *Coalbed Methane Map*, available from the Wyoming State Geological Survey.

**Summary:** WSGS Map.

1499. Wyoming State Geological Survey, 2000, *Coalbed Methane Map*, available from the Wyoming State Geological Survey.

**Summary:** WSGS Map.

1500. Wyoming State Geological Survey, 2000, *Stream Classification and Drainage Systems Map of the Northeast Wyoming Coal Bed Methane Development*, available from the Wyoming State Geological Survey.

**Summary:** WSGS / DEQ Report / Map.

1501. Wyoming Water Resources Center, University of Wyoming, 1997, *A Study of Techniques to Assess Surface and Groundwater Impacts Associated with Coal Bed Methane and Surface Coal Mining: Little Thunder Creek Drainage, Wyoming*, available from the Wyoming Water Resources Center, University of Wyoming.

**Summary:** Wyoming Water Resources Center Report.

1502. Xia, X.; Zhao, L.; Zhang, W.; and Li, J., 1999, *Geochemical Characteristics and Source Rock of Ordovician Gas Reservoir, Changqing Gasfield*, from Chinese Science Bulletin, v. 44, available from the publisher.

**Summary:** Article.

1503. Xina, G., 1999, *Analysis of Data Source and Design of Coalbed Methane Resource Database*, from the proceedings of the 1999 International Coalbed Methane Symposium, Tuscaloosa, Alabama, available from the University of Alabama.

**Summary:** Symposium Paper.

1504. Xinmin, Zhang; and Lingwen, Zhong, 1995, *On the Type of Generation and Storage of Coalbed Methane Reservoir*, from the proceedings of the 1995 International Unconventional Gas Symposium, Tuscaloosa, Alabama, available as Paper 9529.

**Summary:** Symposium Paper.

1505. Yalcin, M. N., 1997, *Role of Basin Modelling in Coalbed Methane Resource Assessment*, from the proceedings of the 1997 International Coalbed Methane Symposium, Tuscaloosa, Alabama, available as Paper 9744.

**Summary:** Symposium Paper.

1506. Yamazaki, T.; Ymaguchi, S.; Tazaki, Y.; and Roces, S. A., 1999, *Adsorption and Desorption of Methane on the Coals Under High Pressure*, from the proceedings of the 1999 International Coalbed Methane Symposium, Tuscaloosa, Alabama, available from the University of Alabama.

**Summary:** Symposium Paper.

1507. Yamazaki, T.; and Roces, S. A., 1999, *The Relation Between Gas in Coal Seams and Artificial Coalification Gas Under Hydrothermal Pressure Systems*, from Coalbed Methane: Scientific, Environmental and Economic Evaluation, available from the publisher.

**Summary:** Report.

1508. Yates, J. H., 1979, *Unconventional Gas Sources - Characterization and Assessment*, available from the Gas Technology Institute as GRI-79/0010.

**Summary:** This GRI report discusses the evaluation of various data bases. This was done to determine the reliability and sufficiency of available information for assessing each of the major unconventional gas resources.

1509. Yee, D.; and Hanson, W. B., 1993, *Gas Sorption on Coal and Measurement of Gas Content*, available from the American Association of Petroleum Geologists in AAPG Studies in Geology, 38.

**Summary:** AAPG Report.

1510. Yelchainov, E. A., 1995, *Mine Methane and Environment: Ways of Methane Utilization*, from the proceedings of the 1995 International Unconventional Gas Symposium, Tuscaloosa, Alabama, available as Paper 9545.

**Summary:** Symposium Paper.

1511. Yin, Q. W.; Li, Y. H.; and Han, C., 1999, *A Case History for Differential Evaluation of Dual Laterolog in Coalbed Fractures*, from Journal of the Jiangnan Petroleum Institute, v. 21, available from the publisher.

**Summary:** Article.

1512. Yong, W., 1999, *China's 21st Century Strategy for Gas Development and Utilization*, from Petromin, v. 25, no. 8, available from the publisher.

**Summary:** Article.

1513. Young, G. B. C.; McElhiney, J. E.; Paul, G. W.; and McBane, R. A., 1991, *An Analysis of Fruitland Coalbed Methane Production, Cedar Hill Field, Northern San Juan Basin*, from the proceedings of the 1991 SPE Annual Technical Conference and Exhibition, Dallas, Texas, available from the Society of Petroleum Engineers as SPE 22913.

**Summary:** This SPE conference paper discusses a three-dimensional, multi-well reservoir simulation study on the Cedar Hill field. This study provides insight into the reservoir parameters of the basal Fruitland coals in the northern San Juan basin.

1514. Young, Genevieve, 1992, *Coal Reservoir Characteristics from Simulation of the Cedar Hill Field, San Juan Basin*, from Quarterly Review of Methane from Coal Seams Technology, v. 10, no. 1, available from the publisher.

**Summary:** Article.

1515. Young, G. B. C.; Paul, G. W.; McElhiney, J. E.; and McBane, R. A., 1992, *A Parametric Analysis of Fruitland Coalbed Methane Reservoir Producibility*, from the proceedings of the 1992 SPE Annual Technical Conference and Exhibition, Washington, D. C., available from the Society of Petroleum Engineers as SPE 24903.

**Summary:** This SPE conference paper discusses a study of San Juan basin coal seam gas resources. In the study, combinations of key reservoir parameters and operational characteristics were evaluated to provide an understanding of coal seam gas behavior and to better assess the techniques used in recovery of the gas.

1516. Young, G. B. C.; Paul, G. W.; Saulsberry, J. L.; and Schraufnagel, R. A., 1993, *Characterization of Coalbed Reservoirs at the Rock Creek Project Site, Alabama*, from the proceedings of the 1993 International Coalbed Methane Symposium, Birmingham, Alabama, available as Paper 9380.

**Summary:** Symposium Paper.

1517. Young, G. B. C.; Kelso, B. S.; and Paul, G. W., 1994, *Understanding Cavity Well Performance*, from the proceedings of the 1994 SPE Annual Technical Conference and Exhibition, New Orleans, Louisiana, available from the Society of Petroleum Engineers as SPE 28579.

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1521. Zabetakis, M. G.; Deul, M.; and Skow, M. L., 1973, *Methane Control in the United States Coal Mines - 1972*, U. S. Bureau of Mines Information Circular 8600, available from the National Technical Information Service.

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1523. Zander, R. A., 1999, *Development, Environmental Analysis, and Mitigation of Coal Bed Methane Activity in the Powder River Basin of Wyoming*, from the proceedings of the 1999 International Coalbed Methane Symposium, Tuscaloosa, Alabama, available from the University of Alabama.

**Summary:** Symposium Paper.



1524. Zebrowitz, M. J.; Kelafant, J. R.; and Boyer, C. M., 1991, *Reservoir Characteristics and Production of the Coal Seams in Northern and Central Appalachian Basins*, from the proceedings of the 1991 3rd Coalbed Methane Symposium, available from the University of Alabama, College of Continuing Studies.

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1525. Zebrowitz, M.; Boyer, C.; Zhu, H.; and Yuan, B., 1993, *Well Testing and Reservoir Engineering Challenges of the Tengshan Mine Coalbed Methane Project, The People's Republic of China*, from the proceedings of the 1993 International Coalbed Methane Symposium, Birmingham, Alabama, available as Paper 9371.

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1526. Zhang, Jianbo; Li, Anqi; Liu, Chenglin; and Wu, Shixiang, 1997, *Research on Production Enhancement of Coalbed Methane and In-Situ Fracturing Test*, from the proceedings of the 1997 International Coalbed Methane Symposium, Tuscaloosa, Alabama, available as Paper 9712.

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1527. Zhang, J.; Li, J.; Wan, Y.; and Wang, H., 1999, *The Study of Influence of Pressure on Coalbed Permeability*, from Coalbed Methane: Scientific, Environmental and Economic Evaluation, available from the publisher.

**Summary:** Report.

1528. Zhang, J.; Li, J.; and Meng, Q., 1999, *Thermal Simulation Research of Partial Opposites Sequence of Carbon Isotope and Ethane Carbon Isotope of Gases*, from Acta Sedimentologica Sinica, v. 17, available from the publisher.

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1529. Zhu, C.; Liu, X.; and Wan, W., 1999, *Financial Analysis Model for Coalbed Methane Projects at Chinese Coal Mines*, from the proceedings of the 1999 International Coalbed Methane Symposium, Tuscaloosa, Alabama, available from the University of Alabama.

**Summary:** Symposium Paper.

1530. Zou, Y.; Yang, Q.; Kang, X.; and Tang, D., 2000, *Maturity Control on the Patterns of Hydrocarbon Regeneration from Coal*, from the proceedings of the 2000 Meeting of the Geological Society of

China, Beijing, China, in Papers on Geology of China, available from the Geological Society of China.

**Summary:** Geological Society of China Meeting Paper.

1531. Zuber, M. D.; Boyer, C. M.; Schraufnagel, Richard A.; and Saulsberry, J., 1989, *Insights and Analysis from the Rock Creek Project: A Reservoir Engineering Approach*, available from the Society of Petroleum Engineers as SPE-19057.

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1532. Zuber, M. D.; Kuuskraa, V. A., 1989, *A Reservoir Simulator-Based Methodology for Calculating Reserves of Coalbed Methane Wells*, from the proceedings of the 1989 Coalbed Methane Symposium, Tuscaloosa, Alabama, available as Paper 8952.

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1533. Zuber, M. D.; Reeves, S. R.; Jones, A. H.; and Schraufnagel, R. A., 1991, *Variability in Coalbed-Methane Well Performance: A case Study*, from Journal of Petroleum Technology, v. 43, no. 4, available from the publisher.

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1534. Zuber, M. D.; Kuuskraa, V. A.; and Sawyer, S. K., 1992, *Optimizing Well Spacing and Hydraulic-Fracture Design for Economic Recovery of Coalbed Methane*, available from the Society of Petroleum Engineers in Reprint Series, 35.

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1535. Zuber, M. D.; Olszewski, A. J., 1993, *Coalbed Methane Production Forecasting: Measurement Accuracy Required for Key Reservoir Properties*, from the proceedings of the 1993 International Coalbed Methane Symposium, Birmingham, Alabama, available as Paper 9381.

**Summary:** Symposium Paper.

1536. Zuber, M. D.; and Semmelbeck, M., 1995, *The Use of Coalbed Methane Simulators for Coal Mining-Related Applications*, from the proceedings of the 1995 International Unconventional Gas Symposium, Tuscaloosa, Alabama, available as Paper 9530.

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1537. Zuber, M. D.; and Hopkins, C., 1996, *Coalbed Methane Engineering Methods*, from SPE Short Course Manual, available from S. A. Holditch & Associates, Inc.

**Summary:** SPE Short Course.

1538. Zuber, M. D., 1998, *Production Characteristics and Reservoir Analysis of Coalbed Methane Reservoirs*, from International Journal of Coal Geology, v. 38, available from the publisher.

**Summary:** Article.

1539. Zuber, M. D., 1999, *The Use of Monte Carlo Analysis to Evaluate Prospective Coalbed Methane Properties*, available from Kluwer Academic Publishers, Boston, Massachusetts.

**Summary:** Report.

1540. Zuber, Michael D.; and Boyer, Charles, 2001, *Analysis Optimizes CBM Economics*, from American Oil & Gas Reporter, December 2001, available from the publisher.

**Summary:** Article.

1541. Zuber, M. D.; and Boyer, C. M., 2001, *Comparative Analysis of Coalbed Methane Production Trends and Variability - Impact on Exploration and Production*, from the proceedings of the 2001 International Coalbed Methane Symposium, Tuscaloosa, Alabama, available as Paper 0136.

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1542. Zuber, M. D.; and Boyer, C. M., 2002, *Coalbed-Methane Evaluation Techniques - The Current State of the Art*, from Journal of Petroleum Technology, v. 54, no. 2, available from the publisher.

**Summary:** Article.



# Index

The following indexes place the listings from the bibliography into easily recognizable categories. Most of the listings appear in more than one of the indexes.

## I LOCATION

*Contains listings that are basin or state specific, or are specific to federal lands (including Indian reservations). Citations appear alphabetically by author/editor and include the title of the work. Refer to the bibliography for more information on the publication.*

1. Adams, M. A., *Central Appalachian Basin Report: A Study of Carboniferous Geology, Coal and the Potential Coalbed Methane Resource of the Central Appalachian Basin in Maryland, West Virginia, Kentucky, and Tennessee.*
2. Adams, M. A.; Eddy, G. E.; Hewitt, J. L.; Kirr, J. N.; and Rightmire, C. T., *Northern Appalachian Coal Basin Report: A Study of Carboniferous Geology, Coal, and the Potential Coalbed Methane Resources of the Northern Appalachian Coal Basin in Pennsylvania, Ohio, Maryland, West Virginia, and Kentucky.*
3. Adams, M. A.; and Kirr, J. N., *Uinta Basin Report, A Study of Cretaceous Geology, Coal and the Potential Coalbed Methane Resource of the Uinta Basin in Utah and Colorado.*
4. Advanced Resources International Inc., *Data Analysis and Reservoir Characterization for Fruitland Coal, Carracas Canyon Unit, San Juan Basin.*
5. Affolter, R. H.; Simon, F. O.; and Stricker, G. D., *Chemical Analyses of Coal from the Healy, Kenai, Seldovia, and Utokok River 1:250,000 Quadrangles, Alaska.*
6. Affolter, R. H.; Hatch, J. R.; Matson, R. E.; and Sauer, L. A., III, *Chemical Analyses of Coal from the Tongue River Member, Fort Union Formation, Decker Coal Deposit, Big Horn County, Montana.*
7. Affolter, R. H.; Hatch, J. R.; and Culbertson, W. C., *Chemical Analyses of Coal from the Tongue River Member, Fort Union Formation, Moorhead and Southeastern Part of the Northward Extension of the Sheridan Coal Fields, Powder River and Big Horn Counties, Montana.*
8. Affolter, R. H.; Stricker, G. D.; Roberts, S. B.; and Brownfield, M. E., *Geochemical Variation of Arctic Margin Low-Sulfur Cretaceous and Tertiary Coals, North Slope, Alaska.*
9. Ahmed, M.; Smith, J. W., *Biogenic Methane Generation in the Degradation of Eastern Australian Permian Coals.*

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12. State of Alaska, Division of Oil and Gas, Department of Natural Resources, *Coalbed Methane Study*.
13. American Association of Petroleum Geologists, *Gulf Coast Coals Being Studied by USGS*.
14. American Oil & Gas Reporter, Wyoming, *Montana Sign CBM Accord*.
15. Ancell, K. L.; Lambert, S.; and Johnson, F. S., *Analysis of the Coalbed Degasification Process at the Seventeen Well Pattern in the Warrior Basin of Alabama*.
16. Anderson, O.J.; Lucas, S.G.; Love, D.W.; and Cather, S.M., eds., *Southeastern Colorado Plateau*.
17. Andrews, R. D.; Cardott, B. J.; and Storm, T., *The Hartshorne Play in Southeastern Oklahoma: Regional and Detailed Sandstone Reservoir Analysis and Coalbed Methane Resources*.
18. Anna, L. O., *Groundwater Flow Associated With Coalbed Gas Production, Ferron Sandstone, East-Central Utah*.
19. Anna, Lawrence O., *Numerical Simulation of Water Flow in Ferron Sandstone Coalbeds, Central Utah*.
20. Anna, L. O.; Faunt, C. C.; D'Agnesse, F. A.; and Henry, M. E., *Three Dimensional Groundwater Flow Modeling of the Ferron Sandstone, Central Utah*.
21. Applied Hydrology Associates, Inc., *3M Project San Juan Basin, Colorado and New Mexico; Hydrology Modeling Report*.
22. Archer, P. L., *Illinois Basin Report; A Study of Pennsylvanian Geology, Coal, and Coalbed Methane Resources in Illinois, Indiana, and Western Kentucky*.
23. Attanasi, E. D.; and Rice, D. D., *Economics and Coalbed Gas in the 1995 National Assessment of U.S. Oil and Gas Resources*.
24. Attanasi, E. D., *Relative Importance of Physical and Economic Factors in Appalachian Coalbed Gas Assessment*.
25. Ayers, W. B., Jr., *Coal Resources of the Tongue River Member of the Fort Union Formation (Palaeocene), Powder River Basin*.

26. Ayers, W. B.; Ambrose, W. A.; and Yeh, J. S., *Coalbed Methane in the Fruitland formation - Depositional and Structural Controls on Occurrence and Resources.*
27. Ayers, W.B., Jr.; and Kaiser, W.R., *Coalbed Methane in the Upper Cretaceous Fruitland Formation, San Juan Basin, New Mexico and Colorado.*
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29. Ayers, W. B., Jr.; Kaiser, W. R.; Scanlon, A. H.; Swartz, T. E.; and Zellers, S. D., *Geologic Evaluation of Critical Methane Resources: Part I - San Juan Basin.*
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32. Ayers, W. B., *Methane Production from Thermally Immature Coal, Fort Union Formation, Powder River Basin.*
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34. Barker, C. E.; and Pierce, B. S., *Burial History and Coal Petrography of the Ferron Coals, Utah as Factors in Their Variable Coal Bed Gas Content.*
35. Barker, Charles E.; Johnson, Ronald C.; Pawlewicz, Mark J.; Crysdale, Bonnie L.; and Clark, Arthur C., *Coal-bed Methane Show Within the Wind River Indian Reservation Enhances Gas Prospects in Deeper Portions of the Wind River Basin, Wyoming.*
36. Barker, C. E.; Clough, J. G.; Roberts, S. B.; and Fisk, R., *Coalbed Methane in Northern Alaska: Potential Resources for Rural Use and Added Supply for the Proposed Trans-Alaska Gas Pipeline.*
37. Barker, C. E.; Bartke, T. C.; Hatcher, P. G.; and Daws, T. A., *An Empirical Correlation Between Coal Bed Gas With Rock-Eval Pyrolysis and (Super 13) C NMR Results, Cretaceous Mesaverde and Meeteetse Formations, Wind River Basin, Wyoming.*
38. Barker, C. E., *The Geologic Controls on Coalbed Gas - A Major Source in the U.S.*
39. Barker, C. E.; Scott, A. R.; and Tyler, R., *The Geology of Coalbed Methane - The Perspective from Basin and Thermal History Studies.*

40. Barker, Charles E.; Pierce, Brenda S.; Garrison, James R., Jr.; and van den Bergh, T. C. V., *The Influence of Burial History on the Coalbed Gas Content of Ferron Coals, San Rafael Swell, Utah.*
41. Barker, C. E.; Dallegge, T. A.; and Seamount, D. C., *Ongoing Coalbed Desorption Studies, Cook Inlet Basin, Alaska.*
42. Barker, Charles E.; Biewick, Laura R. H.; Warwick, Peter D.; and San Filippo, John R., *Preliminary Gulf Coast Coalbed Methane Exploration Maps; Depth to Wilcox, Apparent Wilcox Thickness and Vitrinite Reflectance.*
43. Barker, Charles E., *Rock-Eval Analysis of Sediments and Ultimate Analysis of Coal, Mesaverde Group, Multiwell Experiment Site, Piceance Basin, Colorado.*
44. Barker, C. E.; Gose, M.; Scott, R. J.; Warwick, P. D.; San Filippo, J. R.; Klein, J. M.; and Hook, R. W., *The Sacatosa Coalbed Methane Field: A First for Texas.*
45. Beavers, C. D.; Boyer, C. M.; Dobscha, F. X.; Green, C. D.; Lambert, S. W.; Lanier, J. B.; Sheehy, L. D.; Spafford, S. D.; and Stubbs, P. B., *Rock Creek Methane from Multiple Coal Seams Completion Project.*
46. Beavers, W. M.; Graves, Stanley L.; and Hollingsworth, F. C., *Field Evaluations of Gas Lift and Progressive Cavity Pumps as Effective Dewatering Methods for Coalbed Methane Wells.*
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48. Bennett, P. C.; and Martineau, D. T., *Hydrogeochemistry of the Pine River Coal-Bed Methane Seep.*
49. Biddick, M. A., *An Economic Evaluation of the Hartshorne Coalbed Methane Play in Oklahoma.*
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51. Boreck, Donna L.; and Weaver, Jean N., *Coalbed Methane Study of the "Anderson" Coal Deposit, Johnson County, Wyoming; A Preliminary Report.*
52. Boreck, D. L.; and Strever, M. T., *Conservation of Methane from Colorado Mined/Minable Coal Beds: A Feasibility Study.*
53. Boreham, C. J.; Golding, S. D.; and Glickson, M., *Factors Controlling the Origin of Gas in Australian Bowen Basin Coals; Reply.*



54. Bostic, Joy; Brady, Lawrence; Howes, Mary; Burchett, Raymond R.; and Pierce, Brenda S., *Investigations of the Coal Properties and the Potential for Coal-bed Methane in the Forest City Basin*.
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65. Brady, L. L.; and Guy, W. J., *Coal Resources and Coalbed Methane Potential in the Kansas Portion of the Forest City Basin*.
66. Brownfield, M. E.; Affolter, Ronald H.; and Stricker, G. D., *High Chromium Content in Tertiary Coals, Northwestern Washington; A Key to Their Depositional History*.
67. Brownfield, Michael E.; Hettinger, Robert D.; and Johnson, Edward A., *A Summary of the Stratigraphy, Coal Resources, and Coal-bed Methane Potential of Northwest Colorado*.

68. Bruner, K. R.; Oldham, A. V.; Repine, T. E., Jr.; Markowski, A. K.; and Harper, J. A., *Geological Aspects of Coalbed Methane in the Northern Appalachian Coal Basin, Southwestern Pennsylvania and North-Central West Virginia*.
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70. Brunner, D. J.; and Ponce, J. R., *Methane Drainage at the Minerals Monclova Mines in the Sabinas Coal Basin, Coahuila, Mexico*.
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74. Bureau of Land Management; Holsan, Gary, *Draft Environmental Assessment, Pannaco Energy Deer Creek Exploratory Coalbed Methane Project*.
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86. Burns, T. D.; and Lamarre, R. A., *Drunkards Wash Project: Coalbed Methane Production from Ferron Coals in East-Central Utah.*
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89. Byrer, C. W.; Mroz, T. H.; and Covatch, G. L., *Coalbed Methane Production Potential in U.S. Basins.*
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93. Cardott, B. J., 1999, *Coalbed Methane Activity in Oklahoma.*
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## IV

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## V WATER

*Contains listings that discuss groundwater, produced water and seawater. NOTE: Works that discuss hydraulic fracturing can be found in Index IV. Citations appear alphabetically by author/editor and include the title of the work. Refer to the bibliography for more information on the publication.*

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## **About the INTERSTATE OIL and GAS COMPACT COMMISSION**

The Interstate Oil and Gas Compact Commission (IOGCC) represents the governors of 37 states — 30 member and seven associate states — that produce virtually all the domestic oil and natural gas in the United States. Six international affiliates have been accepted into the IOGCC in recent years.

The organization's mission is to promote the conservation and efficient recovery of domestic oil and natural gas resources, while protecting health, safety and the environment.

Since its creation in 1935, the IOGCC has assisted states in balancing a multitude of interests — maximizing domestic oil and natural gas production, minimizing the waste of irreplaceable natural resources, and protecting human and environmental health — through sound regulatory practices. The IOGCC plays an active role in Washington, D.C., serving as the voice of the states on oil and natural gas issues and advocating states' rights to govern the resources found within their borders.

For more information about the IOGCC, please call 405/525-3556, visit the World Wide Web at [www.iogcc.state.ok.us](http://www.iogcc.state.ok.us), or send electronic mail to [iogcc@iogcc.state.ok.us](mailto:iogcc@iogcc.state.ok.us)

### **Member States**

Alabama (1945)  
Alaska (1957)  
Arizona (1955)  
Arkansas (1941)  
California (1974)  
Colorado (1935)  
Florida (1945)  
Illinois (1935)  
Indiana (1947)  
Kansas (1935)  
Kentucky (1942)  
Louisiana (1941)  
Maryland (1959)  
Michigan (1939)  
Mississippi (1948)  
Montana (1945)  
Nebraska (1953)  
Nevada (1955)  
New Mexico (1935)  
New York (1941)  
North Dakota (1953)  
Ohio (1943)  
Oklahoma (1935)  
Pennsylvania (1941)  
South Dakota (1955)  
Texas (1935)  
Utah (1957)  
Virginia (1982)  
West Virginia (1945)  
Wyoming (1955)

### **Associate States**

Georgia (1946)  
Idaho (1960)  
Missouri (1995)  
North Carolina (1971)  
Oregon (1954)  
South Carolina (1972)  
Washington (1967)

### **International Affiliates**

Alberta (1996)  
Egypt (1999)  
Republic of Georgia (2001)  
Newfoundland and Labrador (1997)  
Nova Scotia (1997)  
Venezuela (1997)



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