



K. Scott Keim

Current Position

Chief Executive Officer & Partner

Profession

Geologist

Years' Experience

35+

Education

BS - Geosciences, The Pennsylvania State University, University Park, PA (1981)

Professional Registrations

CPG - AIPG

PG - KS, KY, VA

Affiliations

American Institute of Professional Geologists

Society of Mining Engineers, AIME

Former Board of Directors – The Penn State Research Foundation

Advisory Board – VA Center for Coal and Energy Research (Associated with VA Tech)

Summary of Experience

Mr. Keim is CEO and Partner of Marshall Miller & Associates, Inc. (MM&A). He directs energy and mineral resources activities including reserve evaluations, predictive geological mapping, merger and acquisition evaluations, geological and engineering applications, feasibility studies, coal quality assessments, and wire-line geophysical applications.

Significant Projects

- > Managed mining feasibility studies in China, Australia, Venezuela, and the United States
- > Coordinated a multitude of major merger and acquisition studies involving the largest transactions in the coal industry.
- > Conducted a variety of evaluations related to the prediction and impact of underground mining conditions and definition of surface reserve potential.
- > Responsible for managing multiple U.S. Securities and Exchange Commission independent reserve filings for publicly traded companies.
- > Coordinated filings in compliance with Australasian Joint Ore Reserve Committee (JORC) and Canadian 43-101 Standards.

Specific International Projects

- > **Australia:** Coordinated a definitive feasibility study for a combined surface and underground coal mine. This included the management of multiple engineering, geological, and environmental firms located in both Australia and the U.S.
- > **Turkey:** Evaluated lignite deposits in the Elbistan District located in southern Turkey.
- > **Colombia:** Prepared reserve assessments for multiple mining concessions and participated in merger and acquisition evaluations of coal mining operations.
- > **China:** Coordinated the evaluation of a billion-tonne reserve base. The evaluation included a geological reserve study, engineering assessment, financial modeling, environmental study, coalbed methane degas and development, and production scheduling. Total project investment was approximately \$500 million (U.S.).
- > **Venezuela:** Evaluated coal reserves located within the Guasare coal basin. This included implementation of an exploration program and the development of a multi-million-dollar exploration budget. Also served as technical advisor to joint venture participants and supervised contract geophysical logging.

Specific United States Projects

- > **Central Appalachian Basin:** Managed multiple due-diligence evaluations associated with merger and acquisition activities. Project parameters included reserve evaluation, Phase 1 environmental site assessment, asset appraisal, mine planning, and financial modeling. Performed work for most of the major energy and land companies with operations and properties located in the Appalachian Basin.
- > **Securities and Exchange Commission (SEC):** Supervised multiple projects associated with SEC filings.



Specific United States Projects (Continued)

- > **United States:** Evaluated coalbed methane reserves in every coal basin within the U.S. for a major U.S. coal producer. This report was used to develop a production strategy for the company and to prioritize properties for development.
- > **West Virginia, Pennsylvania and Kentucky:** Evaluation of numerous deep mineable reserve blocks for longwall development. Projects included seam, roof and floor mapping, geotechnical analysis, hazards/productivity mapping, in-situ stress studies and coal quality processing.
- > **West Virginia:** Investigation and reserve delineation for a multiple million ton per year mining operation. The evaluation was used to confirm reserve tonnage and coal quality for utility contract procurement.
- > **Illinois:** Evaluation of surface mineable reserve base for a multiple million ton per year operation.
- > **Illinois:** Evaluation of deep mineable reserve base for continued longwall development.
- > **Western Kentucky:** Investigation and reserve delineation of both surface and deep mineable reserves involving multiple coal seams throughout a three-county area.
- > **Northern and Central West Virginia:** Regional investigation and exploration of deep and surface mineable coals. Supervised multiple drill rig exploration program, reserve mapping, and hazards/productivity predictive mapping.
- > **Southern West Virginia:** Investigation and reserve delineation of extensive reserves including a detailed study of geological factors influencing seam mineability.
- > **Southwestern Virginia:** Evaluation, including computer application to define potential large-scale multiple seam stripping operations. Involved in the development of specialized computerized mapping to generate multiple strip ratio reserve scenario.
- > **Eastern Kentucky:** Investigation and reserve delineation of surface and underground reserves, including computer modeling reserves and mineability parameters.
- > **Western Maryland:** Supervised exploration and evaluation program of substantial underground and surface mineable reserves.
- > **Eastern Kentucky:** Coordinated computerized database management of active oil and gas leaseholds.
- > **Eastern Kentucky:** Geological mapping of oil and gas reserves.
- > **Northern West Virginia:** Evaluation of coalbed methane reserve potential from both longwall degas wells and gob areas.
- > **Tennessee:** Evaluation of seam mineability and reserve characteristics. Implementation of an exploration program to confirm seam mapping.
- > **Utah:** Evaluated reserve for potential acquisition. Report included map projection of mining conditions controlled by geological parameters.

Professional History

2017-Current

Chief Executive Officer and Partner

Marshall Miller & Associates, Inc.

2012 - 2016

Sr. Vice President Mining, Sr. Principal, Engineering & Environmental Services Division

Cardno, Inc.



2005 – 2012

President

Marshall Miller & Associates, Inc.

Responsible for all Energy and Mineral Resource Division activities including reserve evaluations, predictive geological mapping, merger and acquisition evaluations, geological and engineering applications, feasibility studies, coal quality assessments, and wire-line geophysical applications.

Responsible for managing MM&A's environmental and civil engineering groups, which include environmental science, civil engineering, emergency response, remedial design and oversight, and compliance management activities.

1981 - 2005

President, Energy and Mineral Resources Group

Marshall Miller & Associates, Inc.

Responsible for diverse geologic applications related to mining throughout the coal-bearing regions of the United States; China's Shanxi Province; the Guasare coal basin of Venezuela; Colombia, South America; Canada; Mexico; and the Czech Republic. Coordinated a multitude of major merger and acquisition studies involving the largest transactions in the coal industry. Conducted a variety of evaluations related to the prediction and impact of underground mining conditions and definition of surface reserve potential. Directed feasibility studies for international mining operations, several of which are now in production. Responsible for managing multiple US Securities and Exchange Commission independent reserve filings for publicly traded companies including Peabody Energy, Alpha Natural Resources, Penn Virginia Corporation, James River Coal Company, Natural Resource Partners, and International Coal Group. Coordinated filings in compliance with Australasian Joint Ore Reserve Committee (JORC) and Canadian 43-101 Standards.

Prior positions held within MM&A include field geologist, project geologist, senior project geologist, Vice President, and Senior Vice President.

1981

Assistant Geologist

Anker Mining and Development, Pittsburgh, Pennsylvania

Publications

- > "The Future of Coal – A USA Perspective," presented to 2008 World Mining Congress, Krakow, Poland, September 2008.
- > "China Coal Overview and Summary of AACI Project," presented to West Virginia Coal Mining Institute, Stonewall Jackson Resort, West Virginia, May 2006.
- > "Digital Processing and Presentation of Complex Geological Data and Industry Trends," Keynote Speaker 2005 American Institute of Professional Geologists Annual Meeting, Lexington, Kentucky, October 2005.
- > "Energy Venture in China," presented to the Virginia Economic Development Seminar, Virginia Beach, Virginia, September 2002.
- > "Energy Venture in China," presented to the Virginia Chamber of Commerce, Williamsburg, Virginia, October 2001.



- > "CBM Review: China's Coalbed Methane Reserves," March 2002, World Coal, co-authors J.C. Tien and Marshall S. Miller.
- > "Due Diligence: Reserve Assessment and Engineering Considerations," March 1999, St. Petersburg, Florida, presented at the Financial Times Energy/Coal Outlook Conference, co-authors Marshall S. Miller and John E. Feddock.
- > "Case Study Evaluation of Geological Influences Impacting Mining Conditions at a West Virginia Longwall Mine," 1999 Geological Society of America and International Journal of Coal Geology, co-author Marshall S. Miller.
- > "Modern Geological Applications and Predictive Techniques Applied to Coal Mining," June 1998, Abingdon, Virginia, presented at the spring meeting of the Central Appalachian Section of SME.
- > "Evaluation of Geological Influences Impacting Longwall Mining," April 1998, presented at the spring meeting of the Geological Society of America, Charleston, West Virginia.
- > "Geological and Geotechnical Methods for Evaluation of Longwall Mining Conditions," West Virginia Coal Mining Institute, May 1989, Morgantown, West Virginia, co-authors: J. Scott Nelson, Claudio Faria Santos.

- > Various courses offered by West Virginia University, Colorado School of Mines, and The Pennsylvania State University, including coal reserve engineering and computer applications, financial modeling of mineral projects, and coal preparation.

***Continuing
Education***