
JAMES B. KOENIG

PRESENT POSITION

Senior Advisor to GeothermEx, Inc.

EXPERTISE

Mr. Koenig has been active in geothermal exploration and field development continuously since 1964. His specialties include:

- Analysis of geothermal development opportunities and barriers in developing countries
- Design and management of geothermal exploration, drilling and field development projects
- Reconnaissance evaluation of geothermal and volcanic regions
- Development of regulations to guide geothermal operations
- Economic evaluation and geothermal reservoir assessment from exploration, drilling and testing data
- Contract negotiation for development and utilization of geothermal resources

EDUCATION

B.S. in Geology, Brooklyn College, 1954

Diploma in Meteorology, U.S. Naval Post Graduate School, 1958

M.A. in Geology, Indiana University, 1956

Ph.D. Candidate in Geology-Seismology, University of Nevada, 1967

Speaks and reads Spanish

EXAMPLES OF RELEVANT PROJECTS

- Strategic long-term planning for electric-power development in Kenya, 1990-2003. Led team of scientists, engineers, economists and lawyers in preparation of long-term least-cost development programs for national electric agency of Kenya. Assessment and prioritization of geothermal project sites, and evaluation of legal and institutional framework needed to encourage private overseas investment. For US Agency for International Development and KenGen.
- Assessment of geothermal resources of Yemen. Led team that performed evaluation of geothermal sites, electric power demand, energy economics, and institutional framework for possible investment and development of geothermal energy in the Republic of Yemen. Sponsored by World Bank.

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E-MAIL: mw@geothermex.com

- Planning for private investment in geothermal resources of Northwestern United States. Designed program to encourage private investment in geothermal resources of states of Washington, Oregon, Idaho and parts of Montana and California. Sponsored by Bonneville Power Administration (agency of US government).
- Comparison of opportunities for private investment in Japan and United States. Prepared comparative charts and tables showing requirements for environmental protection, permitting, leasing and royalty terms, and scheduling of finance for private geothermal projects in selected fields in the United States and Japan. Sponsored by New Energy Development Organization (agency of Japanese government).
- Advisor to World Bank on geothermal loans in Kenya, Djibouti, Yemen and Macedonia (Yugoslavia), involving field appraisals, performance reviews, data modeling and budget design.
- Negotiations with national oil company of Indonesia, Pertamina, regarding contracts for private development of geothermal energy at several sites. On behalf of private consortium.
- Assessment of the geothermal energy reserves at Dieng geothermal field in Indonesia from drilling and surface exploration data. For Asian Development Bank.

EXPERIENCE

El Cerrito Consultants, 1995-present

- Independent consulting in geothermal exploration, field management and project finance
- Advisor on rehabilitation and privatization of geothermal power developments and district heating systems
- Advisor to Kenya Power Company on continued development of the Olkaria geothermal field
- Advisor on legislation and policy development for private investment in geothermal energy development, Bolivia and Peru
- Evaluation of combined power generation and district-heating, Izmir area, Turkey

GeothermEx, Inc., 1973 - 1995

Mr. Koenig was the Founder, President and Chairman of Board of Directors of GeothermEx, Inc., the longest-established geothermal consultancy in the world. At GeothermEx, Mr. Koenig specialized in:

- Management and on-site supervision of geothermal projects in the United States, Costa Rica, the Philippines, Papua New Guinea, Honduras, Indonesia, and elsewhere, involving

surface exploration, data analysis, drilling of geothermal wells, well logging and testing, and analysis of reserves.

- Siting and management of initial discovery wells: Miravalles field, Costa Rica (125 MW); Dixie Valley, Nevada (60 MW); Batang Buhay, Philippines (under development)
- Direction of work by technical staff of GeothermEx in exploration, drilling and logging of wells, reservoir analysis and economic assessment.
- Consultant to World Bank, United Nations, Asian Development Bank, OPEC Fund, USAID and other multilateral agencies on project selection, financing, quality control and operations: El Salvador, Bolivia, Kenya, Ethiopia, Mozambique, Uganda, Indonesia, Vietnam, Djibouti, Honduras, Yemen, Georgia, Peru, St. Lucia.
- Consultant to numerous electric utilities and energy agencies, including Los Angeles Department of Water and Power, Sacramento Municipal Utility District, Southern California Edison, Northern California Power Agency, Sierra Pacific Power Company, Pacific Power and Light Company, United States Department of Energy, New Energy Development Organization (Japan), National Power Corporation of the Philippines, Instituto Costarricense de Electricidad (Costa Rica), Comisión Federal de Electricidad (Mexico), Uganda Electricity Board, and Comisión Ejecutiva Hidroeléctrica del Río Lempa de El Salvador, on aspects of development and utilization of geothermal electricity.
- Consultant to numerous geothermal field developers and operators regarding program design, exploration, drilling, budget management, permitting, regulatory compliance, environmental protection, and interpretation of field exploration data, The Geysers, CA; Salton Sea, CA; East Mesa, CA; Dixie Valley, NV; Steamboat Springs, NV; Klamath Falls, OR; Puna, HI; Coso, CA; Bradys, NV; Beowawe, NV; Roosevelt, UT; Mammoth, CA; Cerro Prieto, Mexico; Onikobe, Japan; Minami Aizu, Japan; Kirishima, Japan; Takegami, Japan; Lihir Is., Papua New Guinea; Amatitlán, Guatemala; Zunil, Guatemala; Dieng, Indonesia; Wayang Windu, Indonesia; Patuha, Indonesia; Plataneros, Honduras; Asal, Djibouti; etc.

California Division of Mines and Geology, 1956 - 1972

- Geothermal specialist. Responsible for evaluation of geothermal resources in California via geologic and geochemical exploration, and logging of geothermal wells. 1964 - 1972.
- Chairman of Technical Advisory Committee to Geothermal Resources Board of California, 1971-1972.
- Specialist in geology and seismology for the California Power Plant Siting Committee, 1969-1971.
- Geothermal field studies at The Geysers, Coso Hot Springs, Cascade-Modoc region, and Calistoga, 1964-1970.
- Assisted in preparation of California State law on geothermal resources, 1967-1968, and in design of geothermal operating regulations.

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United States Navy, 1957 – 1960

Meteorologist, rank of Lieutenant.

U.S. Geological Survey, 1955 - 1956

Groundwater Geologist, Minnesota.

Howe Sound Corporation, 1953

Mining Geologist, Manitoba, Canada

EXAMPLES OF GEOTHERMAL PROJECT EXPERIENCE

- Management of geothermal drilling, logging and testing program, Lihir Island, Papua New Guinea. For Kennecott, 1986 - 1992.
- Analysis of exploration data and design of conceptual model of the Chipilapa geothermal field, El Salvador. For CEL (national electric utility), 1991 - 1992.
- Design and implementation of methodology for calculating reserves of geothermal energy from surface exploration data at four geothermal fields in Japan. For New Energy Development Organization (NEDO) of Japan and Japanese government electric utility EPDC; 1985 - 1987.
- Management of field exploration and drilling operations at Batong Buhay geothermal field, northern Luzon, Philippines. For Caltex, 1982 - 1983.
- Management of exploration in Guanacaste Province, Costa Rica; project resulted in discovery of Miravalles field in 1980. For ICE (national electrical utility), with financing from IDB (Interamerican Development Bank), 1975 - 1981.
- Analysis of drilling results and modeling of geothermal fields, leading to calculation of reserves of geothermal energy at numerous geothermal areas in the United States and Central America. For private development companies and national electrical utilities, 1980 - 1985.
- Analysis of drilling data and seismic profiles, regional geothermal modeling and calculations of recoverable hot water for use in secondary oil recovery at the Duri field, Indonesia. On behalf of private oil company, 1982 - 1983.
- Analysis of exploration data, selection of sites for deep drilling, and management of project operations at several geothermal areas in United States. For private companies, agencies of local government and electrical utilities, 1979 - 1990.
- Reconnaissance evaluation of geothermal prospects of Mozambique, Vietnam and Kenya. For the United Nations, 1980 - 1981.

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- Supervision of nationwide geochemical survey programs in Nicaragua and Honduras. For the national electrical utilities, with financing from World Bank and United Nations, 1978 - 1980.
- Organization and implementation of a geothermal exploration program covering one-half million acres of south-central Oregon, culminated in drilling of exploratory wells. For a major landowner and electric utility, 1972 - 1975.
- Economic evaluation of geothermal resources in several areas of the western United States. For financing institutions and private developers, 1983 - 1985.
- Reconnaissance evaluation and field studies of geothermal resources in the Afar region of Ethiopia. For United Nations, 1971.
- Evaluation of reservoir conditions at several geothermal fields in the western United States and overseas from unpublished well test data. For use by electrical utilities in planning field development, 1977 - 1981.
- Preparation of exploration and drilling budgets in numerous areas of the western United States. For several private developers, 1977 - 1993.
- Selection of drilling and geophysical contractors at several projects in California and Nevada. For private developers, 1977 - 1980.
- Reservoir testing and analysis at The Geysers geothermal field as part of field development and operations program. For field operators and electrical utilities, 1979 - 1989.
- Evaluation of results of deep drilling in Utah, Idaho and Nevada, 1978 - 1982.
- Geologic mapping in thermal areas of Nevada, California and Idaho. For numerous private companies, 1973 - 1974.
- Field analyses of water chemistry in thermal areas of six western states, 1973.
- Field surveys of mercury distribution in thermal areas in El Salvador (for United Nations) and in the United States (for agency of U.S. government), 1968 - 1970.
- Synthesis of geologic and geophysical data, geothermal areas in Idaho and Utah, 1976 - 1977.
- In several geothermal areas in the western United States, selection of sites for hundreds of temperature-gradient drill holes, and management of drilling and logging operations for gradient holes ranging from 300-1,000 m in depth. For numerous private companies, 1977 - 1981.
- Analysis of value of Known Geothermal Resource Areas (KGRAs) for competitive bids, 1978 - 1981.
- Preparation and presentation of environmental impact reports for The Geysers and several other sites in California and Oregon, 1974 - 1983.

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- Preparation and presentation of environmental impact report for Olkaria geothermal field in Kenya, 1990.
- Preparation of geologic cross-sections and structure-contour maps for several geothermal areas in Nevada, California, Utah and Oregon, 1974 - 1977.
- Testimony in litigation and in regulatory hearings as expert witness, 1977, 1981, 1982, 1984, 1985 and 1987.
- Petrographic analysis of well cuttings; preparation of lithologic logs, deep drill holes, 1976 - 1983.
- Lectures in geothermal exploration at short courses for Geothermal Resources Council as well as various private and governmental organizations, 1977 - 1980; 1982; 1984; 1987; 1990 - 1992.
- Gravity surveys in two geothermal areas of California, 1963 and 1968.
- Evaluation of the relationship between climate and the discharge from thermal springs, Ahuachapán, El Salvador, 1971.

MEMBERSHIPS AND AWARDS

- Joseph W. Aidlin Award, 1987. Presented by Geothermal Resources Council for Professional Achievement
- Certificate of Merit, Turkish Geothermal Association, 2001
- President, Geothermal Resources Council (1989-1991)
- Director, Geothermal Resources Council (1975-1993)
- Director, International Geothermal Association (1989-1993; 1998-present)
- Chairman, Finance Committee, World Geothermal Congress, 1995, 2000 and 2005
- Fellow, Geological Society of America (1962-present)
- Member, American Geophysical Union (1962-1998)
- Member, International Association of Volcanology (1965-1974)
- Registered Geologist, State of California, License # 494

SELECTED PUBLICATIONS

Resource Risk and its Mitigation for the Financing of Geothermal Projects: Proceedings of the World Geothermal Congress, Vol. 4, p. 2911-2915, with S.K. Sanyal, 1995.

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History and Results of Surface Exploration in the Kilauea East Rift Zone: Proceedings of the World Geothermal Congress, Vol. 2, p. 1233-1238, with M.C. Gardner, J.R. McNitt and C.W. Klein, 1995.

History of Development at The Geysers Geothermal Field, California: Geothermal Resources Council Special Reports, p. 7-18, 1992.

Public Information in the Age of Disinformation; the Challenge to the Geothermal Industry: Geothermal Resources Council Transactions, Vol. 14-Part I, p. 603, 1990.

Nature of Geothermal Resources and Prospects in Developing Countries: U. S. Department of Energy, p. 3-28, November 16, 1989.

Stratigraphic and Structural Controls of the Occurrence of Steam at The Geysers: Geothermal Resources Council Transactions, Vol. 13, p. 461-465, with J.R. McNitt, R.C. Henneberger and A. Robertson-Tait, 1989.

U. S. Department of Energy Geothermal Program Review VII Critique of the Geothermal Exploration R & D Program: U. S. Department of Energy, p. 175-176, March, 1989.

Development of Low-Temperature Geothermal Reservoirs for Commercial Power, the U.S. Experience: Journal of the Geothermal Research Society of Japan, p. 398-401, with S.K. Sanyal, A. Robertson-Tait and A.J. Menzies, November, 1988.

Rapporteur's Summary on the Future of Geothermal Energy 17-18 November 1986: Geothermal Resources Council Special Reports, p. 1-10, 1986.

Controls on the Location and Intensity of Magmatic and Non-Magmatic Geothermal Systems in the Basin and Range Province: Geothermal Resources Council Special Reports, p. 93, with J.R. McNitt, 1983

Geothermal Exploration in Vietnam: Geothermal Resources Council, Bulletin, Vol. 10, p. 7-9, 1981.

Geothermal Power Development in the Third World: Geothermal Resources Council Transactions, Vol. 5, p. 23-28, with M.C. Gardner and J.R. McNitt, 1981.

Well-Site Evaluation of Logs from a Deep Geothermal Well, Ontario, Oregon: Geothermal Resources Council Transactions, Vol. 4, p. 471-475, with S.K. Sanyal, M.C. Gardner and J.R. McIntyre, 1980.

Exploration and Discovery of the Miravalles Geothermal Field, Costa Rica: A Case History: Geothermal Resources Council Special Reports, p. 59-70, June, 1980.

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Heat Flow and Geothermal Gradient Exploration of Geothermal Areas in Cordillera de Guanacaste of Costa Rica: Geothermal Resources Council Transactions, Vol. 1, p. 17-18, with D.D. Blackwell and E.E. Granados, May, 1977.

Exploration of the Guanacaste Costa Rica Geothermal System: Geothermal Resources Council Transactions, Vol. 1, p. 57-58, with M.F. Corrales and J.T. Kuwada, May, 1977.

Exploration and Development of Geothermal Resources in the United States, 1968-1975: LBL—Second United Nations Symposium, Vol. 1, p. 139-142, with D.N. Anderson and G.W. Hutterer, May, 1975.

Exploration and Development of Geothermal Resources, in "Geothermal Energy: Resources, Production, Stimulation," P. Kruger and C. Otte, eds., Stanford Press, 1973, pp. 15-58.

The Worldwide Status of Geothermal Exploration and Development: Geothermal Resources Council Special Reports, p. 1-4, February, 1972.

Remote Sensing at the Coso Geothermal Field: U.S. Navy NWC TP 5233, p. 31, 1972.

Speculations on the Geothermal System at The Geysers: Sacramento Geol. Soc. Annual Field Trip Guidebook, pp. 29-37, 1971.

Geothermal Exploration in the Western United States: Geothermics, Spec. Vol. 2, part 1, pp. 1-13 (paper given at the United Nations Symposium on Development of Geothermal Resources, Pisa, 1970).

The Geysers, California, Geothermal Field: Calif. Div. Mines & Geol. Mineral Info. Service, v. 22, no. 8, pp. 123-128, 1969.

Mercury Distribution at Two Geothermal Fields: Coso Hot Springs, California and Ahuachapán, El Salvador (abs.): Geol. Soc. America Abstracts with Programs, v. 1, part 3, p. 33, 1969.

Geothermal Steam Potential of Mount Lassen: Sacramento Geol. Soc. Annual Field Trip Guidebook, pp. 43-51, 1969.

The Salton-Mexicali Geothermal Province: Calif. Div. Mines & Geol. Mineral Info Service, v. 20, no. 7, pp. 75-81, 1967.

Santa Rosa Sheet: California Div. Mines & Geol. Geologic Map of California, 1:250,000, 1963.

The Petrography of Certain Igneous Dikes of Kentucky: Kentucky Geology Survey, Series B., Bulletin 21, 1956.

SELECTED UNPUBLISHED REPORTS

Emerging Issues in Geothermal Project Development and Finance; invited paper presented to World Geothermal Congress, Plenary Session, 2000.

The Geothermal Resource: Data Requirements for the Fuel Supply; Pre-Conference Courses of the World Geothermal Congress, Vol. C.1., p. 43-71, 1995.

Guidelines for Proposed Geothermal Legislation; report to Government of Peru, 1995.

Seismicity, Waste Water Injection, and Chemical Miscibility; chapters of Feasibility Study for the Clear Lake-Geysers Injection Plan: Environmental Impact Report to Lake County, California; with C.W. Klein, S.K. Sanyal and R.W. Greensfelder, 1993.

Regulatory Requirements Governing The Location and Safety of Geothermal Wells in the United States (including Draft, Geothermal Well Drilling and Completion Regulations in the United States and Selected Case Histories of Well Blowouts), for New Zealand Ministry of Energy, Taupo New Zealand, 1989.

Environmental factors at the Ahuachapán, El Salvador, geothermal field; report to the United National-Government of El Salvador, 1971.

The geology, geochemistry, and hydrology of hot springs in the East African rift system in Ethiopia; report to the United Nations-Government of Ethiopia, 1971; co-author.

Prefeasibility Report, Guanacaste Geothermal Project; report to Instituto Costarricense de Electricidad, San Jose, Costa Rica, 1977.

CITIZENSHIP

USA