



Kadak Associates, Inc.

Resume of Andrew C. Kadak, Ph.D. President

Education:

Massachusetts Institute of Technology
- Ph.D., Nuclear Engineering - Reactor Physics (1972)
- M.S., Nuclear Engineering (1970)
Northeastern University - M.B.A. (1983)
Union College - B.S., Mechanical Engineering (1967)

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Dr. Kadak is a President of Kadak Associates, Inc. a consulting firm specializing in management issues and nuclear energy. Prior to resuming his private consulting practice Dr. Kadak was Principal and Director of Nuclear Services at Exponent, a worldwide company offering multidisciplinary expertise and rapid response capabilities to provide stewardship in addressing complex engineering and scientific problems. Dr. Kadak served on the IAEA special team assessing earthquake and tsunami damage of the Onagawa Nuclear Plant in Japan and has performed extensive studies of the Fukushima Di-iachi Nuclear Plant.

Prior to joining Exponent, Dr. Kadak was a Professor of the Practice in the Nuclear Engineering Department of the Massachusetts Institute of Technology. His research interests include the development of advanced reactors, in particular the high temperature pebble bed gas reactor, space nuclear power systems, improved technology neutral licensing standards for advanced reactors and operations and management issues of existing nuclear power plants. Recently he was asked to serve on the Small Modular Reactor subcommittee of the Secretary of Energy's Advisory Board. His expertise ranges from reactor physics, power conversion, safety analysis and engineering systems. Dr. Kadak has recently been working on Hybrid Fusion Energy systems and sodium cooled fast reactors. He is also a principal author of the MIT fuel cycle study.

Kadak was also President and CEO of Yankee Atomic Electric Company. In this capacity, he was responsible for overseeing all Yankee operations, including the decommissioning of the Yankee plant in Rowe, Massachusetts and engineering, licensing, environmental and operational support to all eight nuclear plants in New England and many other national and international clients.

Dr. Kadak's expertise ranges from day to day operations of nuclear plants to senior executive management. In the past he has lead Yankee Atomic in license renewal of operating reactors, systematic evaluation of older plants to allow them to demonstrate compliance to new regulations, financial rate proceedings to assure adequate capital for safe operation, innovative fuel purchase agreements, high level nuclear waste disposal and storage solutions. His technical background has allowed him to actively direct the Yankee strategy dealing with reactor vessel embrittlement, boiling water reactor pipe replacements and how to manage aging of nuclear plants. At Yankee he managed the economic analysis of the value of continued operation of the Rowe plant. He presently consults on decommissioning of nuclear plants and has served on safety review boards of nuclear utilities.

Dr. Kadak was President of the American Nuclear Society in 1999/2000. He has served as a board and executive committee member of the Nuclear Energy Institute and the industry's Advisory Committee on High Level Waste. He has served as a member of the National Association of Regulatory Utility Commissioners special panel on high level nuclear waste and the Aspen Institute's "Dialogue on Nuclear Waste Disposal". In 1995, he was a member of the Advisory Committee on External Regulation of Department of Energy Nuclear Safety. He has also conducted several audits of nuclear companies to assess management and served as chairman of a panel providing suggestions to the DOE's Nevada Test Site as to how to make their operations more like commercial industries. Dr. Kadak was appointed by the President to serve on the US Nuclear Waste Technology Review Board. *He also served as a member of the Senior Nuclear Safety Oversight Board of the Daya Bay nuclear power stations in Guangdong Province in China* and served as a member of the Rhode Island Atomic Energy Commission. Dr. Kadak has made more than 70 lectures and speeches on topics related to the technical and business aspects of nuclear power.

PROFESSIONAL AFFILIATIONS AND HONORS:

US Nuclear Waste Technology Review Board, Member (past)
Commissioner, Rhode Island Atomic Energy Commission
President, American Nuclear Society, 1999-2000
Nuclear Energy Institute - Board of Directors (past)
Nuclear Energy Institute - Nuclear Waste Advisory Committee (past)
American Nuclear Society (ANS) – President 1999/2000, Board of Directors, (past)
Advisory Committee on External Regulation of DOE Nuclear Safety (member)
Electric Power Research Institute Research Advisory Committee (past member)
The University of Massachusetts Engineering Task Force (past member)
Edison Electric Institute - past member of the Policy Committee on Energy Resources, past member of the Nuclear Power Executive Advisory Committee
Electric Council of New England - Board of Directors (past)
New England Council - Board of Directors (past)
Nuclear Utility Management and Resources Committee (NUMARC) - past member of the Issues Management Committee Board of Directors, and Executive Committee
Northeast Section of the American Nuclear Society, Tau Beta Phi, Sigma Xi
Member of the Industry Review Group on the Chernobyl Accident

PROFESSIONAL EXPERIENCE:

Kadak Associates, Inc. (1997 to Present)

President – Kadak Associates is a firm that specializes in decommissioning, licensing strategies, management reviews intending to improve competitiveness and effectiveness, organizational strategies for deregulation of the utility industry, safety assessments, license renewal, legal and political strategies, innovative solutions to tough problems, spent fuel management, public relations and communication, and adapting to changing regulatory environments.

Exponent (2010 to 2013)

Principal and Director of Nuclear Services – At Exponent, Dr. Kadak applies his extensive experience in the nuclear industry to current problems facing operating nuclear plants and those proposed for construction. He leads the Nuclear Services practice to apply Exponent's skills to address problems of national and international significance. These areas include engineering fundamentals in mechanical, structural, metallurgical, chemical, electrical engineering. Additional areas include executive management consulting, construction, and operations covering such areas as risk, reliability, vulnerability and root cause analyses, and corrective action program development and assessment. Of significance to the nuclear industry, Dr. Kadak's responsibilities include regulatory strategy development and compliance assessment..

Massachusetts Institute of Technology (1997 –2010)

Professor of the Practice – Dr. Kadak supervised the modular high temperature gas reactor project and many graduate and undergraduate theses on many diverse topics from space nuclear power to nuclear powered container ships. He taught classes in design, engineering systems, operational reactor safety, nuclear waste and engineering leadership. He also gave invited lectures on topics relevant to commercial nuclear power.

Kadak Associates, Inc. (1997 - 2010)

President - Kadak Associates is a firm that specializes in decommissioning, licensing strategies, management reviews intending to improve competitiveness and effectiveness, organizational strategies for deregulation of the utility industry, safety assessments, license renewal, legal and political strategies, innovative solutions to tough problems, spent fuel management, public relations and communication, and adapting to changing regulatory environments.

Yankee Atomic Electric Company (1979 - 1997)

President and Chief Executive Officer (1989 - 1997) - Oversaw the Yankee Nuclear Power Station operation and then decommissioning when the plant was permanently shutdown in 1992. Yankee also provides engineering and operations support for the Vermont Yankee, Maine Yankee, and Seabrook Nuclear Power Stations and other clients worldwide. Yankee was a \$ 100 million revenue company with over 500 professional staff with expertise ranging from engineering, environmental sciences, nuclear safety analysis, quality assurance, fuel procurement, inservice inspection and plant support.

Vice President (1986-88) - Responsible for Nuclear Engineering, Environmental Engineering, Environmental Laboratory, Computer Services, Generic Licensing, and Commercial Sales.

Project Manager, Vermont Yankee (1983-85) - Managed engineering and licensing support for operation of the Vermont Yankee NPS (BWR).

Project Manager, Yankee NPS (Rowe) (1980-83) - Directed engineering, capital projects, and licensing for the Yankee NPS. Managed Yankee's response to the NRC's Systematic Evaluation Program, for the oldest operating plant in the country.

Assistant to the Vice President (1979-80) - Coordinated emergency planning for the Yankee, Vermont Yankee, and Seabrook Nuclear Power Stations, performed post-TMI assessments of operating reactors, and represented Yankee on the Utility Waste Management Group.

New England Power Company (1975-79)

Manager, Nuclear Information - Directed efforts to educate the public on nuclear power. He managed the informational, advertising, citizen coalition and political support for a new power plant project proposed for Rhode Island.

Combustion Engineering Corporation (1972-75)

Principal Physicist, PWR Physics (1973-75) - Concentrated on the operational control aspects of pressurized water reactors; formulated improved methods of reactor control and analysis; developed improved monitoring and safety protection systems; investigated reactor maneuvering capabilities and the application of space-time kinetics to safety analysis.

Selected Papers and Lecture Topics:

1. Papers in Refereed Journals List:

1. Kadak, A.C., Freidberg, J.P. "Fusion-fission hybrids revisited", *Nature Physics*, June 2009, Vol. 5
2. Kadak, A. "MIT Pebble Bed Reactor Project", *Nuclear Engineering and Technology*, 39 (2), 2007, pp. 95-102.
3. Kadak, A.C., "A Future for Nuclear Energy: Pebble Bed Reactors", *International Journal of Critical Infrastructures*, Vol. 1 No. 4, 2005, pp. 330-345.
4. Kadak, A.C., "Intergenerational Risk Decision Making: A Practical Example", *Risk*, Vol. 20, No. 6, 2000, pp. 883-894.
5. Kadak, A.C., Matsuo, T., "The Nuclear Industry's Transition To Risk Informed Regulation and Operation in the United States", *Reliability Engineering and System Safety*, Vol. 92, Issue 5, May 2007, pp. 609-618.
6. Kadak, A.C., Zhai, T., "Air Ingress Benchmarking with Computational Fluid Dynamics Analysis", *Nuclear Engineering and Design*, Vol. 236, Issue 5-6, March 2006, pp. 587-602.
7. Kadak, A.C., Berte M.V., "Advanced Modularity Design for the MIT Pebble Bed Reactor", *Nuclear Engineering and Design*, Vol. 236, Issue 5-6, March 2006, pp. 587-602.

2. Other Major Publications:

1. Kadak, A.C, Berte, M.V. "Modularity Design of the MIT Pebble Bed Reactor", American Nuclear Society Meeting, Reno, Nevada. November 2001.
2. Kadak, A.C., "An Advanced Nuclear Power Plant That Can Compete With Natural Gas", *Electric Power 2001 Conference Proceedings*, March 21, 2001.
3. Kadak, A.C., "The MIT Modular Pebble Bed Reactor Project", Seminar on HTGR Application and Development conference proceedings, Beijing, China, March 19, 2001.
4. Zhai, No, Kadak, "LOCA Analysis in a Pebble Bed Reactor", American Nuclear Society paper submitted for June 2001 meeting in Milwaukee, Wi.
5. Kadak, A.C, Berte, M.V., "Advanced Modularity Design for the MIT Pebble Bed Reactor", 2nd International Topical Meeting on High Temperature Reactor Technology, September 22-24, 2004, Beijing, China.
6. Kadak, A.C., Zhai, T., "Air Ingress Benchmarking with Computational Fluid Dynamics Analysis", 2nd International Topical Meeting on High Temperature Reactor Technology, September 22-24, 2004, Beijing, China.
7. Kadak, A.C., Feng, B., "Conceptual Design of an Advanced Breeder Burner Reactor", American Nuclear Society, June 2007.
8. Kadak, A.C., "Nuclear Power: Made in China", *The Brown Journal of World Affairs*, Vol. XIII, Issue I, Fall/Winter, 2006.
9. Kadak, A.C., "Reconsidering Nuclear Power", *Science Year Book 2003*, pp. 68-83.
10. Kadak, A.C., Bazant, M.Z., "Pebble Flow Experiments for Pebble Bed Reactors", 2nd International Topical Meeting on High Temperature Reactor Technology, September 22-24, 2004, Beijing, China.
11. Kadak, A.C., "Establishing a Safety and Licensing Basis for Generation IV Advanced Reactors", Workshop on Advanced Reactors, Advisory Committee on Reactor Safeguards, June 4-5, 2001.
12. Kadak, A.C, Brudieu, M.A, "Blind Benchmarking Predictions of NACOK Air Ingress Tests Using Computational Fluid Dynamics, 3rd International Topical Meeting on High Temperature Reactor Technology, October 1-4, 2006, Johannesburg, South Africa.
13. Kadak, A.C., Finan, A.E, Miu, K., "Nuclear Technology & Canadian Oil Sands: Integration of Nuclear Power with In-Situ Oil Extraction", International Congress on Advances in Nuclear Power Plants, June 4-8, 2006, Reno, Nevada.

14. Kadak, A.C, Finan, A.B, "Integration of Nuclear Energy with Oil Sands Projects for Reduced Greenhouse Gas Emissions and Natural Gas Consumption", MIT CANES white paper, June 2007.
15. Kadak, A.C., "Licensing and Deployment of Advanced Reactors", American Nuclear Society Annual Meeting, June 2002.
16. Kadak, A.C., "An Advanced Nuclear Power Plant That Can Compete with Natural Gas", Electric Power 2001 Conference, March 21, 2001.
17. V. Dostal, K. Gezelius, J. Horng, J. Koser, J.P. Iv, E. Shwageraus, P. Yarsky, and A.C. Kadak, "Mission to Mars: How to Get People There and Back with Nuclear Energy" (September 2004), MIT-NSA-TR-001
18. P. Yarsky, A.C. Kadak, and M.J. Driscoll, "Design of a Sodium-cooled Epithermal Long-term Exploration Nuclear Engine" (September 2004), MIT-NSA-TR-002
19. T. Zhai, A. Kadak, and H-C. No, LOCA and Air Ingress Accident Analysis of a Pebble Bed Reactor (March 2004), MIT- ANP-TR-102.
20. T.A. Galen, D.G. Wilson, and A.C. Kadak, Comparison Between Air and Helium for Use as Working Fluids in the Energy-Conversion Cycle of the MPBR (February 2001)

3. Selected Invited Lectures:

Woodrow Wilson International Center for Scholars, May 8, 2008 – Current and Future Prospects for Civilian Nuclear Power: US and Japanese Perspectives”, Washington, D.C.

Manhattan Institute, New York City – Nuclear Energy Options, March 28, 2007.

American Physical Society Conference - Nuclear Renaissance, October 31, 2006

Westinghouse/BNFL, "MIT's Pebble Bed Reactor Research" May 11, 2001, Monroeville, PA.

Bettis Atomic Power Laboratory, "MIT Fuel and Safety Research", May 11, 2001

New England Council of Public Utility Commissioners, "The Inevitability of Nuclear Energy", May 21, 2001, Mystic CT.

Council of Scientific Society Presidents, "Advanced Nuclear Energy Plants – The Pebble Bed Reactor", May 6, 2001, Washington, DC

University of Rhode Island, "China's Nuclear Energy Program", December 2013

Nuclear Innovation Alliance Workshop, Washington DC, "Technology Neutral Risk Informed Licensing Approaches and a Proposal", October 2015

World Nuclear Fuel Market Conference, New York City, "Nuclear Power Construction Programs – Can We Do It Again?" June 2014

45th Annual Meeting on Nuclear Technology, Frankfurt Germany, "US Decommissioning Experience", May 2014

Japan Atomic Industrial Forum, "The Environmental Imperative of Nuclear Energy –Despite the Challenges", Tokyo, Japan, April 2014

Department of Energy, Nuclear Energy Research Advisory Committee, Washington, DC, "Views and Priorities on Advanced Reactor Research and Development" January 2015.

MIT Energy Conference, Cambridge MA, "Nuclear Power Plants – Will there be 6 or 60?", April 2008.

6th Annual Technical VHTR Review Meeting 2013, Idaho Falls, "Nuclear Innovation in High Temperature Gas Reactors" May 2013

Not all listed

4. Selected Management Presentations

"Airplanes Are Different - The Management Challenge," ANS Annual Meeting, New Orleans, Louisiana, June 1994.

"The Safety Goal as a Regulation," ANS Executive Conference, Washington, D.C., March 1994.

"Self Assessment - A Challenge to Human Nature," ANS Conference, San Diego, California, November 1993.

"Engineering Excellence," ANS Executive Conference on Engineering Excellence, Jupiter Beach, Florida, October 1993.

"The Quality of Management - The Next Self Assessment Challenge," American Nuclear Society Executive Conference, Self Assessment for Self Assurance, La Jolla, California, December 1990.

"Excellent and Economic Nuclear Plant Performance Conference," ANS/ASME Joint Conference, Newport, Rhode Island, September 1990.

"Promoting Professionalism and Credibility in the Engineering Organization," INPO Workshop, Atlanta, Georgia, May 1990.

"What's a Safety Culture? How do I Get It? How Do I Keep It?" Presented to the Nuclear Nonoperating Owner's Group, Boston, September 1989.

"Is Technology Enough? What About Management?," 16th Reactor Operations International Topical Meeting, August 1993.

5. Selected other Lectures and Presentations

"Generating Companies, An Idea Whose Time Has Come...Again," Nuclear Engineering International, September 1989.

"Utilities of the 1990's - Generators of Cash or Electricity?," American Nuclear Society Executive Conference on Utility Management Strategies of the 1990's, April 1989.

"Institutional Investors Conference on Economics of Older Nuclear Power Plants," Lehman Brothers, New York, March 1992.

"The Atom and Human Values," 60th Steinmetz Memorial Lecture, Union College, October 1992.

"How to Decide to Shut Down a Nuclear Plant Prematurely," NUMARC panel presentation, October 1992.

"How Long Will the Current Nuclear Power Reactors Operate?," MIT October 1993.

"The Safety Goal as a Regulation," ANS Executive Conference, March 1994.

"Yankee's Decommissioning Program," NRC Regulatory Information Conference, May 1994.

"High Level Waste Legislation," New England Conference of Public Utility Commissioners, March 1995

"Risk Management in Electric Utility Decommissioning," ANS Executive Conference, May 1995.

“The Science and Politics of High Level Waste,” International Conference on High Level Radioactive Waste Disposal, May 1996.

“The U.S. NRC’s Nuclear Regulator Research - Accomplishments and Needs,” ANS/ENS International Meeting, November 1996.

“An Intergenerational Approach to High Level Waste Disposal (that Might Work),” A Symposium on Advances in Nuclear Technology, MIT April 1997.

“Developing a Practical and Cost Effective Decommissioning Plan,” Energy Daily Conference, April 1997.