

Joseph C. Martz, Ph.D.
William J. Perry Fellow in National Security Science
Center for International Security and Cooperation (CISAC)
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Major Expertise and Background:

Dr. Martz' 20+ year career has been focused on issues surrounding nuclear security and nuclear weapons. The majority of his career has focused on nuclear weapons and materials, and he has lead a variety of national and international projects related to nuclear weapon design and maintenance, plutonium storage and disposition, stockpile life extension and plutonium aging, nuclear operations, and nuclear intelligence analysis. Dr. Martz is a 25 yr. employee of the Los Alamos National Laboratory in which he has served in a variety of research, leadership and management positions. In addition to his research at Los Alamos, he has led national project teams including the recent reliable-replacement warhead design competition and several complex nuclear material experiments. Dr. Martz is the author of over 50 papers and invited presentations in these areas.

Dr. Martz has represented Los Alamos National Laboratory, the Nuclear Weapons Complex, and the National Nuclear Security Administration (NNSA) to a variety of stakeholders and policy makers including the Nuclear Weapons Council, STRATCOM, Congress, the National Security Council, and others. He has had extensive interactions with the national and international press.

Dr. Martz currently holds DOE Q, TS/SCI, and a variety of SAP clearances.

Career Interests:

The danger of nuclear proliferation coupled with the promise of nuclear energy and the need for a reliable nuclear deterrent form an intimately connected, complex technology and policy challenge for the United States. My desire is to contribute reasoned and innovative technical solutions to this challenge to gain maximum benefit from nuclear technologies while minimizing the attendant risks. I am a proponent of reducing nuclear weapons stockpiles to minimal levels while preserving the benefits of deterrence. Elucidation of a "roadmap" to the vision espoused by many senior policy makers of a nuclear-weapons free world is a career goal. The complexities of this topic require in-depth technical expertise coupled with an appreciation for policy issues and communication skills to articulate these complex topics to non-technical audiences.

Work Experience:

William J. Perry Fellow, Center for International Security and Cooperation (CISAC), Stanford University (Sept. 2009 – present). Major responsibilities: served as the inaugural Perry Fellow in residence at Stanford University, while remaining an employee of Los Alamos National Laboratory. Research and participation in the area of nuclear deterrence and nonproliferation, investigating technical means to preserve security in an environment of nuclear weapon stockpile reductions. Studied and advanced ideas in the area of capability-based deterrence, particularly the concept that an agile and confident nuclear weapons complex can serve a deterrent role, replacing the need for deployed weapon systems.

Evaluated the characteristics of such a weapon complex, including production capacities and timelines. Evaluated numerous issues surrounding comprehensive test ban treaty ratification. Participated actively in Stanford and university interactions to cross-collaborate between nuclear weapons science and relevant policy communities. Taught numerous classes and provided lectures in the areas of nuclear weapon design, history, testing, and deterrence theory. Interacted closely with senior policy advisors to numerous administrations in the areas of nuclear policy and options.

Senior Staff Advisor, Principal Associate Directorate for Nuclear Weapons (March 2008-August 2009). Major responsibilities: led several teams and special projects in the areas of nuclear weapons planning, deterrence theory, intelligence, and complex transformation. Led a lab-wide team to gain public, employee, and community leader buy-in for the proposed Complex Transformation plans of the NNSA. This resulted in an over 80% favorable turnout at public meetings in support of LANL and NNSA objectives, and considerable positive news coverage in local and regional newspapers, radio, and television. Provided technical analysis to an important intelligence program, and began and led a systems study of nuclear deterrence options in conjunction with Sandia. Continued theoretical and modeling work in support of plutonium surface-chemistry analysis and application.

Program Director for Reliable Replacement Warhead (RRW), Principal Associate Directorate for Nuclear Weapons. (May 2005 – March 2008) Major responsibilities: led a team of several hundred participants from seven national sites to prepare the New Mexico team's design and submission for the Reliable Replacement Warhead Competition. Provide leadership, coordination, and guidance for all aspects of the RRW competition and RRW interactions with federal agencies. Brief various, interagency high-level officials including the National Security Council, Congress, Pentagon, and DoE on RRW program goals and methods. Provide central customer interface for LANL for RRW activities.

General Experience:

Regular interaction with DOE, NNSA, media, and public advocates on weapon material issues and stockpile stewardship. Periodically teach courses on weapons materials and function. Interaction with foreign weapon programs in areas of mutual interest. Coordinated a number of special weapons and other projects on behalf of LANL and DOE for various government agencies.

Prior Positions:

Deputy Division Leader, Applied Physics (X) Division, Los Alamos National Laboratory. (December 2003-May 2005) Major responsibilities: assist in management of X-division (the central weapon design division at Los Alamos) including line-management responsibility for 380 employees and 7 diverse technical groups with a budget near \$100M. Principal responsibilities include oversight of science programs and planning, coordination of key technical assessments and programs related to stockpile certification, leadership and guidance of X division technical reviews and assessments, and leadership for implementation of institutional requirements within X-division.

Program Manager for Weapon Materials and Enhanced Surveillance, Los Alamos National Laboratory. (July 1997 -November 2003) Major responsibilities: technical administration and management of a diverse materials science and diagnostics program to determine aging mechanisms and lifetimes of nuclear weapon components. Develop diagnostics to monitor for early aging effects. Responsible for direction and assessment of weapon material issues at

Los Alamos. Responsible for management and administration of diverse programs totaling over \$34M in resources.

Group Leader for Weapon Component Technology (NMT-5), Nuclear Materials

Technology Division. (July 1994-August 1997). Principal line manager for large and diverse group of scientists and technicians (~80 people total, \$12M/yr budget) responsible for all metallic plutonium and pit activities at Los Alamos. Managed efforts in pit surveillance, pit fabrication, and plutonium metal R&D. Oversaw transfer of key capabilities from the Rocky Flats facility to LANL. Responsible for safety and security aspects of plutonium facility operations associated with group activities. Responsible for fiscal and personnel management of group resources and employees.

Staff Member, Weapon Component Technology (NMT-5/MST-15), Nuclear Materials

Technology Division. (May 1991-June 1994). Research scientist specializing in plutonium surface chemistry and corrosion. Principal investigator for plutonium storage degradation mechanisms. Provided and briefed this material to DOE and the Defense Nuclear Facilities Safety Board. Results of this work became the 94-1 recommendation to repackage plutonium nationwide. Founded the ARIES program, a plutonium disposition initiative, with both technical research and contributions to the hydride/dehydride process and also formed the first programmatic proposals for the integrated ARIES system. Continued research into plutonium surface chemistry, pyrophoricity, oxidation, and plutonium dispersal mechanisms.

Education:

Ph.D., Chemical Engineering, University of California, Berkeley, May 1991. GPA: 4.0 out of 4.0. Dissertation Title: Dynamics of Metal Etching and Oxidation in Fluorocarbon-Oxygen RF Glow Discharges.

B.S., Chemical Engineering, Texas Tech University, May 1986. GPA: 4.0 out of 4.0

Select Honors and Awards:

2009 Inaugural William J. Perry Fellow in National Security Science, Stanford University
2009 Top Ten Most Interesting Citizens in Santa Fe, *Santa Fean Magazine*, April/May 2009
2009 Keynote Speaker, Risk Symposium 2009, Risk Analysis of Complex Systems
2008 NNSA Defense Programs Award of Excellence, as Project Leader, for Complex Transformation
2008 Invited Speaker, National Academy of Engineering, Frontiers in Engineering Annual Conference
2007 Invited Keynote Speaker, American Glovebox Society National Convention
2006 Large Team Distinguished Performance Award, LANL – RRW Program (as Program Director)
2006 Pollution Prevention Award, for RRW Design (as Program Director)
2004 Graduate, First Cohort, Director's Development Program, Los Alamos National Laboratory
2002 Large Team Distinguished Performance Award, LANL – Octave Project (as Project Leader)
2002 *Distinguished Engineer*, College of Engineering, Texas Tech University
2001 *40 under 40 Top Professionals in New Mexico Recipient*, New Mexico Business Weekly
1999 Featured Scientist for DOE Stockpile Stewardship Overview
1995 *R&D 100 Award for hydride/dehydride ARIES technology for weapon plutonium recovery*

1994 *Los Alamos National Laboratory Individual Distinguished Performance Award*
1987 National Science Foundation Fellowship

Selected Publications (complete list available on request):

- J.C. Martz, and J.S. Ventura, "Nuclear Deterrence in the 21st Century: The Role of Science and Engineering", Proceedings of the United States National Academy of Engineering Frontiers in Engineering Conference, LA-UR-08-05019 (2009)
- A.J. Schwartz, K.B. Alexander, and J.C. Martz, "Overview of Plutonium Aging and the Lifetime of a Primary (U)", in Defense Research Review 13 (3), p. 11 (2005)
- J.C. Martz, L.A. Morales, and K. B. Alexander, "An Overview of Plutonium Aging", in Conf. Transactions of Plutonium Futures – The Science, G.D. Jarvinen, ed., American Institute of Physics, New York 673 p. 67 (2003)
- J.C. Martz and A.J. Schwartz, "Plutonium: Aging Mechanisms and Weapon Pit Lifetime Assessment", Journal of Metals, 55(9) pp.19-23, (2003)
- R.J. Hanrahan, D.F. Teter, and J.C. Martz, "Short Circuit Oxygen Transport Paths in Rutile Scales", Proc. Symposium on High Temperature Corrosion, ASM International p. 1-8 (2001).
- J.M. Haschke and J.C. Martz, "Catalyzed Corrosion of Plutonium: Hazards and Applications", in Los Alamos Science #26, Volume 1, p. 266 (2000)
- S.H. Hecker and J.C. Martz, "Aging of Plutonium and Its Alloys", in Los Alamos Science #26, Volume 1, p. 238 (2000)
- S.H. Hecker and J.C. Martz, "Plutonium Aging: From Mystery to Enigma", Proceedings of the Oxford Conference on Aging and Lifetime Extension of Materials (1999).
- J. C. Martz and J. M. Haschke, "A Mechanism for Combustive Heating and Explosive Dispersal of Plutonium", J. Alloys and Comp., 266 (1998) pp.90-103
- J. M. Haschke and J.C. Martz, "Plutonium Storage", in Encyclopedia of Environmental Analysis and Remediation, John Wiley and Sons, New York (1998) pp.3740-3755.
- M.F. Stevens and J.C. Martz, "Aging Phenomena in Metallic Plutonium", Transactions of the American Nuclear Society 79 p. 86 (1998)
- J. M. Haschke and J.C. Martz, "Oxidation Kinetics of Plutonium in Air from 500 – 3500 C: Application to Source Terms for Dispersal", J. Alloys and Comp., 266 (1998) pp.81-89.
- J.M. Haschke, T.M. Allen, and J.C. Martz, "Oxidation Kinetics of Plutonium in Air: Consequences for Environmental Dispersal," J. Alloys and Comp., 271 (1998) pp.211-215
- C.P. Munson, E.P. Chamberlin, D. Curtis, and J.C. Martz, "Development of Plasma Based Decontamination of Large Metallic Objects", Proc. of the IEEE Int. Conf. on Plasma Science 2(7) p. 147 (1996)

- J.C.Martz, " Plasma-Based Decontamination of Plutonium", in Environmentally Conscious Design and Manufacturing, Vol 2., C. Berger, ed., ECM Press, Albuquerque, (1994) p. 39.
- J. C. Martz, J.M. Haschke, and J.L. Stakebake, "A Mechanism for Plutonium Pyrophoricity," J. Nucl. Mat. 210 (1994) pp. 130.
- P. T. Cunningham, J. M. Haschke, and J. C. Martz, "Plutonium Storage: Requirements and Challenges", Trans. of the American Nuclear Society volg 69 p. 89 (1993)
- J. M. Haschke and J. C. Martz, "Interim Storage of Excess Plutonium: An Assessment of Options (U)," LA-12624-MS (S/RD) (1993).
- J. C. Martz, D. W. Hess, & E. E. Petersen, "A Generalized Model of Heat Effects in Surface Reactions. I. Model Development," J. Appl. Phys. 72 (1992) p. 3282.
- J. C. Martz, D. W. Hess, & E. E. Petersen, "A Generalized Model of Heat Effects in Surface Reactions. II. Application to Plase Etching Reactions," J. Appl. Phys. 72 (1992) p. 3289.
- J.C. Martz, D.W. Hess, & W.E. Anderson, "Mass Spectrometric Analysis of CF₄/O₂ Plasmas: Effect of Oxygen Concentration and Plasma Power", Plas. Chem. and Plas. Processing, 10(2), p.261-75 (1990)
- J. C. Martz, D. W. Hess, & E. E. Petersen, "Tantalum Etching in Fluorocarbon/Oxygen rf Glow Discharges," J. Appl. Phys. 67 (1990) p. 3609.
- J.C. Martz, D.W. Hess, & W.E. Anderson, "Partial-Pressure Analysis of CF₄/O₂ Plasmas", Plas. Surf. Proc. and Interaction of Materials. Vol 176, p. 175 (1990)
- J. C. Martz, D.W. Hess, J. M. Haschke, J. W. Ward, & B.F. Flamm, "Demonstration of Plutonium Etching in a CF₄/O₂ rf Glow Discharge," J. Nucl. Mat. 182 (1991) p. 277