Edmund J. Synakowski, Ph.D.

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March 18, 2017

To: Alberto Pimentel, Managing Partner
Storbeck/Pimentel and Associates

Dear Mr. Pimentel and Search Committee,

I wish to express my interest in the position of Vice President for Research and Economic Development (VPRED) at the University of Wyoming. The prospect of joining the university's leadership to help it obtain the highest level of impact is compelling, and I believe is aligned with my experience and life goals. I look forward to promoting research within and across disciplines that at once serves the student educational experience, addresses great societal challenges, and serves the state of Wyoming.

I serve as Associate Director of Science for the U.S. Department of Energy (DOE), for Fusion Energy Sciences (FES), a multidisciplinary national research program. I am responsible for leading program strategic planning, budget formulation, execution, and defense. With an enacted budget of over $400M, FES directly supports research at over fifty universities, eight national and two federal labs, including Idaho National Laboratory, and fifteen industrial groups. FES resides within the Office of Science, at $5B annually the largest supporter of physical science research in the U.S. There I am exposed to a wide range of research, research administration, and research institution management practices. Previously I led the Fusion Energy Program at the Lawrence Livermore National Laboratory (LLNL; annual budget about $25M) and was Deputy Physics Division leader in the Physics and Life Sciences Directorate. As in my present role, at LLNL my research exposure extended well beyond the topics of my own field. At Princeton University's Princeton Plasma Physics Laboratory (PPPL), I was Head of Research for one of the country's leading fusion science centers, the National Spherical Torus Experiment (NSTX), leading that team in developing its first five-year research plan (2004-2008), and successfully defending it with DOE. There, participation of universities from across the country and the world was, and is, essential.

My research record is strong when measured by standards of a major research university. It includes over 160 peer-reviewed publications, awards for excellence in research from Princeton University and the American Physical Society, and Fellowship in the American Physical Society and the UK's Institute of Physics. I believe this record would be well regarded by the University of Wyoming faculty.

Translating experience to the VPRED role: strategic planning and action – Strategic planning will be asked of the next VPRED. I've learned that developing and optimizing a strategic vision requires constant engagement with the research community being served. I led the development of a ten-year strategic plan for fusion research in the United States, submitted to Congress in 2015. The planning process was complex and involved working with our federal advisory committee, the national research community, and stakeholders within the Administration. Developing a plan that extends beyond this ten-year horizon continues, as we are seeking further advice from the National Academies of Science. Following the submission of our ten year plan to Congress, my office has continued to seek further community input by holding a series of five national workshops to identify research opportunities pertaining to the strategic plan's priorities. It is with these priorities in mind that we are making investments. As mentioned above, I also led the development of PPPL's first five-year research plan for the NSTX research program.

Sometimes, acting strategically in an era of constrained budgets means making difficult choices. Likely such situations will fall upon the VPRED, and almost certainly upon the university leadership as a whole. As VPRED, I will work collegially to make or help make such choices when necessary, and will defend them respectfully and openly. When given challenging budgets by the Administration that demanded cuts, and when presented with requirements from Congress that demanded unpopular actions, my decisions

have been guided by strategic considerations. At times, these decisions resulted in considerable pressure, including from Congress, as the affected institutions mounted challenges. Pressure was also applied through the national scientific press. In response, I have always acted professionally and respectfully in my duty to defend the Administration's budget proposals, and would do so as VPRED if faced with analogous circumstances. I articulated my decision logic in national town hall meetings, within the Administration, on the Hill, and with the press. My team and I worked vigorously to mitigate any losses to our national research capacity, and to minimize student impacts. While some choices I made with difficult budgets had conspicuous effects on leading institutions, they also preserved smaller enterprises that were less able to motivate a sympathetic response in Congress. One action, strategically important if unpopular because of its impact on a large program at a prominent research university, ensured continued contributions from modest programs at about forty less visible, but scientifically impactful, schools.

Translating experience to the VPRED role: Federal program administration - My service as VPRED will be informed by deep experience in strategic planning; federal science priority setting; and budget formulation, execution, and defense. The stakeholders I engage are as diverse as they will be for this VPRED: I lead discussions of FES plans, issues, and budgets with faculty from across the country, on Capitol Hill, within DOE (including at the Secretarial level), with the Office of Management and Budget, the Office of Science and Technology Policy, other agencies, and the National Academy of Sciences. I've also given Congressional testimony. My staff of about 25 and I work together to engage in these venues, generating a common sense of purpose. We also know what makes a university proposal in the federal system successful, as we set their metrics and evaluate them.

It will be incumbent on the next VPRED to examine afresh the university's research support practices, with an eye on efficiency, clarity of roles and responsibilities, and instilling a sense of office purpose aimed at enabling the researcher to succeed. Here, indications of a well-run Office of the VPRED will be manifest by the university faculty joining the VPRED office in a shared understanding that the VPRED office works effectively and efficiently in identifying research opportunities, pursuing partnerships, and ensuring research compliance without undue burden. These same values are central to the enterprise I presently lead. I've worked to ensure an analogous shared understanding between my present office and the national research community, as well as with offices we work with within DOE. I've restructured the FES office, developed clear roles and responsibilities, hired new division leaders, appointed a chief of staff, and introduced a matrixed approach to program management to get the most out of the FES staff. I've also been fortunate to attract a tremendously talented group of young scientists to FES. All of these changes have helped ensure that the workplace is stimulating, efficiently run, and in touch with the national community's research needs. The next VPRED will need to work within his or her own office and with faculty and leadership in developing such a shared sense of purpose and functionality.

A shared sense of purpose is important regarding compliance. Compliance requirements exist to protect researchers, the institution, and, if applicable, the research subject. My responsibilities include national lab stewardship, where safety and radiological compliance is essential. I know of university faculties demoralized by research compliance requirements poorly administered, and institutional research output severely compromised. However, I've also seen in my own research and administration experience that, properly executed, effective research compliance can be fully aligned with an efficient, disciplined research approach. Compliance requirements can be applied efficiently and effectively if there is a shared set of goals between researchers and those who administer and oversee compliance requirements.

Translation of experiences to the VPRED role: Partnerships - I believe research partnerships can be an expression of connectivity that is central to the values of Land Grant institutions. As the next VPRED, I will build upon my successes in partnership building.

My experience with partnering began with group leadership at PPPL in the 1990's, where I formed and led collaborative research campaigns involving experimentalists and theorists within the lab. I also reached out to a private company, General Atomics (GA), to form a partnership that coupled these

research efforts with those of industrial and university scientists. After this, I became Head of Research for the NSTX research program, one that collaborated with over thirty universities. Part of my role was to ensure that our research partners had experimental facility access that supported the program's goals while they developed leadership roles that would be meaningful to their home institution's departments.

Partnering was central to my leadership effort at LLNL, where I formed a first-of-a-kind research team that spanned organizations in the lab and benefitted two federal agencies, and also spawned a new partnership between LLNL and the University of California. This was part of a strategic redirection for the program I led, was highly successful scientifically, and led to professional opportunities and national recognition for those involved. This strengthened alignment of my program with the lab mission, probably saving during a lab downsizing. This team's formation was enabled by my negotiation with the supporting funding agency, the office I now lead, of a redirection of research funds.

Partnering is key to success in my work, both within the federal government as well as across borders. There are useful parallels between intra-governmental partnering and partnering between departments on the University of Wyoming campus. For example, I have succeeded in strengthening the FES partnership with the Office of Advanced Scientific Computing Research (ASCR), creating further opportunities in research based on supercomputing for U.S. scientists and students. This includes growing Administration and Congressional support for additional resources for it. Building on community work-shopping activity my office launched, we recently received Administration buy-in for a major FES strategic thrust based on exascale computing that ASCR is pursuing. I also approved an initiative for a new experimental enterprise using federal government stimulus funding that levers investments made by FES's sister organization, the Office of Basic Energy Sciences. This has yielded a new research platform in plasma science at Stanford that is world leading and available to university researchers from around the country and the world.

I've made programmatic judgments that have enabled university-industry partnerships to thrive. A leading example of this is the establishment and continuation, through periods of challenging budgets, of the Michigan Institute of Plasma Science and Engineering. Our investment to form the center has been levered many times over in institutional and industrial support. The relation between universities and industry is that of a vibrant, evolving ecosystem that is rare in its productivity and mutual benefit.

Wyoming's growing its impact in addressing great questions will benefit from partnering outside of its institutional borders. There is great promise for levering Wyoming's unique strengths through partnering with other the Land Grant universities. I would enthusiastically embrace exploring these possibilities. As VPRED I will also work hard to identify new partnerships overseas that will enable the impact of faculty to grow globally. Here within DOE, I've grown FES funds available for overseas partnerships, obtaining Administration and Congressional support for a doubling of dollars. We've also developed a new model for using these funds, one that gives faculty and students new opportunities via national teams of universities, labs, and industry. They are now doing research at extraordinary new facilities in Europe and Asia, enabling faculty and students to assert leadership in areas previously inaccessible. During my tenure, FES is also setting a high bar for U.S. science in remote research participation: FES scientists nationwide are now participating in and running experiments on $B-class facilities sited overseas, from U.S. centers. This convinces me that present models of what a successful university partnership looks like can and should be augmented beyond what is traditionally imagined in order to meet 21st century needs.

Public representation - As VPRED, I will represent this institution with local, state, and national governments with an approachable, professional, and diplomatic manner. DOE has found me trustworthy at high levels that required political acumen. I've engaged with scientific leaders and science ministers regarding one of science and engineering's megaprojects, ITER, an experiment aimed at demonstrating the scientific and technical feasibility of fusion energy. Complexity is born from ITER's diverse research cultures and political systems: participants are China, the European Union, India, Japan, Russia, South Korea, and the U.S. I have served as a member and past vice chair of ITER's governing Council. ITER is predicated on the potential and necessity of partnership to get great things done. However, ITER's unique

technical, engineering, and management complexities are unprecedented in the history of globally conducted science. I believe I have represented FES and the U.S. well and with a face appropriate for diplomacy in this complex international setting. While this situation is unusual, it is highly relevant to the VPRED role. First, increased international engagement ought to be a goal, as it presents great opportunity. And second, for any partnership - with other campuses, industry or national labs, or foundations - there will always be the need to be sensitive to cultural differences, to understand the needs of partners, and to be flexible while remaining true to core values of the university.

You might get a sense of what I project publically by viewing two videos in which I am featured, one a short piece produced at the University of Michigan Institute for Plasma Science and Engineering (http://mipse.umich.edu/life/index.htm#miplasma_19), the other a public lecture I gave at PPPL last fall on discovery in the fusion sciences (https://mediacentral.princeton.edu/id/1_6qyfeawo). I hope one thing that is conveyed is an ability and eagerness to communicate a passion for discovery in general, in realms that are both exciting and of great practical importance.

Commitment to diversity - Through my appointments of outstanding candidates identified by FES program managers and myself, our federal advisory committee is now comprised of researchers who are far more representative of the U.S. population than prior to my arrival at DOE. I have appointed based on excellence and promise, and often against norms of gender or ethnicity. For the Presidential Early Career Award program, we work hard to recommend from as broad a national pool of applicants as possible. The diversity of winners far outdistances that of the fusion and plasma sciences research community overall.

Understanding university research cultures - I've visited campuses of major research institutions across the country, and have met privately with grad students in order to learn and share ideas. Conversations have been uplifting, surprising, and frank. I've also met with administration research leaders at these same campuses. This has revealed a great range of outlooks among some of the country's most outstanding research universities, their similarities as well as differences and weaknesses where you might not expect them, and the role of campus leadership in shaping the cultures these students inhabit and the outlooks they adopt. I have had my office conduct a national survey of all of FES sponsored programs to obtain a quantitative picture of graduate student involvement nationwide to inform judgments of workforce needs, and am engaging in discussions with university research leaders about how this class of research is supported on campus, and what we can do to ensure leadership opportunities for faculty.

Personal motivations - Let me close with some comments regarding my personal driving factors. First, I've been considering a move to a research university setting for some time, starting with a thorough assessment of what I find most satisfying and meaningful. I've come to understand that my most mature satisfaction comes from creating opportunities for others to succeed, which, when combined with my career experience, would seem to be aligned precisely with the obligations for this position.

I've also derived great satisfaction in being involved in a broader and broader research palette over time. This drove my moves to LLNL and DOE. Now I seek to be part of the leadership of a major research university, tasked to be a champion for a wide range of disciplines. That research is intrinsically a social enterprise is also meaningful to me, and promoting healthy and stimulating research communities in STEM fields and the humanities, and in cross-disciplinary areas involving both, is a compelling prospect.

I am also motivated to support a core obligation of a research university, education. Research can and should be central to education for all students. I came to understand early in my life the power of investigation and active participation in transforming one's sense of place in the world, first as a youngster with amateur astronomy and radio, and more broadly, through musical study and performance. This thread continued through my undergraduate (working in a Physics Department lab with work-study support) and graduate years and into my career. I have found my sense of place in the world transformed and enlarged every time I've experienced discovery through my own investigation. Such discovery irreversibly animates one's awareness that the world can be understood and made better through one's own industry and actions. Whether in the STEM disciplines or in the humanities, if a student graduates

with such sharpened self-awareness, then that institution has succeeded in its most important obligation. I seek to be with a university that acts on this understanding.

As for leaving the DC area for Wyoming, this is a prospect my wife Ellen and I find compelling. The moves I have made for professional reasons have all been stimulating and worthwhile from a personal perspective as well. I would come to Wyoming buoyed by a love of the outdoors, an interest and respect for people with all manner of different backgrounds, and an attraction towards university towns, all combined with my professional interests that I have described here. I suspect this combination would combine to create a great quality of life for us.

References - Allow me to offer names of research leaders who can offer views regarding my qualifications for this position. Each has had a different view of my career that might be of interest.

- Professor Roger D. Bengtson, Department of Physics (emeritus), University of Texas at Austin
- Dr. Patricia Dehmer, Director of Science Programs, Office of Science, DOE; retired November 2016 and, until then, my direct supervisor
- Dr. William Goldstein, Director, Lawrence Livermore National Laboratory
- The Honorable Rush D. Holt, C.E.O., American Association of the Advancement of Science; former U.S. Congressman
- Professor Russell Hulse, 1993 Nobel Laureate in Physics, Regental Professor and Associate Vice President for Strategic Initiatives at the University of Texas at Dallas
- Professor Christopher Keane, Vice President for Research, Washington State University
- Professor Cherry A. Murray, Benjamin Peirce Professor of Technology and Public Policy and former dean of, the Harvard School of Engineering and Applied Sciences. Former Director, U.S. DOE Office of Science
- Professor David Newman, Physics Department, University of Alaska, Fairbanks
- Dr. John Parmentola, former Senior Vice President, Energy and Advanced Concepts Group, General Atomics, a private company. Former Director of Research, U.S. Army
- Professor Karl Van Bibber, chair, Department of Nuclear Engineering at Berkeley
- Dr. Sharlene Weatherwax, Associate Director of Science, DOE, for Biological and Environmental Research

I will be pleased to offer detailed contact information as needed as this process moves forward.

I close by reaffirming my deep interest in this opportunity, and belief that it is aligned with my personal motivations, my temperament, and my career experience. I'll value the opportunity to discuss my qualifications and the university's interests with you, and I thank you for your consideration.

Respectfully,

Edmund J. Synakowski

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At DOE: Federal Research Program Leader and Administrator

Associate Director of Science, U.S. Department of Energy (DOE), for Fusion Energy Sciences (FES), 2009-present

- Responsible for national program strategic planning, budget formulation and execution, federal oversight of projects including U.S. ITER, and program integration with other agencies and offices. Budget in 2016 of over $400,000,000
- Key Accomplishments: Led development of U.S. ten-year strategic plan for fusion and plasma sciences. Launched national workshops to identify further opportunities. Created intra-DOE partnership yielding a new class of plasma research now regarded as world-leading. Grew overseas partnerships with university and national lab teams

In the Field: Research Program Leader

Lawrence Livermore National Laboratory (LLNL; 2006-2009); Princeton Plasma Physics Laboratory, Princeton University (PPPL), 2000-2006

LLNL: Fusion Energy Program Leader (FEP), 2006-2009; Deputy Leader, Physics Division, Physical and Life Sciences Directorate, 2009

- Responsible for FEP strategic planning, execution, and business management. Multiple funding sources. Annual budget $25-30M
- Key Accomplishments: Strategic realignment of the LLNL FEP research program with lab and national interests, through negotiation with DOE and LLNL leadership

PPPL: Head of Research, National Spherical Torus Experiment (NSTX), a national collaborative research facility, 2004-2006; Deputy Program Director, 2000-2004

- With NSTX leadership, contributed to annual development of Field Work Proposals
- Key Accomplishments: Led development of NSTX Five Year Plan, 2004-2008 (2003). Successfully defended the NSTX research program in competitive DOE review (2005)

In the Laboratory: Research Physicist

Princeton University's Princeton Plasma Physics Laboratory: All levels, 1988-2000

Research: Both individual PI and team lead on the largest fusion research facility in the U.S.

- Proposed, defended, and led award-winning studies of energy and particle transport
- First-of-kind partnerships with computational theory group
- Forged partnership with private industry in joint research (General Atomics, La Jolla, CA)
- Developed plans and argued successfully for experimental run time for Transport Group
- American Physical Society and Princeton University awards for excellence in research

Research support for national team: Responsible for spectroscopic measurements of ion temperatures and flows for the national Tokamak Fusion Test Reactor research program

Education

Ph.D., Physics, The University of Texas at Austin, 1988
B.A., Physics, The Johns Hopkins University, 1982
Graduated with Departmental Honors
Donald Kerr Medal for Excellence in Physics
Phi Beta Kappa

Professional Society Membership and Honors

American Physical Society prize for Excellence in Plasma Physics Research (2001)

Princeton University's Kaul Foundation Prize for Excellence in Plasma Physics Research and Technology Development (2000)

American Physical Society prize for Excellence in Plasma Physics Research (2001)

Princeton University's Kaul Foundation Prize for Excellence in Plasma Physics Research and Technology Development (2000)

Publications

Over 160 peer-reviewed journal articles. Some details follow; a complete list is in a separate file

Select Research Achievements

First experimental causality tests of the role of sheared plasma flows in reducing turbulence and losses of fuel and energy in a hot fusion plasma core. Also, the first demonstration of control by varying flows of energy containment and turbulence in a fusion plasma core

Publications include:

- Synakowski, E. J., *"Formation and structure of internal and edge transport barriers,"* Plasma Physics and Controlled Fusion **40** (5) 581-596 (invited international review)

- Synakowski, E. J., S. H. Batha, M. A. Beer, M. G. Bell, R. E. Bell, R. V. Budny, C. E. Bush, P. C. Efthimion, G. W. Hammett, T. S. Hahm, B. LeBlanc, F. Levinton, E. Mazzucato, H. Park, A. T. Ramsey, G. Rewoldt, S. D. Scott, G. Schmidt, W. M. Tang, G. Taylor and M. C. Zarnstorff (1997). *"Roles of electric field shear and Shafranov shift in sustaining high confinement in enhanced reversed shear plasmas on the TFTR Tokamak,"* Physical Review Letters **78** (15) 2972-2975

- Synakowski, E. J., S. H. Batha, M. A. Beer, M. G. Bell, R. E. Bell, R. V. Budny, C. E. Bush, P. C. Efthimion, T. S. Hahm, G. W. Hammett, B. LeBlanc, F. Levinton, E. Mazzucato, H. Park, A. T. Ramsey, G. Schmidt, G. Rewoldt, S. D. Scott, G. Taylor and M. C. Zarnstorff (1997). *"Local transport barrier formation and relaxation in reverse-shear plasmas on the Tokamak Fusion Test Reactor "* Physics of Plasmas **4**(5): 1736-1744 (national invited paper).

Select Research Achievements (continued)

First comparative study between major fusion research facilities (national lab and private industry) of plasma regimes with reduced cross-field transport in the hot core

Publications include:

- Synakowski, E. J., M. A. Beer, R. E. Bell, K. H. Burrell, B. A. Carreras, P. H. Diamond, E. J. Doyle, D. Ernst, R. J. Fonck, P. Gohil, C. M. Greenfield, T. S. Hahm, G. W. Hammett, F. M. Levinton, E. Mazzucato, G. McKee, D. E. Newman, H. K. Park, C. L. Rettig, G. Rewoldt, T. L. Rhodes, B. W. Rice, G. Taylor and M. C. Zarnstorff (1999). *"Comparative studies of core and edge transport barrier dynamics of DIII-D and TFTR tokamak plasmas,"* Nuclear Fusion **39** (11Y) 1733-1741 (international invited paper)

First measurements of helium born in fusion reactions in the laboratory, leading to an assessment of favorable implications for a future fusion reactor.

Publications include:

- Synakowski, E. J., R. E. Bell, R. V. Budny, C. E. Bush, P. C. Efthimion, B. Grek, D. W. Johnson, L. C. Johnson, B. Leblanc, H. Park, A. T. Ramsey and G. Taylor (1995) *"Measurements of the Production and Transport of Helium Ash in the TFTR Tokamak,"* Physical Review Letters **75** (20) 3689-3692

First experimentally determined fluxes of heat and multiple species of ions compared with state-of-the-art instability theory and computation. This indicated that electrostatic turbulence is the dominant driver of heat and fuel across a confining magnetic field in a fusion system. and has favorable implications for a fusion reactor.

Publications include:

- Synakowski, E. J., P. C. Efthimion, G. Rewoldt, B. C. Stratton, W. M. Tang, B. Grek, K. W. Hill, R. A. Hulse, D. W. Johnson, M. W. Kissick, D. K. Mansfield, D. McCune, D. R. Mikkelsen, H. K. Park, A. T. Ramsey, M. H. Redi, S. D. Scott, G. Taylor, J. Timberlake and M. C. Zarnstorff (1993). *"Helium, Iron, and Electron Particle-Transport and Energy-Transport Studies on the Tokamak Fusion Test Reactor."* Physics of Fluids B-Plasma Physics **5** (7) 2215-2228 (national invited paper)

First-ever measurements of the spatially localized helium diffusive and convective fluxes in a fusion plasma and comparison to heat and momentum fluxes. This suggested electrostatic drift-wave turbulence is the dominant transport mechanism for ions.

Publications include:

- Synakowski, E. J., B. C. Stratton, P. C. Efthimion, R. J. Fonck, R. A. Hulse, D. W. Johnson, D. K. Mansfield, H. Park, S. D. Scott and G. Taylor (1990). *"Measurements of Radial Profiles of He2+ Transport-Coefficients on the TFTR Tokamak,"* Physical Review Letters **65** (18) 2255-2258

Select Research Achievements (continued)

First-ever comparisons of main ion (tritium) and impurity ion transport in a fusion plasma.

Publications include:

- Efthimion, P. C., S. von Goeler, E. J. Synakowski, M. Bitter, S. H. Batha, R. E. Bell, C. E. Bush, W. A. Houlberg, F. M. Levinton, E. Mazzucato, D. McCune, D. Mueller, H. Park, A. T. Ramsey, A. L. Roquemore, G. Taylor and M. C. Zarnstorff (1998) *"Observation of tritium and helium core transport barriers in reversed shear plasmas on TFTR,"* Plasma Physics and Controlled Fusion **40** (5) 621-625

Increased by an order of magnitude spectroscopic analyses of fusion plasma temperatures and flows, in service to the national research group at PPPL. This enabled spatial and temporal analyses of nearly every experiment on TFTR, helping scientists establish a new global standard for understanding through research in the fusion sciences

Position Details and Responsibilities: Federal Research Program Leader

Associate Director of Science, DOE, for Fusion Energy Sciences (FES), 2009-present

- Strategic planning; community and stakeholder engagement; budget formulation, defense, execution, and oversight; interagency integration. Budget for 2016 is over $400,000,000
- FES directly supports programs at eight national and two federal laboratories, about 40 universities, and eight private industries, not including subcontractors.
- Duties include: oversight of construction projects including U.S. ITER, proposal solicitations and reviews, funding awards; establishing national lab program metrics, and reviewing national lab performance
- Stakeholder engagement includes program briefings and program direction and issues discussions with:
  - Congressional staff
  - University research leaders, faculty, and students
  - National lab leaders and scientists
  - National Academies panels and committees
  - Local, national, and international press
  - Administration stakeholders including the Office of Management and Budget, Office of Science and Technology Policy, the President's Science Advisor, and the Secretary and Deputy Secretaries of Energy
  - Congressional testimony, House Committee on Science and Technology, October 2009, cf. http://archives.democrats.science.house.gov/publications/Testimony.aspx?TID=15260
- Oversight responsibilities include the U.S. ITER Project Office and FES projects
- ITER Council: U.S. delegation (2009-present), Vice Chair (2012, 2013). Head of U.S. delegation (2009, 2013), U.S. representative at ministerial level (2013)

Position Details and Responsibilities: Laboratory Research Program Leader

Fusion Energy Program (FEP) Leader, LLNL, 2006-2009

- Strategic planning, execution, and business management
- Annual budget of $25-30M from the Office of Science, defense, CRADAs, and work-for-others contracts. At the time, FEP was the lab's largest Office of Science program
- Redirection of FEP, leading to new university-laboratory partnerships and alignment of FEP with laboratory mission
- Elements included partnerships with private industry (General Atomics), other national labs, and university researchers

Head of Research, 2004 - 2009, Deputy Program Director, 2000 – 2004, National Spherical Torus Experiment (NSTX), Princeton Plasma Physics Laboratory

- NSTX is the leading fusion experiment at the lab and one of the two largest fusion experiments in the country
- Led group development of the NSTX Five Year Research Plan in 2003
- Led development of the near term (1 - 2 year) research program on NSTX
- Successful defense of program in competitive DOE review in 2005
- Oversight of program execution, data analysis, and dissemination of research results

Examples of Talks, Forums, and Publications as Federal Research Program Leader

U.S .Department of Energy Report to Congress - The Office of Science's Fusion Energy Sciences Program: A Ten Year Perspective – Submitted to Congress, December 2015. Led the Administration's development of this plan, including obtaining community input. Available at

http://science.energy.gov/~/media/fes/pdf/program-documents/FES_A_Ten-Year_Perspective_2015-2025.pdf.

Congressional testimony, Subcommittee on Energy and Environment Committee on Science and Technology U.S. House of Representatives October 29, 2009; available at

https://www.fas.org/sgp/congress/2009/102909synakowski.pdf

Briefings to staffs of various Congressional committees, including:

- House and Senate Energy and Water Development Appropriations (at least annually)
- Senate Energy and Natural Resources
- House Science, Space, and Technology

University presentations. For example, *Leading Challenges and the Role of Transformation in the Fusion Energy Sciences*, 2015, at Columbia University, UCLA, and University of Michigan. These presentations accompany visits where I meet with graduate students, faculty, and university administration research leaders

Examples of Talks, Forums, and Publications as Federal Research Program Leader (continued)

University Fusion Associates Town Hall, annually, American Physical Society Division of Plasma Physics national meeting

2nd Monaco-ITER International Fusion Energy Days, Principality of Monaco, December 2013, *Directing Transformation: The Science of Energy and Fusion*

Federal advisory committee meetings: for fusion and other Office of Science programs. Approximately biannually

Annually to the National Academies Board on Physics and Astronomy

Videos Online

Plasmas in Our Lives series interview, October 7, 2015, Michigan Institute for Plasma Science and Engineering:

- http://mipse.umich.edu/life/index.htm#miplasma_19

Reimagining the Possible: Scientific Transformations Shaping the Path Towards Fusion Energy, Public lecture video, March 5, 2015, "Science on Saturday," PPPL:

- https://mediacentral.princeton.edu/id/1_6qyfeawo

Professional Community Service

- Chair, five year review of major national fusion research and technology program. Advisory committee member of two leading US fusion experimental programs (university and industry)
- American Physical Society Division of Plasma Physics (APS-DPP) Executive Committee, APS-DPP Program Committee, and APS-DPP Distinguished Lecturer
- Vice-Chair, Energy Policy Act (EPAct of 2005) Task Group for development of US Research Plan for the international fusion project ITER, developed in response to Congressional request
- Vice Chair, Chair, and Steering Committee Chair, US Transport Task Force

Interests and Activities

- Musical performance (trombone). Presently jazz; traditional jazz; dixieland in and around Washington D.C., in a quartet and other small groups. Also wind symphony, jazz orchestra, orchestra, British brass band, musical theater
- Literary interests include biography; history and philosophy of science; history of invention
- Amateur radio
- Cycling; recreational speed skating

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Invited research talks, colloquia, and other select presentations

Fusion Energy, Plasma Turbulence, and a Shifting Scientific Landscape - presented as part of the APS-DPP Distinguished Lecturer series at the Physics Departments of

Lafayette College, Easton, PA, April 2006; Millersville University, Lancaster, PA, April 2006; California State University, Chico, March 2006; The Johns Hopkins University, December 2004; The University of Texas at Austin, March 2004
Also at the Physics and Advanced Technology Directorate, LLNL, June 2004

Research on NSTX: Results and Directions
Department of Applied Physics and Applied Mathematics Colloquium
Columbia University, October 2003

NSTX as a Scientific Instrument in Fusion Energy Development
Princeton Plasma Physics Laboratory Colloquium, April 2003

Fusion Energy: Global Needs and Global Partnership
TechTrends 2003 Conference, Wilmington, Delaware, April 2003

The National Spherical Torus Experiment (NSTX) Research Program and Progress Towards High Beta, Long Pulse Operating Scenarios
Nineteenth International Conference on Plasma Physics and Controlled Nuclear Fusion Research
Lyon, France, October 2002

An Initial Look at Local Physics on NSTX
MIT Plasma Science Fusion Center; April 2001

Keeping the Genie in the Bottle: Magnetic Fusion and Plasma Confinement
Clarkson University Physics Department Colloquium (PPPL Speakers Bureau); April 2001

A Comparative Study of Core and Edge Transport Barrier Dynamics of DIII-D and TFTR Tokamak Plasmas
Courant Institute for Mathematical Sciences; New York University; November 1999

New Understanding of Poloidal Rotation Measurements
IPP-Teilinstitut; Greifswald; October 1999

Physics of TFTR and DIII-D Transport Barrier Dynamics and Implcations for Pressure Profile
Control Strategies
Max Planck Institute for Plasma Physics; IPP Garching; Germany; June 1999

A Comparative Study of Core and Edge Transport Barrier Dynamics of DIII-D and TFTR Tokamak Plasmas
Sixteenth International Conference on Plasma Physics and Controlled Nuclear Fusion Research
Yokohama, Japan, October 1998

The Formation and Structure of Internal and Edge Transport Barriers
Ernst-Moritz-Arndt University
Greifswald, Germany, April 1998

The Formation and Structure of Internal and Edge Transport Barriers
Plasma Science and Fusion Center Seminar
Massachusetts Institute of Technology, November 1997

A Review of the Formation and Structure of Internal and Edge Transport Barriers
6th IAEA Technical Committee Meeting on H mode Physics
Kloster Seeon, Germany, September 1997

Local Transport Barrier Formation and Relaxation in Reverse-Shear Plasmas on the TFTR Tokamak
Thirty-eighth Annual Meeting of the Division of Plasma Physics
American Physical Society, Denver, CO, November 1996

Transport and E×B Shearing in Reversed Shear Plasmas on TFTR
Meeting of the Ninth Annual U.S. - European Transport Task Force Workshop
Philadelphia, PA, March 1996

Helium Ash Production, Transport, and Pumping on TFTR
Plasma Physics Colloquium

Department of Applied Physics
Columbia University New York, NY, October 1995

An Overview of Alpha Particle Studies During D-T Operation on TFTR The Third International Workshop on Helium Transport and Exhaust Charleston, SC, September 1995

Helium Ash and Tritium Transport on TFTR
U.S. - European Transport Task Force Workshop
Marina Del Rey, CA, March 1995

Local Multispecies Particle and Energy Transport Studies on the TFTR Tokamak
Thirty-fourth Annual Meeting of the Division of Plasma Physics
American Physical Society, Seattle, WA, November 199

Multispecies Transport Studies in Supershots and L-Modes on TFTR
Meeting of the Fifth Transport Task Force Workshop
Oak Ridge, TN, March 1992

Multispecies Particle and Energy Transport Studies on TFTR
Plasma Physics Colloquium
Department of Applied Physics
Columbia University, New York, NY, February 1992