Fusion Power Report

Complete Coverage Of Worldwide Fusion Developments

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USDOE Plans Termination of All Fusion Technology Efforts

According to the U.S. Department of Energy's FY 2005 budget submission to Congress, and a subsequent clarifying letter from DOE Office of Science director Raymond Orbach, the Department plans to terminate all its efforts on Fusion Technology by September 30 of this year. These efforts were funded at a level of $11.1 million in FY 2003. In a related action, the DOE also plans to reduce its efforts on Advanced Design and Analysis of fusion energy systems from $6 million in FY 2003 to $2.6 million in FY 2005. The DOE had proposed last year to terminate the Fusion Technology effort in FY 2004 but a Congressional add-on and a strongly-worded letter to Orbach from his Fusion Energy Sciences Advisory Committee (FESAC), resulted in a partial reprieve. DOE has since announced that it used the Congressional add-on to plan for "orderly close-out" of the Fusion Technology programs in FY 2004.

In its letter to Orbach last year, FESAC said, "...devastating cuts in certain program elements are alarming; this note expresses our most serious concerns," and commented, "Thus, FESAC is puzzled by the elimination in the FY 2004 budget of funding for fusion technology." The FESAC said, "Similarly, inertial fusion energy (IFE) is an important element of a balanced US fusion program: it provides the principal alternative to magnetic fusion and takes advantage of NNSA investments in the National Ignition Facility. The FY 2004 budget, however, eliminates (fusion) chamber technology for both MFE (magnetic fusion energy) and IFE. With respect to the Advanced Design and Analysis program, the FESAC said, "The study of future energy systems is a central component of fusion research. Its evolving conceptualization of an eventual fusion power plant has helped us visualize our target, while allowing us to identify key scientific challenges." "In summary," the 2003 FESAC letter said, "FESAC finds the Presidential request for fusion research funding in FY 2004 to be not only meager but also harmfully distorted. It terminates components of the program that are truly essential." The recent FY 2005 budget request is similar to the FY 2004 with regard to the funding distributions criticized by FESAC in 2003.

In a recent letter to Livermore scientist John Lindl, DOE Office of Science director Ray Orbach defended the planned termination of the Fusion Technology effort, saying, "The issue really is the degree to which our Fusion Energy Sciences program should become an energy development program. The Administration position on this issue is that now is not the right time for us to invest energy related R&D for fusion, either for MFE or for IFE." Orbach said, "For MFE, funding for energy relevant technology R&D will wait for the results of ITER. Similarly, for IFE, we will wait for the achievement of ignition and gain before investing in the technology required for energy applications." "Until we are confident that we understand the science of fusion, we would be taking an unacceptable risk to commit the sums required to develop the technology needed to apply that science," Orbach said.

Critics of the Orbach letter point out that, even at the FY 2003 level of $11 million, the programs at issue were only about 5% of the fusion budget, that the science of fusion was judged sufficiently understood to justify the construction of NIF (a $4 billion expenditure) and the proposed construction of ITER (an estimated $5 billion expenditure), and that various review panels have judged the probability of NIF and ITER achieving their performance objectives to be high. Critics say that it is one thing to differ on the amount to be spent preparing for the longer term and quite another to have a policy to spend nothing.

The complete text of the Orbach letter to John Lindl and Lindl's original email to Orbach are appended below:

From Orbach to Lindl. March 2004:

Dear John,

Thank you for your thoughtful email after the Fusion Power Associates meeting. I have taken some time to reply because this subject is an important one and because it is broader than Inertial Fusion Energy. The issue really is the degree to which our Fusion Energy Sciences program should become an energy development program. The Administration position on this issue is that now is not the right time for us to invest in energy related R&D for fusion, for either MFE or for IFE. Our FY 2005 budget request to Congress reflects this position.

As you know, we have charged FESAC to review all aspects of our Inertial Fusion Energy program, including that funded in NNSA. Our intention is to assemble the various portions of IFE, wherever it is supported, to see whether a coherent national program could be put together for energy purposes. This assessment will be valuable, but it seems wise to wait for NNSA to develop the science further before we make any major commitment to IFE for energy purposes.

In the meantime, we intend to focus our IFE program on the science issues of IFE, including the heavy ion accelerator physics program which contributes to non-neutral plasma physics. Our fast ignition work is our current contribution to the emerging field of high energy density physics, an area that we hope to expand in the future. While focusing on IFE science, we are bringing the IFE and the MFE long-range fusion technology program elements to conclusion this year, using the Congressional supplement to our budget request to complete those activities in an orderly way.

For MFE, funding for the energy relevant technology R&D will wait for the results of ITER. Similarly, for IFE, we will wait for the achievement of ignition and gain before investing in the technology required for energy applications. I understand your desire to move more quickly, but our budgets are highly constrained. Until we are confident that we understand the science of fusion, we would be taking an unacceptable risk to commit the sums required to develop the technology needed to apply that science.

Sincerely,
Raymond L. Orbach

From Lindl to Orbach:

Date: Sun, 23 Nov 2003 20:36:51 -0800
To: ray.orbach@science.doe.gov
From: John Lindl <lindl1@llnl.gov>
Subject: My comments at the Fusion Power Associates Meeting

Dear Dr. Orbach,

I would like to apologize for interrupting you at the FPA meeting while you were answering my question regarding support for the Inertial approach to fusion energy (IFE) within DOE and the Administration more generally. I recognize that your work on behalf of fusion has been critical in the US decision to rejoin ITER and in the US effort to bring negotiations to a successful conclusion. A burning plasma experiment is essential for the future of MFE, both in the US and in the broader world MFE program. As such, ITER is clearly the top priority for the US Fusion program. I am doing everything I can to utilize the resources at LLNL to help make ITER a success.

What I was trying to express in my question was a tremendous sense of frustration felt by everyone working in IFE. The US Government will have spent over $3B building NIF. To spend nothing exploring the issues beyond ignition which will determine whether inertial fusion has a viable path toward energy production seems incomprehensible to me. The equivalent in MFE would be to say that the entire world program in magnetic fusion should be nothing but ITER. Yet this seems to be where we are heading in IFE.

The principal IFE work supported by the Office of Science, involving the scientific assessment of the use of ion beams (HIF), has decreased from almost $20M in FY99 to about $13M this FY. The effective elimination this FY of the scientific program addressing fusion chamber issues in IFE is a crippling blow to the heavy ion effort. Most of this work, which involved small scale scientific experiments and analysis, was carried out at universities. My understanding is that the OMB continues to push for further reductions in the OFES HIF program.

As you mentioned, the Congress has actually been quite supportive of funding research on IFE to take advantage of the NNSA stockpile stewardship research on NIF and the associated ignition program. In fact the Congressional add-ons to support research on lasers and z-pinches total $29M for FY04. Thus almost 70% of the IFE related research in FY04 is funded by Congressional mandate. In spite of the year-to-year uncertainty in funding, the researchers involved in this work have put together an excellent program. However, in the longer term, this is a completely untenable situation.

I am well aware of the reasons given by NNSA for why they cannot broaden their mission statement to include IFE, why this money is not part of the OS budget, and why the OMB wants to eliminate IFE research. My question to you is do you see any possible way out of this quagmire? The recent interest

in high energy density physics is certainly a thrust that I support. But that on its own will not support a program to develop the science needed to establish the basis for IFE. It is the equivalent of trying to base the MFE program on the value to Astrophysical phenomena of magnetic reconnection or turbulence in magnetized plasmas. These kinds of applications are valuable but not the organizing principle of an Office of FUSION ENERGY Science.

Sincerely,
John

ANS President Urges Restoration of Fusion Technology Program

In written testimony to the Subcommittee on Energy and Water Development of the House Committee on Appropriations, Larry Foulke, President of the American Nuclear Society, urged the Subcommittee to restore "at least $5M to the Fusion Technologies and Advanced Design categories as part of the FY 2005 budget of the Department of Energy, Office of Science, Fusion Energy Sciences program." The Department has proposed to terminate all Fusion Technology effort in FY 2005.

Foulke said, "It is difficult to understand this decision to terminate the fusion technology program given the support for fusion energy research at the highest Administration levels, the plan for the US to join construction of the ITER device which is the highest priority facility listed in DOE Office of Science's Strategic Plan, and the continuing construction of the National Ignition Facility."

Foulke said, "It would seem prudent to maintain some balance in the program between science and technology and between MFE (magnetic fusion energy) and IFE (inertial fusion energy). This is reflected in several statements from the Fusion Energy Sciences Advisory Committee (FESAC) in regard then to the FY 2004 budget. At that time, DOE had proposed to terminate the fusion technology effort in FY 2004 but a Congressional add-on and a strongly-worded letter from FESAC helped to provide a reprieve. The FY 2005 budget request includes the same fusion technology funding cuts which, as part of the FY 2004 budget, were criticized by FESAC in 2003."

Foulke said, "Fusion technology research addresses the fundamental scientific issues that will be encountered in fusion systems with substantial amount of fusion energy (including such fusion facilities as ITER and NIF). It provides solutions to near term technology issues that will certainly arise in building and operating facilities like the NIF and ITER. The advanced design and analysis of fusion energy systems provide a vision of the ultimate fusion energy goal and a tool that is useful for guiding the highest leverage near term scientific research."

Foulke expressed "our concern regarding recent changes in the direction of US fusion research," as reflected in a recent statement of DOE Office of Science Director Ray Orbach, "now is not the right time for us to invest in energy related R&D for fusion, for either MFE or for IFE,". He noted that "Other participants in ITER, in particular EU and Japan, have strong programs in fusion technology R&D in preparation for testing in ITER and leading to a power reactor in the future. It would be regretful at this stage for the US to pull out of this R&D area and to be left in the precarious position of having to catch-up with our international partners in the future once we decide to seriously develop the advanced technology required for attractive fusion power plants (of either MFE or IFE types.)."

The complete text to Foulke's testimony is available from Fusion Power Associates: fpa@fusionpwrassoc.org.

FESAC Panel Urges Balanced Inertial Fusion Energy Effort

A panel of the Department of Energy's Fusion Energy Sciences Advisory Committee (FESAC), charged with reviewing its Inertial Fusion Energy (IFE) program, has urged the Department to carry out "a coordinated program with some level of research on all the key components (targets, drivers and chambers), always keeping the end product and its explicit requirements in mind." The wording is intended to call attention to the fact the DOE recently announced termination of all its efforts on targets and chambers for IFE as part of its plan to end all work on Fusion Technology.

The panel noted that there are three main approaches to IFE, based on heavy ion accelerators, lasers, and z-pinches. They said, "The recent progress related to these approaches is substantial and the quality of science and engineering research is

excellent." They said, "All approaches are currently on track for developing the science and technology to properly evaluate their potential for IFE. However, the planned termination of technology programs in support of the heavy ion approach is not consistent with their importance to heavy ion IFE, and the Panel is concerned about the impact of this action."

The Panel said that "each of the approaches to IFE may benefit if the technique of Fast Ignition proves effective. However, since fast ignition is at an early stage of development it would be premature for any of the IFE approaches to rely on the success of fast ignition to achieve an attractive fusion energy system."

"In sum," the Panel said, "the IFE Panel is of the unanimous opinion that the IFE program is technically excellent and that it contributes in ways that are noteworthy to the ongoing missions of the DOE. Moreover, the Panel agrees with the IFE community that the most efficient way to achieve the ultimate goal of fusion energy is to carry out a coordinated program with some level of research on all of the key components (targets, drivers, and chambers), always keeping the end product and its explicit requirements in mind."

The Panel also noted that "the scientific and technical challenges posed by IFE, along with their many connections to high energy density physics, have attracted many outstanding researchers from academia as well as federal laboratories. Success will depend on sustaining the commitment and involvement of such people in a broad spectrum of scientific disciplines."

The Panel was chaired by Rulon Linford (University of California), with Vice Chairs Jill Dahlburg (US Naval Research Laboratory) and Riccardo Betti (University of Rochester).

The full FESAC endorsed the Panel report at it meeting March 29, and transmitted it to DOE Office of Science Director Ray Orbach, stating, "The Fusion Energy Sciences Advisory Committee (FESAC) has reviewed the enclosed report, "A Review of the Inertial Fusion Energy Program," and submits it to you with our full endorsement." The FESAC is chaired by Richard Hazeltine (University of Texas).

Copies of the Executive Summary are available from Fusion Power Associates: fpa@fusionpwrassoc.org.

Components Arriving for New German Stellarator

The first major components have been delivered for the new, billion-dollar-class stellarator, Wendelstein 7-X, being constructed in Greifswald, Germany. The components include a magnet coil, the first plasma vessel segment, vessel ports and a microwave transmitter for plasma heating. Stellarators are magnetic fusion configurations similar to tokamak configurations but having no plasma current. A much smaller ($86 million) "compact stellarator" is under construction in the U.S. at the Princeton Plasma Physics Laboratory. A billion-dollar-class stellarator,LHD, is already in operation in Japan.

Wendelstein 7-X is scheduled for completion in 2010.

The Wendelstein 7-X will be heated in continuous mode by ten microwave gyrotrons, each having one megawatt of power at a frequency of 140 gigahertz. Such gyrotrons previously have been limited to pulses of a few seconds and powers of a few hundred kilowatts. The improved tubes are being developed by the French company, Thales Electron Devices, and by the U.S. company Communication and Power Industries (CPI).

Further information is posted at http://www.ipp.mpg.de

Information on the Japanese LHD stellarator is posted at http://www.lhd.nifs.ac.jp

Information on the U.S. compact stellarator, NCSX, is posted at http://www.pppl.gov/projects/pages/ncsx.html

Information on the HSX stellarator program at the University of Wisconsin is posted at http://hsxa.ece.wisc.edu

A newsletter describing international stellarator research results is available at http://www.ornl.gov/fed/stelnews/

India May Join ITER Effort

India has accepted an offer from the United Kingdom to join the ITER project as part of the European Union's team, according to Indian Science Secretary, V. Ramamurthy, as reported in the science journal Nature (25 March 2004). India was expected to join the ITER effort as a "junior partner" after the other six Parties (EU, Japan, Russia, China South Korea and U.S.) had reached agreement on construction, but decided instead to accept an offer from British Science Advisor David King to join in immediately under British auspices.

Officials from the other ITER Parties, however, disputed whether India could join under these terms at this time, saying that India would have to wait until after a site had been selected and then join as an independent Party.

Meanwhile, the six ITER Parties continued to be deadlocked on choosing a site for constructing ITER, with three favoring France and three favoring Japan. A technical working group completed its site analysis activities at a meeting March 12-13 in Vienna and a high level group of government officials from France met with officials from Japan in Tokyo March 22-23 without reaching an agreement on how to resolve the site issue.

Opinion is mixed on how or whether the six ITER Parties will reach an agreement on site. Even if the site is chosen, however, legislative bodies in the various countries must still appropriate funds for actual construction before the project can move forward. The Parties still hope to begin construction in 2006, with completion in 2014.

Fusion Research in China Summarized

Fusion research in China started at the end of the 1950s, marked by the establishment of the fusion research department at the Institute of Atomic Energy of China, now called The Southwestern Institute of Physics (SWIP) and affiliated with the China National Nuclear Company (CNNC). SWIP is located in Chengdu, Sichuan Province.

A medium sized tokamak, HL-1, was constructed during the mid-1970s and upgraded to HL-1M in the 1980s. The results from these experiments formed the basis for fusion research in China.

In parallel, during the 1970s, the Chinese Academy of Sciences initiated a fusion research program and founded the Institute of Plasma Physics in Hefei, Anhui Province in 1978 and set up the Department of Plasma Physics at the University of Science and Technology of China.

By the mid-1980s, several small and medium-sized tokamaks had been built and a stable fusion research workforce had been established. While science research was carried out at these two institutes, fusion technologies and associated products were developed in industries and factories. A focused technology effort was initiated in March 1986 through the development and implementation of the Project of Fusion and Fission Hybrid Reactor R&D, resulting in accomplishments in the areas of tritium handling, heating and current drive and the design of advanced tokamak fusion reactors.

China's first superconducting tokamak, HT-7, was built in 1994, through collaboration with the Russian Federation. and experiments have been ongoing since then. In March 2003, a repetitive plasma discharge of longer than one minute was achieved in this experiment. Another tokamak, HL-2A, acquired from Germany, began operation in late 2002 at SWIP. A new superconducting experiment is under construction, with operation expected to begin in 2005.

During the past 30 years, hundreds of fusion scientists and engineers from China have been sent around the world to study and to exchange fusion research know-how, particularly by participation in the experiments TFTR (in the U.S.), JET (in the U. K.) and JT-60 (in Japan). Within China there is a great deal of interest in fusion among students, as well.

The above report is drawn from a report written by Kaihui He and Changchun Yang of the ITER China Office and published in the November 2003 ITER ITA Newsletter. Copies of the ITER ITA Newsletters may be requested from C. Basaldella: c.basaldella@iaea.org

Energy Options for the Future Discussed

A meeting was held March 11-12, 2004 at the U. S. Naval Research Laboratory to discuss Energy Options for the Future. The meeting was coordinated by Steve Obenschain (Head, Laser Fusion Program, US Naval Research Laboratory) and John Sheffield (Director Emeritus, Joint Institute for Energy and Environment, University of Tennessee). The talks, presented by experts from many fields, have been posted at http://other.nrl.navy.mil/EnergyOptions/

In addition to opening remarks by Obenschain and a talk on Energy Projections by Sheffield, the papers were presented by David Conover (Director, Climate Change Technology Program, US Department of Energy), Rita Bajura (Director, National Energy Technology Laboratory), David Greene (Corporate Fellow, Oak Ridge National Laboratory), Marilyn Brown (Director, Energy Efficiency and Renewable Energy, Oak Ridge National Laboratory), Eldon Bos (Director, Energy Analysis Office, National Renewable Energy Laboratory), Kathryn McCarthy (Director, Nuclear Science and Engineering, Idaho National Energy and Environment Laboratory), David Christian (Senior VP, Dominion Resources, Inc.), Gerald Kulcinski (University of Wisconsin), and Stephen Dean (President, Fusion Power Associates).

A major theme of the meeting was the international character of all the issues, including the relationships between energy sources, social stability, and economic security. Climate change issues were also a common theme of the discussions of the various energy supply options.

One major concern expressed was that, though there is not currently a lack of energy resources globally, these resources are unevenly distributed and, as used today, cause too much pollution. Another concern is the estimated trillions of dollars of new capital investment that will be required in the relatively near future, where this capital will come from, and how it will be made available in those geographical areas most in need.

Sheffield noted that world population is expected to grow from around 6 billion today to around 8-14 billion by the end of the century and that an increase in per capita energy use will be needed to raise the standard of living in the countries of the developing and transitional parts of the world. He noted that a shift has already begun, from a situation wherein the majority of Mid-East oil used to go to Europe and the U.S., to a situation where today 60% of that oil is going to Asia. "The requirement to reduce carbon emissions to prevent undesirable changes in the global climate will have a major impact on the deployment of energy sources and technologies," Sheffield said.

Technological progress was noted on many fronts, including reductions in pollution from fossil sources, improved economics of unconventional oil recovery, enhancements in energy efficiency, improved economics of renewable energy sources, improved designs of nuclear power plants, and the potential for fusion power.

David Conover noted a U. S. Climate Change Technology Program document, "Research and Current Activities," which he said discussed the $3 billion being spent in the U.S. on all areas relevant to climate change. He said this was distributed approximately as follows: Energy Efficiency (34%), Deployment (17%), Hydrogen (11%), Fission (10%), Fusion (9%), Renewables (8%), Future Generation (8%), and Carbon Sequestration (3%). He said that power production today is dominated by fossil fuels: 51% coal, 16% natural gas, and 3% petroleum.

Energy Costs Rising Rapidly

The Potomac Electric Power Company (PEPCO), in an April 2, 2004 letter to its Washington, DC area customers, notes that over the past four years fuel prices have risen sharply, including a 46% rise in the price of natural gas, a nearly 70% rise in the price of oil, an almost 60% rise in the price of gasoline, and a nearly 82% rise in the price of coal. Most electricity in the U.S. comes from coal, with a growing percentage coming from natural gas.

Noting that fuel is only one element in the cost of electricity, the other substantial cost being transmission, PEPCO states they expect the average total price their residential customers pay for electricity (including supply and delivery) will increase approximately 16% this year.

Sleeper Comments on Energy Crisis

The following is a "Counterpoint Editorial" written by Dr. Arthur M. Sleeper for the Greensboro (NC) News and Record, April 14, 2004. Dr. Sleeper was an important member of the U. S. government's fusion office during the energy crisis years of the 1970s. A Ph.D. physicist by training at that time, Dr. Sleeper left the fusion program and went to medical school after his wife, Renata, died of cancer in 1983. He now is medical director of the Ravenel Oncology Center at Memorial Hospital in Martinsville, VA. He can be reached at ASONC@kimbanet.com

Counterpoint: World Production Crisis Looms
April14, 2004
By Arthur M. Sleeper

The recent increase in gasoline prices to record levels may herald the most serious problem of our age: We are running out of gas. A new book by that title, "Out of Gas," written by physicist and CalTech vice provost David Goodstein, develops the case for an impending crisis in oil production.

In the 1950s, geophysicist Marion King Hubbert, using three statistical methods, predicted that oil production in the United States would peak by 1970. Although not well received at that time, his forecast, known as "Hubbert's peak," proved accurate. U.S. oil production peaked in 1970 at 9 million barrels per day and has declined since to the present 6 million barrels per day.

Applying these methods to world oil production, a worldwide Hubbert's peak is predicted within the next several years. Goodstein notes that shortly thereafter the widening gap between production and consumption will result in worldwide inflation as competition for limited oil reserves intensifies. Ultimately, as worldwide energy stocks are depleted, our modern lifestyle could revert to that of the 18th century. Goodstein further notes that such a society, without fossil or nuclear energy, could only support 5 percent of the current world population.

How to avoid this impending crisis? Goodstein does not offer much comfort. Our options include coal, which is dirty and CO2-producing; nuclear fission, which is potentially dangerous; and solar energy, which is diffuse and expensive. The advertised hydrogen economy, he correctly notes, is only a storage battery; a primary energy source is required to separate hydrogen from water.

Solutions must come from two areas. The first, longer-term solution is greatly increased funding for controlled thermonuclear fusion. This is the worldwide program to produce energy by the fusion of isotopes of hydrogen. The energy source is unlimited and the process relatively clean. Unfortunately, the program has been starved for funds, and only recently has the United States rejoined an international consortium to build an experimental reactor.

The second, more immediate solution is a major effort in conservation. This will require an adjustment to smaller, fuel-efficient automobiles, smaller homes in urbanized settings to lower heating and cooling costs and reduce commuting times, and mass transportation. Given the fragility of our political institutions, a major change in national expectations will be necessary to negotiate the transition on a time scale to avert catastrophe.

Crisis Coming in Computational Science?

In the keynote address entitled "The Coming Crisis in Computational Science" to the IEEE International Conference on High Performance Computer Architecture, February 14, 2004 in Madrid, Douglass Post (Los Alamos National Laboratory) warned that computational science faces three major challenges: "The Performance Challenge," "The Programming Challenge," and "The Prediction Challenge." He said, "As a community we are meeting the first challenge ... but are not doing as well with the other two challenges . . . ."

Post notes the exponential growth in processor speed and the advent of massive parallelization, resulting in increased computing power by thirteen orders of magnitude since 1945, but comments "However, the complicated architectures of these new platforms have made programming more difficult" and "Furthermore, much of the improved predictive power has been achieved by increasing the complexity of the application models and algorithms." The latter, he said, "has raised the level of the challenges associated with developing and using the large, complex computer codes." He said,

"Many, if not most application codes achieve only a small fraction of the potential peak performance."

Post also said, "With regard to the Prediction Challenge, computational science does not have the predictive reliability of traditional methodologies such as theory, experiment and engineering design. The results of many major computer applications are often wrong or are misinterpreted, sometimes with disastrous consequences." "Computational science must mature as a field if it is to become a reliable methodology for addressing important problems," he said.

For further information, or to request a copy of his paper, contact Doug at post@lanl.gov

Award Nominations Sought

The International Standing Committee (ISC) for the International Symposium on Fusion Nuclear Technology (ISFNT) has approved an award for Outstanding Technical Contributions to the Field of Nuclear Technology (FNT). This award will be presented for the second time at ISFNT-7 in Tokyo in May 2005. The deadline for the nominations is 1 October 2004.

The tiitle of the award is the Miya-Abdou Award for Outstanding Technical Contributions to the Field of Fusion Nuclear Technology (FNT). The award title is abbreviated as MA-FNT Award.

The award aims at acknowledging outstanding technical contributions to the field of Fusion Nuclear Technology at a young age. The technical contributions can be in any field that is within the scope of ISFNT. The award is intended for scientists and engineers at age 40 or younger.

The winner of the award will receive $ 5000 (five thousand) and a certificate plaque briefly citing his/her principal achievements.

The nomination can be made by any individual. The nomination package must have:

1. A nomination letter with adequate documentation of the nominee's technical contributions and accomplishments. The nomination letter must briefly summarize the principal outstanding accomplishments of the nominee. The nomination must certify that the nominee is at 40 or younger at the time of the nomination.

2. Three (or more) letters from other scientists supporting the nomination.

All nomination packages must be submitted electronically via e-mail to Dr. Charles Baker's e-mail address: cbaker@ucsd.edu.

The deadline for receiving nomination packages is 1 October 2004.

Bob Card Leaves USDOE April 18

In a surprise move, the U.S. Department of Energy (USDOE) announced that UnderSecretary of Energy Robert Card left the department April 18. Card had recently been very visible on "The Hill," testifying before Congressional committees on the USDOE's Fiscal Year 2005 budget requests. Card also chaired the December 20, 2003 "ministerial meeting" which was unable to reach agreement on a site for the ITER international fusion engineering test reactor project. With his industrial and engineering background, Card also had been a modest counterbalance to the Administration's penchant for casting the U.S. fusion effort as a "science" program with no engineering development component. The U.S. government currently views ITER as a "burning plasma physics experiment," whereas the other ITER Parties (Europe, Russia, China, Korea and Japan) view ITER primarily as a fusion engineering test reactor stepping stone to a fusion power plant. In a statement, Card said "I had planned from the beginning to serve the full term, but pressing family issues overtook my plans early this year."

The USDOE also announced that David Conover will take over Card's responsibilities for DOE's "climate change portfolio." Conover, who is Senior Policy Advisor in the Office of the Secretary of Energy, recently participated in an "Energy Options for the Future" meeting at the U.S. Naval Research Laboratory. In his talk, Conover indicated that fusion was an important part of the USDOE's long range plan for dealing with climate change. The Office of Management and Budget reportedly asked Conover to remove fusion from his list of climate change technologies, citing that fusion was just a science program. Conover reportedly refused to do this. The role of fusion in the US climate change portfolio is posted at http://www.climatetechnology.gov

Calendar

May 17-20 13th Joint Workshop on Electron Cyclotron Emission and Electron Cyclotron Resonance Heating. Nizhny Novgorod, Russia. http://www.ec13.iapras.ru

May 24-28 16th International Conference on Plasma Surface Interactions in Controlled Fusion Devices. Portland, Maine. http://www.psfc.mit.edu/psi16

May 25-28 Innovative Confinement Concepts Workshop (ICC2004). Madison, Wisconsin. Contact: hooper1@llnl.gov

June 7-11 2004 International Symposium on Heavy Ion Inertial Fusion. http://nonneutral.pppl.gov/HIF04

June 13-17 2004 International Congress on Advances in Nuclear Power Plants. Pittsburgh, PA. http://www.ans.org/goto/icapp04

June 14-17 21st Symposium on Plasma Physics and Technology. Prague, Czech Republic. http://aldebaran.feld.cvut.cz/sppt/

June 20-25 International Workshop on Chaotic Transport and Complexity in Fluids and Plasmas. Carry leRouet (Marseilles), France. Contact: jdurand@up.univ-mrs.fr

June 28 – July 1 Thirty-first IEEE International Conference on Plasma Science (ICOPS2004). Hyatt Regency, Baltimore, Maryland. Contact: commisso@suzie.nrl.navy.mil

June 28 – July 1 35th AIAA Plasmadynamics and Lasers Conference. Portland, OR www.aiaa.org/calendar/index.hfm?cal=1

June 28 – July 2 31st European Physical Society Conference on Plasma Physics. Imperial College, London. http://www.fusion.org.uk/eps2004

July 5-9 5th International Conference on Open Magnetic Systems for Plasma Confinement. Novosibirsk, Russia. http://0s2004.inp.nsk.su

July 26-27 U. S. Fusion Energy Sciences Advisory Committee Meeting. Gaithersburg, Maryland. Contact: albert.opdenaker@science.doe.gov

Sep 13-18 10th International Conference and School on Plasma Physics and Controlled Fusion. Alushta (Crimea), Ukraine. Contact: garkusha@ipp.kharkov.ua

Sep 14-16 16th Topical Meeting on the Technology of Fusion Energy. Madison, Wisconsin. http://fti.neep.wisc.edu/tofe

October 25-29 12 International Congress on Plasma Physics. Nice, France. http://www-fusion-magnetique.ces.fr/ICPP2004/

Nov 1-6 20th IAEA Fusion Energy Conference. Tivoli Marinotel, Vilamoura, Portugal. http://www.cfn.ist.utl.pt U.S. Participants contact: steve.eckstrand@science.doe.gov