Public Interest Report

60th Anniversary

THE FEDERATION OF AMERICAN SCIENTISTS Volume 59, Number 1 Winter 2006

SPECIAL 60TH ANNIVERSARY ISSUE

COMMENTS ON THE 60TH ANNIVERSARY OF FAS

By Henry Kelly, President, Federation of American Scientists

In his welcome address, Henry Kelly touches on the events leading up to the founding of the Federation of Atomic Scientists on 1 November 1945. His remarks are on page 5.

HANS A. BETHE AWARD

Steve Fetter, recipient of the Hans A. Bethe Award, suggests that the United States voluntarily disarm itself of nuclear weapons to regain the moral and legal authority to enforce a global prohibition of nuclear weapons. Read more of his insight into the future of U.S. nuclear policy in his acceptance speech on page 11.

SOME RUMINATIONS ON THE NUCLEAR ARMS RACE

By Carl Kaysen, Ex Officio member of the FAS Board of Directors, and Deputy Special Assistant for National Security Affairs under President John F. Kennedy

Carl Kaysen explains what led to the nuclear arms race between the United States and the former Soviet Union on page 16.

About FAS

The Federation of American Scientists (FAS), founded on 8 December, 1945 as the Federation of Atomic Scientists by Manhattan Project scientists, works to ensure that advances in science are used to build a secure, rewarding, environmentally sustainable future for all people by conducting research and advocacy on science public policy issues. Current weapons nonproliferation issues range from nuclear disarmament to biological and chemical weapons control to monitoring conventional arms sales and space policy. FAS also promotes learning technologies and limits on government secrecy. FAS is a tax-exempt, tax-deductible 501(c)3 organization.

FAS
PUBLIC INTEREST REPORT

Winter 2006, Volume 59, Number 1

ADDRESS SERVICE REQUESTED

FAS Public Interest Report

FAS Public Interest Report,
USPS No. 188-100
is published quarterly at:

1717 K Street, NW, Suite 209
Washington, DC 20036.

Periodicals postage paid at
Washington, DC

POSTMASTER:
SEND ADDRESS CHANGES TO

FAS Public Interest Report
1717 K Street, NW, Suite 209
Washington, DC 20036

Annual subscription is $25/year.

Archived FAS Public Interest Reports are available online at www.fas.org

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PRESIDENT'S MESSAGE

From its origins, the Federation of American Scientists has worked both to advance technologies that its members felt could meet critical public goals — in 1945 they worked to promote research of civilian nuclear power — and to block dangers created by scientific advances that scientists were in a unique position to understand. In 1945, the challenge was proliferation of the technology of atomic weaponry. Our anniversary forced us both to reflect on the successes and failures of our organization's work over the course of 60 years and assess how our community can be most useful in the future.

It's painful that the dangers of nuclear proliferation continue to increase in spite of the prescient alarms raised by the FAS founders in 1945. Nuclear weapons tested by India and Pakistan, the unknown extent of the damage done by A.Q. Khan's bake sale on nuclear secrets, a hidden North Korean program for enriching uranium and separating plutonium, and the potential for large-scale enrichment in Iran point to a dangerous future. And there is increasing likelihood that the number of nuclear power plants will greatly expand in the coming decades with an accompanying increase in uranium enrichment facilities.

The only possible mechanism for reducing these dangers is skillful and aggressive diplomacy and a clear signal that the U.S. is willing to consider dramatic changes in its own nuclear posture. In fact, negotiations are dangerously stalled in no small part because of U.S. contempt for international institutions. Efforts to persuade non-nuclear nations to show forbearance are undercut by the U.S. pursuit of new nuclear weapons for its own uses. In his speech accepting this year's Hans Bethe award, reprinted in this issue, Steve Fetter makes a convincing case that only a clear U.S. offer to eliminate its nuclear arsenal would be dramatic enough to break this disastrous impasse.

While the threat of nuclear proliferation will obviously remain a major part of FAS' work in the coming decade, we've expanded our work over the years to cover new areas of concern. The U.S., and the world, are beginning to realize that the war on infectious diseases is far from won, and a major worldwide outbreak of flu or other epidemic could be catastrophic. This risk, coupled with concern about malicious development of biological agents, is the focus of a major new FAS program. Steve Aftergood continues his relentless pursuit of openness in government — a pursuit made increasingly important by the torrent of new Bush Administration programs designed to protect government information from public scrutiny. Matt Schroeder forcefully reminds us that most people killed by terrorists and rogue combatants are killed by conventional weapons. His work to curtail illicit trafficking in conventional weapons remains essential.

The future is also clouded by the threats of massive changes in climate driven by unchecked emissions and global instability urged by competition over shrinking supplies of inexpensive energy. We've put considerable thought into where FAS can make a unique contribution in this important area and chose to focus on a little-explored technology that can have a major impact on U.S. and world energy use — composite materials for residential and commercial construction. The goal is to design products that will be immediately attractive to the market without subsidies because they are safe, attractive and less expensive than alternatives. The research is obviously not a substitute for critically needed international agreements on climate or for a real national energy policy, but our research could lead to major reductions in energy use and emissions while agreements on carbon tracing and other measures move painfully ahead.

We've also launched a major new program in information technology focused on an area where a neglected field of research could pay huge dividends: Learning Technology. We've collaborated with leading corporate and academic researchers to define the need for a stronger learning technology research program and have worked hard to secure passage of legislation supporting the concept introduced with bipartisan support in both the House and Senate. One of the best ways to understand research needs in this complex field is to try to build functioning systems. We're well on our way in learning tools designed for three quite different subject areas and targeted age groups. These projects will be the focus of the next issue of the PIR so I won't dwell on them here at length.

As you have undoubtedly noticed, we're also celebrating our 60th year with a new format for the Public Interest Report. The PIR is designed to serve our members with a mixture of substantive articles and news about the organization itself. You'll notice a number of changes. Printing technology has advanced to the point where full color images are affordable. We've changed the layout of the report to make it easier to find topics of interest. There will always be a letter from the President on the second page. In future issues the letter will deal with an urgent topic in science and policy. As always, the PIR will continue to be available through the FAS website.

5 DECEMBER 2005

BOARD OF DIRECTORS MEETING

By Monica Amarelo

In December, the FAS Board of Directors met to review recent developments and share thoughts on the future direction of the Federation at the National Press Club in Washington, DC.

FAS President Henry Kelly opened the meeting with the Independent Auditor's Report for fiscal year 2005 (July 2004 through June 2005), which received the highest opinion allowed by the AICPA, and a brief financial summary that illustrated positive financial growth for the year.

During the meeting, FAS Board Members took a special interest in the *Digital Opportunity Investment Trust* (DOIT) legislation. The Board wants to mobilize efforts with a letter writing campaign to Congressional representatives. Board Members Larry Grossman and Lee Fikes are already involved with the **Digitalpromise.org** campaign.

The Board also unanimously approved the nomination of Nathanial "Nat" Goldhaber to serve a three-year term as a member of the Board of Directors. Goldhaber brings to the Board two decades of experience as an investor and executive in Silicon Valley. Before co-founding Claremont Creek Ventures, he was most recently the founder and CEO of Cybergold, Inc., an internet marketing and payment system which went public in 1999 and was ultimately sold to United Airlines. In 1991, he became the founding CEO of Kaleida Labs, a multimedia joint venture between IBM and Apple Computer. In 1984, he founded Centram Systems West — also known as the Transcendental Operating System (TOPS) — a local area networking company which he sold to Sun Microsystems. TOPS allows for the transparent file sharing among Macs, PCs, and Unix machines using the AppleTalk protocol. Goldhaber holds a master's degree in education and is an emeritus member of the Executive Board of the College of Letters and Science at the University of California, Berkeley.

Board members were asked to provide FAS with names of candidates to fill the eight vacant positions on the Board of Directors. FAS staff will forward a list of names with biographical data of the nominations prior to the next Board Meeting in June 2006.

Ivan Oelrich, Vice President of the Strategic Security project at FAS, provided an overview of the FAS 60th Anniversary Event held on 30 November 2005, at the National Press Club. Congressman Edward Markey of Massachusetts spoke during the Awards Luncheon which honored Steve Fetter, Dean of the School of Public Policy at the University of Maryland, with the *2005 Hans Bethe Award.*

Henry Kelly, and Board Members Eamon Kelly and Art Rosenfeld reported on the activities of the FAS *Housing Technology Project.* Board Members emphasized the need for a campaign to better link the housing technology program with the FAS mission. Specifically, Chair Tara O'Toole suggested that the FAS staff consider how the housing technology links with climate change and global warming.

At lunch, keynote speaker Nils J. Bruzelius, Deputy National Editor of Science for *The Washington Post,* spoke at length on the state of science communications. He opened by stating that news staff reductions and buyouts are common. Two important developments — a decline in circulation and competition for the circulation dollars — hit at the home of ambitious science journalism in the United States.

During the golden age of science reporting in the 1980's, roughly 100 papers devoted at least one page, if not an entire section, to science news coverage. Today, science sections are undermined by advertising and see huge competition from the internet.

With the exception of *National Public Radio* (NPR), the only mass media with an increase in audience, broadcast news audiences are down. And although there has not been a diminution of interest over the years, when newsrooms feel the budget squeeze, science coverage gets cut.

Bruzelius concluded that, "The Bush administration has done more in the way of controlling access than any other. It's much more difficult than it used to be when you call government agencies. When a reporter calls an agency or a scientist for an interview, the call gets bounced to senior public relations personnel."

The meeting closed with a presentation by Steve Aftergood who reported that more than 15.6 million classification actions were performed as confidential, secret or top secret, and 4,000 individuals in the executive branch have authority to classify documents as secret.

One emerging problem is a lack of procedures for eliminating restrictions on unclassified information.

The FAS uses the *Freedom of Information Act* (FOIA) as a channel to alter the reality of government secrets. Aftergood tries doing things that others aren't already doing. FAS makes secrecy a high profile issue.

One major FOIA coup occurred this past year. For the first time, a federal court ordered the Central Intelligence Agency to disclose budget information. The *Government Secrecy* project learned that in 1963 the budget for the CIA was $500 million.

There is a consensus that information policy within the government is broken. Aftergood concluded that there is increasingly bipartisan support for secrecy policy and open government.

Board members should forward their nominations to Jeff Aron via email at **jaron@fas.org.** We thank all of the FAS Board of Directors for their time and continued support, and look forward to working with them throughout the year.

FAS

Then and Now

By Monica Amarelo

Courtesy of Michael Light

The Federation of Atomic Scientists (FAS) announced its formation and released its first newsletter on Capitol Hill on 1 November 1945. FAS's members were associations of atomic scientists at national laboratories such as Los Alamos, Oak Ridge, Chicago, who organized themselves to help the United States understand the problems of atomic energy on which they were the most expert.

The group immediately opposed the May-Johnson bill — legislation designed to maintain military control over nuclear research. FAS supported international control of atomic energy and civilian control inside the United States. Members helped to draft and shape the McMahon bill, which created the Atomic Energy Commission.

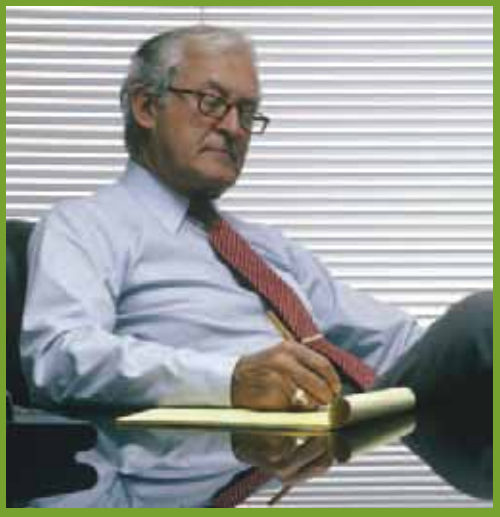
William Higinbotham, the Chairman of the Association of Los Alamos Atomic Scientists (ALAS) became the first Chairman of the FAS, and six months later served as its first Executive Director. By 8 December 1945, a constitution was drafted and the group was officially renamed the **Federation of American Scientists** to allow other scientists to join the organization.

At the time, more than 3,000 scientists became members and paid dues of $5 per year. They supported the Baruch Plan to educate Americans on issues of nuclear energy, such as the tests performed at Bikini. They sought to prevent secrecy at universities and to declassify information that during World War II was considered top secret. FAS members pioneered communications with Russian scientists of common concern.

The organization and its members were active in the debate as to whether science was to be used for the preparation of war or to advance cooperation for peace.

Items that appeared in the first FAS Newsletter included a section titled the *Legislative Scene* devoted to updates on military personnel who favored military control of the McMahon Committee. At the time, spy hysteria and government propaganda threatened the genuine civilian control of atomic technology. Meanwhile, FAS members such as Philip Morrison and L.N. Ridenour testified before Congress on the impossibility of achieving security through secrecy.

FAS



CALL FOR ARTICLES

Attention FAS Members

In our continuing effort to provide the FAS community with timely articles about national security policy, learning technologies and other areas of science and technology policy, we are inviting members to submit proposals for articles (maximum of 1,000 words). Selection of articles is at the discretion of the Editor and completed articles will be peer-reviewed.

Please provide us with your full mailing address, including email in all correspondence.

Proposals should be sent to:

Editor, PIR, Federation of American Scientists
1717 K Street, NW, Suite 209
Washington, DC 20036
or email to press@fas.org.

Remarks by Henry Kelly, President, Federation of American Scientists at the FAS 60th Anniversary Symposium at the National Press Club in Washington, DC on Wednesday November 30, 2005.

Ivan Oelrich, Vice President of Strategic Security for FAS, and Zeynep Gueven, Research Assistant at FAS, contributed invaluable historical research for this article.

Comments on the 60th Anniversary of the Founding of the Federation of American Scientists

When the Pacific War finally ended with Japan's formal surrender on September 2, 1945, it was a euphoric moment. Science and engineering had played essential roles in that victory. Radar, code-breaking electronic computers, heavy bombers, cathode ray tubes, and a blizzard of other inventions had changed the nature of conflict forever. But it was the atomic bomb that dominated discussions that fall. An invention that could, in an instant, obliterate a city and a hundred thousand lives forced issues that had been discussed in private into plain view. Did the species that had the intellectual power to create such things also have the wisdom to use this power wisely? And specifically, did the people who created the weapons carry a special obligation to ensure that wisdom was exercised?

It was these questions, and these discussions, that led directly to the formation of the *Federation of American Scientists.*

The discussions that led to FAS actually began before the war ended. As the *Manhattan Project* team began to realize that their work would actually succeed, they began to consider the implications, not just for the on-going war, but for the world *after* the war. The scientists at Chicago were the first to become involved, in part for the simple reason that their duties were declining just as the activity at Los Alamos was reaching a climax.

In June of 1945, Nobel Laureate James Franck, working at the Metallurgical Laboratory, or "MetLab", at the University of Chicago, formed *The Committee on Social and Political Implications.* Franck, a German speaker, was never comfortable in English so he turned to a colleague, Eugene Rabinowitch, to help with drafting his ideas.

The resulting *Franck Report* argued against using the bomb on Japan specifically because of the effects it would have on the post-war attitudes about the bomb. Franck thought use of the weapon would cut off all chance of controlling it and spark a global arms race. Franck personally delivered his recommendations to Secretary of War Henry Stimpson. The recommendations were obviously not taken. Years later, Rabinowitch said, "I remember very vividly the feeling which was certainly shared by Franck and by others that we were surrounded by a kind of soundproof wall so that you could write to Washington or talk to somebody but you never got any reaction back..." Rabinowitch and others were determined to become more effective politically and he went on to become the founding editor of the *Bulletin of the Atomic Scientists.*

The first meeting of the whole Committee on Social and Political Implications, attended by nearly all of the MetLab scientists, took place the day after the Hiroshima bombing. The Committee renamed itself the Atomic Scientists of Chicago.

Scientists at the Clinton Laboratory at Oak Ridge felt most cut off from the big picture during the war, but were in the forefront of scientists organizing after the war. They formed the Association of Oak Ridge Scientists.

Comments on the 60th Anniversary of the Founding

On August 30, five hundred people from Los Alamos congregated in one of the theaters and formed the Association of Los Alamos Scientists. The notes of that meeting do not reveal whether they picked the name because of the acronym, "ALAS", but comments make clear that they were aware of the ironic title.

Substitute Alloy Materials, or "SAM", lab scientists, at Columbia University, met on 10 October and drew up a constitution for the Association of Manhattan Project Scientists, New York Area. So yes, there were, indeed, Manhattan Project scientists actually working in Manhattan.

These groups sprang up spontaneously with little or no coordination. During the war security was so tight that most scientists had little knowledge about other parts of the Project or where they were located. Compartmentalization was so rigid that a group of scientists and engineers at Oak Ridge, working at a facility called Y-12, formed the Atomic Production Scientists of Oak Ridge, completely unaware that the Association of Oak Ridge Scientists had already formed. These movements, arising and working independently, developed a remarkably consistent set of objectives.

Los Alamos, Chicago, Columbia, and Oak Ridge representatives met on 31 October and on 1 November. The groups held a press conference in the office of Senator Mitchell of Washington to announce the formation of the Federation of Atomic Scientists.

Robert Maynard Hutchins, President of the University of Chicago, played a critical role at the beginning of the effort. Deeply concerned about the consequences of the atomic bombings, he gave $10,000 from the University's special educational funds to the Atomic Scientists of Chicago, including — importantly for our story — $1000 to establish a Washington office.

The first office space of the Federation of Atomic Scientists was loaned by another organization at 1018 Vermont Avenue. Austin Brues from Chicago wrote in a letter that "The office consists of a small room which houses a desk, telephone, an ancient and noisy typewriter, an inadequate number of chairs, the *World Almanac,* a telephone book, and $20 worth of newly purchased stationery supplies."

A couple of weeks later, another visitor, Beirne Lay, noted in a memo that the office now included a second typewriter, bottles of aspirin and bicarbonate of soda in the bathroom, but still had only one chair; the secretary had the chair and scientists apparently sat on the floor surrounded by copies of speeches and the *Congressional Record.* While all FAS staff now have chairs, I have to admit that there are still bottles of aspirin and antacids next to the sink in the kitchen.

On 10 November, Willy Higinbotham visited Washington from Los Alamos as the ALAS representative to the Federation of Atomic Scientists.

From his first day, Higinbotham envisioned a larger group, one that would include others in addition to the *Manhattan Project* atomic scientists.

Partly this was a response to the members themselves.

Everyone realized that with the end of the war, the *Manhattan Project* labs would be at least partially demobilized. Some of the atomic scientists would not, in fact, meet the strict definition of "atomic scientist" in a few months, as they returned to their old civilian jobs. But they still wanted to be politically involved. Higinbotham also wanted to create a broader-based political organization. Up to this point, the Federation of Atomic Scientists had influenced Congress primarily though meetings with individual members. Higinbotham saw a need for a wider lobbying effort.

On 7–8 December 1945, Higgenbotham's views prevailed. The various atomic scientist groups, and a few other newly-formed groups of politically active scientists, met in Washington and announced the formation of the Federation of American Scientists. We are meeting today to celebrate the sixtieth anniversary of this event.

The *Manhattan Project* had been a military project. Many

politicians and military leaders believed that the United States had the "secret" of the atomic bomb and could exploit it for military advantage. The atomic scientists realized that there was no "secret". Other countries would soon be able to develop nuclear weapons, leading to a nuclear arms race. They were convinced that the solution was greater openness in nuclear research, transparency, and international control of nuclear materials. Thus, the Federation had two immediate political objectives.

The first was to assure civilian control of nuclear research and even development of nuclear weapons. Immediately after the war, the War Department drafted what was called the May-Johnson bill that would have made all

of the Federation of American Scientists – *Cont.*

nuclear research a military activity under strict rules of secrecy and security. The Federation lobbied hard, and ultimately successfully, for the defeat of May-Johnson and for passage of the competitive bill, the McMahon bill, that set up a civilian agency to support research in nuclear physics. It is because of this decision sixty years ago, that nuclear weapons research is now in the Department of Energy and not the Department of Defense. This was part of a larger debate in which FAS was an important player: scientists lobbied hard to create a National Science Foundation to ensure a source of funding for science that was independent of the much larger military research budget.

The second political goal was to find a way to safely use nuclear technology to support civilian energy by putting the nuclear fuel cycle under some form of international control. Many of the atomic scientists who had worked on the world's most damaging weapon, were driven by a desire that their work could also contribute to a better world. They wanted the Atomic Energy Commission to support technology that could make Atomic power a source of inexpensive electric power. This curious amalgam of a civilian energy research program and a highly secretive program for developing and testing atomic weapons lives with us today as the Department of Energy.

It was apparent from the beginning, however, that the technology of civilian nuclear power and the technology of atomic weapons were intimately linked. A key technology for making weapons — separating the isotope U235 from uranium ore — was also central to producing the fuel for nuclear power plants. No one was able to imagine a technical way to operate a civilian nuclear power industry in a way that did not run the risk of building an infrastructure that could also be used to build weapons. Protections would have to come from unique security arrangements.

FAS supported the *Acheson-Lilienthal Report,* which called for information sharing with the world, including the Soviet Union, international inspections and control of nuclear materials including weapons, and rapid nuclear disarmament. The atomic scientists had good personal relations with David Lilienthal, the head of the Tennessee Valley Authority and co-author of the report. The Truman administration, however, made significant revisions. The plan finally presented to the UN by Truman's representative Bernard Baruch, proposed to give the U.S. a nuclear monopoly until it was satisfied that failsafe inspection and monitoring systems were in place. This early unilateralism did not fare well at a time when Cold War tensions were growing. International control of nuclear materials had to wait decades, until the Non-Proliferation Treaty.

It's a bit disappointing to realize that the two issues that drove the founding of FAS are still very much before us in one form or another. And these two issues: the proper management of nuclear weapons, and the need for a strong international mechanism to manage nuclear fuel cycles, will be the focus of today's discussion. We have an extremely distinguished panel of speakers. Most of them have personally experienced much of the brief history of the issues involved, and the experience of the scientists who have tried to influence the debate. I look forward to their comments and to the discussion that will follow.

If it's disheartening to realize that the debate over controlling atomic power is still roiling the international community after sixty years, it's perhaps more disheartening to see that the mechanisms for bringing science and technology advice into national debates are probably worse than they have been in sixty years. The scientific community feels increasingly that its advice is neither sought nor taken seriously when delivered. Key decision-makers take the position that scientists are simply another interest group. This is surely a dangerous situation.

We at FAS, and our friends and members are determined to find better ways to bring the insights of the scientific community into national policy discussions. Over the past sixty years the challenges and opportunities created by science and engineering advances have become inextricably tied with virtually every national policy choice. And FAS as an institution has expanded its scope of work. We are, for example, concentrating intensely on ways to counter the dangers of advances in biological research. And we continue to explore where federal research investment in areas like energy technology, or technology to improve education, could pay huge public benefits.

Scientists do not bring any unique moral force or wisdom to the debate, but they do bring essential insights into where dangers lie and where unexpected and wonderful things can be achieved through scientific advances. They have, in my view, not just a right but a moral obligation to participate in the political process.

I'm delighted that we have today a number of scientists who have lived up to this obligation in spectacular ways over the years. I hope that they inspire a generation of scientists who will carry the flag forward for another 60 years. **FAS**

Remarks by Edward Markey (D-MA) at the FAS 60th Anniversary symposium at the National Press Club in Washington, DC on Wednesday November 30, 2005.

Thank you very much, Henry, for inviting me here, and to Tara and to Ivan, who is the affirmative action, non-Irish scientist at the table, which is a new phenomenon by the way. And I thank all of you for inviting me here today. It's a great honor to participate in this incredible event. The Federation of American Scientists, right from the dawn of the nuclear age, has played a very important role in having our country and the world debate this tension that exists in a technology, which on the one hand has the capacity to provide enormous technological benefits across the whole of society and on the other, simultaneously, the capacity for great destruction.

My introduction to this issue actually began when Ted Sorenson was President Kennedy's right-hand man in the White House. I was a sophomore at Malden Catholic High School in 1962. And like any other overachieving sophomore in high school, I had to enter the science fair, even though I had no scientific ability at all.

Now at this time, Linus Pauling was making an argument that was resonating throughout the world, but I was unaware of it.

The overachieving sophomore, having no idea as to what should be the subject of his science project, turned to his father — who drove a truck for the Hood Milk Company in Boston — and said "Pop, what should I do my science fair project on?"

He said, "I have no idea."

As a graduate of Lawrence Vocational High School, he had no idea about what it should be. So, he said, "Why don't I take you over to the Hood Milk Company Laboratories?"

I spent an afternoon over there as the scientists in this huge laboratory in Charlestown, Massachusetts, were trying to figure out how, in addition to homogenization and pasteurization, they were going to add a third process — strontium-90 removal.

As the U.S. and U.S.S.R. were detonating these nuclear weapons, the clouds were capturing the fallout, carrying it hundreds of thousands of miles; and when it rained, it brought the particulates down into the soil, into the grass. The cows were eating the grass and ultimately, the children were drinking the milk.

Linus Pauling felt this was a huge public health crisis. And the Hood Milk Company was responding to it.

Well, I brought home their entire project and showed it to my father, who as a graduate of Lawrence Vocational High School, had enormous ability to construct things. The dirty little secret of all these science fair projects is that no one actually builds them alone. Your mother or father are helping you when you're a kid. So in the basement, on the last night, until 4:00 in the morning, my father was constructing this three-tiered strontium-90 removal system with tin cans and pipes along with a demonstration as to how the various acids were going to have this ion exchange that would result in the milk ultimately being drinkable as it came out of the final can.

So I took my project, on a cart, down to Malden Catholic, and set it up. They used to invite nine former graduates of Malden Catholic, who had gone on to MIT or RPI or someplace, to act as three panels of judges. You would explain your project to each group of three and whoever had the highest cumulative grade would win.

I was a sophomore taking biology and I was competing against all the juniors who were already taking chemistry. So, it was me alone against all the juniors. I had no scientific ability at all. I explained my strontium-90 removal process and how it's the key to nuclear non-proliferation in the future; that if we're not going to have a treaty, then we're going to have to have a process to protect children against this public health disaster.

The next day on the front page of the *Malden Evening News,* there's a picture of me explaining the nuclear strontium-90 removal process to my twin brothers, who are one year younger than me. My mother didn't get married until she was 39 and had me and my brothers all in the one year. Irish triplets.

So, there's my picture explaining it to my two freshman brothers. Why? Because twins are always an incredibly attractive photographic opportunity.

So my father comes home. He's sitting there in his t-shirt, opens up the *Malden Evening News* and says:

"Eddie. This is unbelievable. You won the contest, but you put it up backwards. You had the whole thing backwards. You explained this to nine PhDs. Eddie, you shouldn't be a scientist, you should be a politician."

So that's what I've done for my whole career.

And I'm not saying, Ted, that my science fair project was the key, but twelve months later, President Kennedy signed the atmospheric test ban treaty with President Krushchev. But, I like to think that President

of the Federation of American Scientists – *Cont.*

Kennedy and Linus Pauling provided the inspiration that interested young people in these issues, in terms of how to use technology to solve very complex problems.

Today, as we know, this President not only does not know the name of his science advisor, but could not pick him out of a line-up of two people. And that is not a good situation for our country. From climate change to arsenic in water, and a whole litany of other issues, at the top of the list should be nuclear nonproliferation.

Three years ago I had the opportunity to identify a special program in the defense appropriations bill to build a new nuclear bunker buster; a nuclear weapon which could be used in urban areas to accomplish military goals. It had already come out of the defense committee. No one had tried to stop it there. There were no amendments against it. And in the same way that I introduced the nuclear freeze amendment in 1982, along with Senator Kennedy to inspire national debate, I felt that it was important to do so again.

Jeff Duncan, who is my legislative staff director, who is sitting over here, drafted the amendment for me. He has been with me for 20 years. Nicole Gastperini, who is also here, is my science fellow for this year and she is working on these issues. The first year I got 172 votes on the house floor, and that was with no debate, just with FAS and a couple other groups helping to educate people on the issue, but with no other lobbying involved. It was just this quick public education campaign.

The next year, I offered it again and I got 199 votes. Then last year, it went up to 204 votes, but needed 218 to win. At that point David Hobson who is a republican from Ohio joined in. He was a key person. Jack Murtha joined in. He was also a key person. As a result, the money for the nuclear bunker buster has now been taken out of the federal budget. That is a victory for public education.

In other words, all issues go through three phases — education, activation, and implementation. You can't short circuit any one of these phases, but the education phase comes out of the scientific community; when we're talking about all of these concerns. Ultimately, the public accepts the wisdom of what scientists have developed as an argument for the right path to take in a particular area.

And no matter how hard politicians might fight it, ultimately that public consensus wins.

So for me, this is a great honor because this is now my 30th year in the United States Congress. Which is shocking. I am here largely because of the inspiration of John F. Kennedy and Ted Sorensen in the White House telling me as a boy that politics is the noblest profession — if you can animate it with the wisdom of the new frontier, of new issues, so that you accept the change which has to take place in order to benefit all of society.

Actually, I went down to Nicaragua with Ted Sorensen in 1983. He and I traveled there together at the height of the Sandanistas' power. As I was leaving I said to Ted, "I'm going up to Boston and there will be eight cameras waiting for me as I return from Nicaragua. They're going to want to know why their Congressman was in Nicaragua." And he said, "Just say to them: 'Better their Congressman than their son.'"

Either the United States is going to abide by international law and not allow other countries to circumvent it (the nuclear nonproliferation treaty) because of near term need on the part of this administration from their perspective to counterbalance China.

This guy is just so wonderful, as are all of you. It is a great honor for me to be here. My one challenge to you is this:

We now have an issue of a sale of nuclear materials to India. India has not signed the non-proliferation treaty. It does not abide by the nuclear suppliers group conventions.

And yet the President wants to sell nuclear materials to India. I can only tell you that it makes fools out of the other countries that have all signed the nuclear nonproliferation treaty. What is the point?

You cannot preach temperance from a bar stool.

Either the United States is going to abide by international law or not allow other countries to circumvent it because of a perceived near term need on the part of this administration to counterbalance China. That was the same mistake that President Carter made in 1980 when he sold 50 tons of uranium to India. It drove the Pakistanis crazy. They said that if their people had to eat grass and leaves for a generation they, too, would have a nuclear weapon. If we want to be the world's moral and political leader, then we need to maintain our own standards.

So I'm going to introduce a bill to block the sale of uranium, of nuclear materials, to India. They only produce 1% of their electricity from nuclear. That is not why they want it. 70% of their electricity is coal.

If the President was going to make a huge scientific announcement with India, it should have been a multi-billion dollar scientific exchange to give the Indians the most modern technology to mine and burn their coal as cleanly as possible. Because mostly that's what they're going to do for the next hundred years.

Instead, he cuts a deal on nuclear. Which is what the Indians want, unfortunately, in my opinion, to advance their nuclear program. But the repercussions are going to be profound around the whole world.

So we need your leadership on this issue. We need your guidance. And I can tell you that you continue to inspire me.

There is no known instance of an Irishman from Boston voluntarily leaving the United States Congress. I'm staying forever and I need your help.

It's an honor to be here at this great gathering. Thank you so so much.

FAS

Hans Bethe Award

Remarks by Tara O'Toole, Chair of the FAS Board and CEO and Director of the Center for Biosecurity at the University of Pittsburgh Medical Center, and Professor of Medicine at the University of Pittsburgh.

Well, first of all thank you all for being here. This is obviously an important landmark in the history of the Federation of American Scientists.

I'm here today to present the *Hans Bethe Award.*

The Hans Bethe Award commemorates a great scientist and one of the founders of the Federation of American Scientists. During the *Manhattan Project,* Dr. Bethe was the director of the theoretical division of Los Alamos at the heart of the atomic weapons program.

And he later, of course, won a prize; the Nobel Prize in 1967, for his explanation of the mechanism of nuclear fusion in the sun. He also, throughout his life, demonstrated a constant concern for the social and political implications of science and technology, and particularly the security implications of nuclear weapons. He worked constantly to alert the world, the public and the Congress, to the potential dangers of the science which he helped create.

And, I am very pleased today to present the *Hans Bethe Award* to Steve Fetter, who is a superb example of the ideal of putting science in the service of society. Steve is trained as a physicist and is now Dean of the University of Maryland's School of Public Policy, which in itself is quite an achievement in this day and age. He has a remarkable ability not only to wisely address current questions, but to anticipate the question that is going to be on all of our minds tomorrow or the week after.

His career is a prodigious story both in terms of the scope of his interests and the issues which he has addressed, as well as the quality of his work. He has published many seminal papers in a wide variety of fields.

I will just list some. He wrote a very influential book on comprehensive nuclear weapons testing, on verification of nuclear weapons testing bans, on the risks of nuclear fuel reprocessing, as you heard this morning. He wrote some of the first papers measuring plutonium production around the world, and one of the first papers on weapons in space. And of course, he's been very prolific in the context of energy and climate change. Again, you got some glimpse of that this morning.

He has also — people wanted me especially to note — labored long and diligently in that netherworld wherein one strives to make National Academy of Science reports both technically correct and readable. And that is no small thing.

These are the kinds of chores for which one gets little, if any, recognition, but are essential to maintaining the communication of science to the policymakers and to the general public. And, as we all witnessed earlier today, he is an inspired teacher and an articulate explicator of some of the technical and policy complexities which confront us all.

He has also worked on the action side of science policy that Congressman Markey mentioned. He served in both the Departments of State and Defense. He is on the Board of the Arms Control Association, as well as the Advisory Committee to the Arms Division of the Human Rights Watch. He is a member of the Department of Energy's Nuclear Research Advisory Committee and the NAS Committee on International Security and Arms Control.

And he also recently served as the Vice-Chair of the Board of Directors of the Federation of American Scientists.

So Steve, in recognition of your lifetime work and service to your country and to science, it's a great honor to present this award. **FAS**

Hans Bethe Award

Hans A. Bethe co-founded the Federation of Atomic Scientists, now the Federation of American Scientists (FAS), with the belief that scientists had an obligation to participate in the difficult choices that were forced on our country by the extraordinary advances in nuclear physics so vividly demonstrated by the development and use of atomic weapons.

In the sixty years since the founding of the organization, the range and complexity of issues hinging on sound scientific advice has increased.

In 2003, Hans Bethe presented the award to Philip Morrison for his unfailing ethical compass to America's most critical decisions.

FAS presents the **2005 Hans A. Bethe Award** to Steve Fetter in recognition of his outstanding contributions as an advocate for arms control and nonproliferation and for his insightful and rigorous analysis of nuclear energy climate change, and carbon-free energy supply. Dr. Fetter is a former vice chairman of the FAS Board of Directors and the current Dean of the University of Maryland's School of Public Policy.

Photo taken on 19 December 1996, by freelance photographer Michael Okoniewski. The equation on the blackboard is Bethe's "Carbon Cycle" equation for nuclear energy generation in stars.

Acceptance Speech

Acceptance Speech by Steve Fetter, Dean, School of Public Policy at the University of Maryland, College Park

First, I should state the obvious: how incredibly flattering it is to be given an award named for Hans Bethe, for which the previous recipient was Phillip Morrison. I want to assure everyone that I know I'm not in the same league as these giants. But I am very grateful and pleased to accept it. I'm especially proud to have been associated with FAS, and happy to see that it is on such firm footing.

I was asked to give a short talk. And I thought that, as part of my ongoing campaign to ensure that I will never again be asked to work for the U.S. Department of Defense, I'd like to propose that the prohibition of nuclear weapons should be the centerpiece of our nonproliferation policy—indeed, a key element of our overall foreign and defense policy.

You'll recall that, soon after the end of the Cold War, there was much interest in prohibiting nuclear weapons. The Canberra Commission was perhaps most prominent, and there were also studies and books by Pugwash, the Stimson Center, Jonathan Schell, and others. John Holdren wrote a very nice piece on the subject, and he chaired a National Academy committee that produced a consensus report that looked favorably on working toward the prohibition of nuclear weapons.

The basic logic seemed compelling. During the Cold War, the United States faced an implacable adversary. Many people believed that the Soviet Union was ready, willing, and able to use the huge armies under its control to subjugate all of Europe and most of Asia. Nuclear weapons were at the very center of U.S. security policy — first to deter or defeat conventional attacks against U.S. allies in Europe and Asia, and then, as the Soviet Union developed a nuclear arsenal of its own, to deter nuclear attacks.

The huge armies crumbled with the collapse of the Warsaw Pact and the Soviet Union, and with them the need to deter large-scale conventional war. The only remaining role for nuclear weapons, it seemed, was to deter a nuclear attack by Russia, and perhaps China. But if we could somehow eliminate Russian and Chinese nuclear weapons, then there would seem to be no need for U.S. weapons.

There remained serious questions about the practicality of this goal — in particular, whether we could ever be sure that other countries had eliminated their weapons, how much it would matter if others cheated.

But the fundamental desirability of the goal was hard to deny, at least from a U.S. perspective. This was summed up well by Les Aspin in 1992:

"The United States is the biggest conventional power in the world. There is no longer any need for the United States to have nuclear weapons as an equalizer against other powers. If we were [offered a] magic wand [that would wipe out all nuclear weapons and the knowledge of their construction], we'd wave it in a nanosecond. A world without nuclear weapons would not be disadvantageous to the United States. In fact, a world without nuclear weapons would actually be better. Nuclear weapons are still the big equalizer but now the United States is not the equalizer but the equalizee."

A few months later Aspin became Secretary of Defense and commissioned a bottom-up review of U.S. nuclear policy. But the notion that the transformation in world politics called for fundamental changes in nuclear doctrine never took hold. I know because I participated in the review. There were substantial reductions in the number of weapons, but the basic character of U.S. nuclear posture did not change. The U.S. continued to maintain a large, alert strategic force, targeted for rapid attack against Russian nuclear forces and command and control. This was sometimes attributed to bureaucratic inertia and the persistence of established patterns of thought and behavior, coupled with weak civilian control of the nuclear planning process.

But in the late 1990s, a new pattern of thought started to take hold — one that finds that nuclear weapons are now even more useful to the United States than they had been during the Cold War — not as central to U.S. security, perhaps, but essential nevertheless, and useful against a broader range of targets, and against many more countries.

This new pattern fully blossomed after the election of George W. Bush. Leaked portions of the 2001 Nuclear Posture Review, as well as other documents and statements, describe a belief that:

- U.S. nuclear weapons can deter potential adversaries from acquiring or using chemical, biological, and nuclear weapons and other advanced weaponry;
- That the U.S. should threaten and should plan to use nuclear weapons preemptively to prevent WMD attacks on the United States, its forces abroad, or U.S. allies;
- That the U.S. should use nuclear weapons to destroy certain high-value targets — in particular, hardened and deeply buried targets, or stocks of chemical and biological weapons — that are difficult to destroy with conventional weapons.

It's fair to say that the authors of this doctrine, if offered Les Aspin's magic wand, would chose not to wave it. They believe that nuclear weapons are valuable for much more than deterring nuclear attack.

A thorough critique of the Bush nuclear doctrine would take most of the afternoon. Just a few points:

- Many of the countries mentioned by name in the NPR—North Korea, Iran, Syria, and formerly Iraq and Libya—have been trying to acquire WMDs in order to deter the United States from invading or otherwise attacking their vital interests. It's absurd to suggest that U.S. threats will deter these countries from acquiring WMDs. Quite the opposite — it will spur them on.
- Threats and plans to use nuclear weapons in response to a chemical or a biological attack are at best unnecessary, and at worst counterproductive. Countries already know that the U.S. has nuclear weapons and that, if they hurt us badly enough, they might provoke a nuclear

response. Explicit threats cannot add much to this "existential deterrence". But they can lead the U.S. into a commitment trap, promising retaliation that might be grossly disproportionate. And retaliation would be senseless if we could not determine the true source of the attack. Such threats also violate the negative security assurances the United States has made and restated repeatedly, not to use nuclear weapons against countries that don't have them.

- Plans for preemptive use of nuclear weapons are even more dangerous. Such plans are often framed as necessary to prevent a devastating attack against the United States, by attacking key WMD targets before they can be used. But when you examine the logic of this argument, the utility of nuclear attacks evaporates.
  - First, U.S. intelligence would have to be virtually certain that an enemy was about to attack the United States. But how would we know this, and how could we convince others, after the fact, that preemption was justified? Activities that we might interpret as preparing for an attack might only be intended to signal their resolve — for example, to deter a U.S. invasion. A mistaken preemptive nuclear attack would be a tragedy, and unless it was perfectly effective it could trigger attacks against the United States that might have been avoided altogether.
  - Second, U.S. intelligence would have to correctly identify the enemy weapons, launchers, and command facilities necessary to carry out the attack. Two wars with Iraq have demonstrated the inability of U.S. intelligence to identify strategically important targets. Particularly instructive was the opening salvo of the current war, in which the United States dropped four 1-ton bombs on a site U.S. intelligence believed was a command bunker containing Saddam Hussein. Later inspections revealed that no underground facility existed.

    Adversaries can use various deception techniques, such as relying on mobile facilities or on moving key functions between ordinary surface facilities. If we don't know where the targets are, we can't destroy them.
  - Third, assuming that we could correctly locate and identify them, the strategically vital targets would have to be vulnerable to nuclear attack, but not to conventional attacks. The only such class of targets is deep underground facilities. Even here, conventional attacks on tunnel entrances and other surface features can disable the facilities. And even nuclear weapons can't destroy very deep facilities, which merely encourages countries to dig deeper.
  - Finally, the collateral damage that would result from a nuclear attack would have to be deemed acceptable and proportionate. But over half of the suspected strategically important targets are located in or near cities; even a single nuclear attack in a major city is likely to kill hundreds of thousands of people. It is difficult for me to imagine a U.S. president being confident enough in U.S. intelligence to order such an attack, and confident that he could subsequently justify it, to his own citizens and to the world, as necessary.

Critics of the Bush nuclear doctrine have emphasized the damage it does to the nonproliferation regime. They cite the apparent violation of our negative security assurances. They claim that moves by the United States to enhance the usefulness of nuclear weapons will increase pressures on other countries to acquire nuclear weapons, and that it will undermine efforts to persuade other countries not to acquire them. After all, if the United States, by far and away the strongest military power, needs nuclear weapons to counter non-nuclear threats, then why does not every other country have even more need for nuclear weapons?

Defenders of the doctrine note that the decisions of the countries we are most worried about — North Korea and Iran — are not much influenced by U.S. restraint. Their efforts to acquire nuclear weapons won't be diminished if the US reduces the number of nuclear weapons it deploys, if we ratify the CTBT, if we forego a nuclear bunker-buster, or even if we pledge not to use nuclear weapons first.

I tend to agree — U.S. nuclear doctrine has little direct effect on the incentive of such countries to "go nuclear."

Instead, I think we should focus on how *our* nuclear doctrine affects our incentives, and the incentives of likeminded countries, to prevent proliferation and nuclear terrorism. The Bush nuclear doctrine — and the Clinton doctrine before it — are impediments to strengthening the regime — indeed, not just strengthening it, but replacing it with something much more robust.

It's time to admit that the nonproliferation regime is in serious trouble. North Korea probably already has nuclear weapons, and Iran has taken a major step in this direction. Like a perverse Johnny Appleseed, A.Q. Khan has spread centrifuge enrichment technology around the world; how widely, we don't know. Those that have it could give it or sell it to others. Several countries could be producing HEU a decade from now. Some of these countries will be unstable and vulnerable to penetration by terrorists or their sympathizers — Pakistan is the poster child for such worries. HEU could be sold or stolen, and it's quite plausible that a terrorist group could make a gun-type weapon. Although we can deter countries from attacking us with nuclear weapons — assuming we don't invade their country and they have something to lose — it's not clear that terrorists can be deterred.

None of this is certain. We might muddle through, as we are trying to do now — containing the North Korean or Iranian nuclear programs through a combination of unappetizing carrots and brittle sticks. Perhaps enrichment technology will spread no further; perhaps no HEU will be sold or stolen. Or perhaps not.

Now consider the types of policy initiatives that would be necessary to substantially reduce the risks of nuclear proliferation and nuclear terrorism. They might include:

- A prohibition on enrichment and reprocessing, except as approved by an international body and placed under international control;

- A prohibition on all production, use, and stocks of HEU or plutonium, except as approved by an international body and placed under international control;
- Global environmental monitoring networks and other verification activities able to detect any undeclared activities to produce significant quantities of nuclear explosive materials;
- Stringent international standards for the protection, control, and accounting of nuclear explosive materials; declarations of all stocks of nuclear materials; audits to ensure that declarations are accurate and complete; inspections and red-team exercises to ensure that agreed standards of physical protection are being met.

I would say there is very little chance of putting any of these policies into effect under the current regime. The Bush administration would prefer to simply impose these policies on states of concern — a "just say no" approach to nonproliferation. But that isn't going to work, at least not over the long run.

This is where prohibition comes in. A decision by the United States to seriously advocate for the prohibition of nuclear weapons, and to lobby other nuclear weapon states to join it, would dramatically change the terms of debate. It is the one thing I can think of — short of a nuclear detonation in a city — that would get everyone's attention and would allow such proposals to be seriously considered.

Now, as you know, the United States formally committed itself to the goal of prohibition when it signed the NPT, and we recommitted ourselves to that goal when the Treaty was extended indefinitely in 1995. But the U.S. national security establishment considers this a joke — one of those empty promises that states are obliged to repeat.

I'm talking about something very different from paying lip service to Article VI of the NPT — I'm suggesting that we would propose to replace the NPT and associated nuclear-weapon-free-zone treaties and other agreements with an entirely new treaty prohibiting nuclear weapons. This new treaty could contain an enforcement mechanism, or the permanent members of the Security Council could make it clear that they would authorize the use of force against any country found to be violating the Treaty. This proposal could be coupled with an expansion of the permanent members of the Security Council, which might give it added support. It could also be coupled with a new "atoms for peace" program, which would promise to make proliferation-resistant nuclear power available to all countries, as a measure to mitigate climate change.

This isn't going to happen overnight, of course. It might take decades to achieve a prohibition on nuclear weapons. But in the short term there would be many advantages in taking this position — enough, perhaps, to achieve some of the related agenda, such as placing sensitive fuel-cycle facilities and stocks of weapon-usable materials under international control. Many of these things could be done under the banner of laying the groundwork for prohibition.

To go down this road one would, of course, have to decide that a treaty prohibiting nuclear weapons, if it could be achieved, would truly be in our own best interests — taking into account the possibility of cheating. I think it would be.

By voluntarily divesting ourselves of nuclear weapons, we would give ourselves and the other current nuclear powers the strongest possible incentive to see that no other countries were allowed to get the bomb, while at the same time giving us the moral and legal authority to assemble broad coalitions to enforce a global prohibition. It is very likely the only path toward removing nuclear weapons from the regions where they are most likely to be used — South Asia and the Middle East.

To put it bluntly, if we aren't going to have nukes, we're going to make damn sure no one else does. Disarming ourselves is best way to communicate to others that spread of nuclear weapons in intolerable, and the best way to compel ourselves to act like we believe it. Threats to use force in order to thwart proliferation would be quite credible if the nuclear weapon states had voluntarily divested themselves of nuclear weapons.

What about undetected cheating? Here I think is the biggest worry in the retention of nuclear weapons by the existing nuclear powers. Having thought long and hard about this, I don't think that any system or monitoring and verification could rule out the possibility that Russia had hidden a few hundred warheads, that China, Israel, India, Pakistan hadn't squirreled a few. In order to sign on to a prohibition, we'd have to be able to live with that risk—just as other countries would have to live with the risk that the United States had sequestered as many as a hundred warheads.

I think that is a risk worth taking, in the sense that it is outweighed by the potential benefits of an agreement and the associated measures to greatly reduce the risks of nuclear proliferation and terrorism. Bear in mind that any of the countries that now have nuclear weapons could build new weapons from scratch in a matter of months. As Jonathan Schell correctly pointed out, this would act as a deterrent to cheating or secret rearmament. The hidden nukes could be used to advantage at most once, for a period of a few months, until others were able to build some of their own. A handful of nuclear weapons could not be used to assert — much less maintain — world dominance. And, if one is worried about this possibility, one could consider retaining a few nuclear weapons under multilateral control as a deterrent.

Would prohibition carry risks? Of course it would. But the continued overt possession of large nuclear arsenals by ten or more countries carries risks, too — risks that they might be used accidentally or without authorization, or as a result of miscalculation or inadvertent escalation, with unimaginably horrible consequences.

Most people in the national security establishment believe that the United States can and should and will retain nuclear weapons for the indefinite future. Indeed, the Bush administration is making plans to rebuild our capacity to design, test, and produce nuclear weapons. If we do this, so will others. Eventually, more will join the club. Can this go on forever without a catastrophe? If the answer is "no," then we ought to start thinking about the alternative, and I don't see why we shouldn't start today. **FAS**

Ted Sorensen with President John F. Kennedy

Remarks by Theodore Sorensen at the FAS 60th Anniversary symposium at the National Press Club in Washington, DC on Wednesday November 30, 2005.

Thank you very much. It's an honor for me to appear before an organization that I have known about and admired since its founding. I was trying to search my memory. I'm quite certain that a leader of, or one of the founders perhaps, of your organization, lobbied me so-to-speak when I was the young assistant to Senator John F. Kennedy. I distinctly recall our having lunch together in the Senate cafeteria. It might have been Hans Bethe if he did that sort of thing. And maybe some of you here are old enough to know whether he did. Well, I think that's who it was, and no lobbying was required because all of the goals that he sought were the goals that I sought and that John F. Kennedy sought.

I was told that this point in the program was for Carl and me to discuss science during the Kennedy administration.

Let me tell you, it was a golden age for science.

If you want to use the internet to research, you can find an article that appeared in *Science,* the monthly, just after President Kennedy's death. In fact, it was the November 1963 issue, by Jerome Wiesner. He was the science advisor to the president and Chairman of the Science and Technology committee and so forth. It's a wonderful compendium of all that John F. Kennedy did in the scientific area.

There was a science advisor who was very well known to the President of the United States. Not many science advisors have been, not any since then. But Jerry Wiesner was our friend, he was our advisor. I was the liaison though I have no scientific knowledge or talents myself. I'm lower on the totem pole than Ed Markey. Is he still here?

[Edward Markey: "I'm right here."]

Ed, I was very glad to be here to hear your speech. "You can't preach temperance from a bar stool." I love that. Why can't I come up with lines like that?

And as long as you're here, let me add one item to your agenda, which I was going to come to later in my talk. Your terrific staff will find for you what John F. Kennedy said about preserving outer space as a peaceful domain. Keep weapons of mass destruction, keep convention weapons, but stop the militarization of space. Which is what Donald Rumsfeld is talking about all the time now. Congress has got to stop that. And I hope that you will add that to your agenda.

I'm so glad that you're going to try to stop the bunker buster, but stopping the militarization of ... can you imagine what this world would be like if space became an armed camp or even worse — two- or three-armed camps? There would be no safe place on Earth.

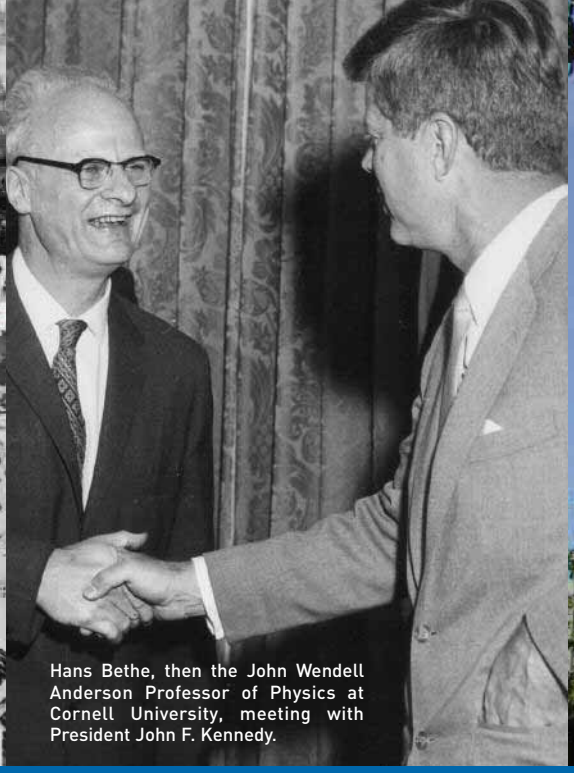
So I'm glad you're here, Ed. And I'm glad you're carrying on the good fight.

But, back then it was a golden age for scientists. When the science advisor was Jerry Wiesner and the president was listening to him on not just science issues with a capital "S", but on national security issues and weapons issues, domestic issues, foreign policy issues and medical health issues. Science was not locked out and denied at the FDA with respect to global warming issues then.

It's incredible that we live in a time now so different from John F. Kennedy's time and leadership. When science was honored and not denied.

In this organization that was honored, scientists were honored. John F. Kennedy twice came to the National Academies of Sciences to give very important policy speeches. In his address to the United Nations, he talked about what science could do to change our world and how science had to be shared among all the nations of the world and not claimed as U.S. intellectual property alone.

I think it's fair to say that one of the reasons for his candidacy to become president was the reason your forbears formed this organization. And I think it was pretty shrewd of most folks 60 years ago to form an organiza-



Hans Bethe, then the John Wendell Anderson Professor of Physics at Cornell University, meeting with President John F. Kennedy.

tion knowing the issues would still be alive 60 years later. Talk about intelligent design. But it was to prevent nuclear war.

John F. Kennedy was fearful that the massive retaliation policies of John Foster Dulles and the republican administration were bound to lead this country into a nuclear war with the Soviet Union and he wanted none of it. He felt the highest priority any president could possibly have was to prevent a nuclear exchange with its devastating effects upon this country. And he also wanted to keep nuclear weapons out of space. In fact, he was also a believer in the United Nations. And one of the first steps in nuclear arms control was a resolution in which the Soviets and the Americans joined — after the grim lesson of the Cuban Missile Crisis — at the United Nations in a resolution to ban weapons of mass destruction from outer space. Another ban that has been challenged and weakened under this administration.

Finally, Kennedy believed in a multilateral approach. He felt in a world as complicated and dangerous as this one, the United States cannot possibly solve its problems alone — whether they are problems of the environment, problems of pollution, problems of health, problems of mass refugee or immigration movements. Certainly not problems of weapons and terror.

Other countries have so much from which we can learn. Other countries have contacts, networks, intelligence and information on which we should be able to draw. Other countries have experience dealing with terror and problems of every kind, and we ought to be utilizing their experience instead of insisting that we don't want back seat drivers. Rather, we can do it all by ourselves.

So I hope that Carl will agree with me because I'm going to have to run to the airplane and leave it in his good hands. Carl, one of my best friends in the White House and since, has combined scientific genius, economic genius and national security genius. He was a perfect fit for an administration in which we had as president, a man who was not a scientist, (don't misunderstand me, he didn't know a gene from a chromosome and neither do I), but he had that one scientific quality that all of you have, and that is *unquenchable curiosity*. He wanted to know everything about everything. He wanted all the facts.

At the very beginning of the Cuban Missile Crisis — yet another very different approach from the current administration — JFK wanted to know all his options — the pros and cons of all possible options, diplomatic as well as military. Multi-lateral not merely unilateral.

And it was that curiosity that interested him in the exploration of space — in deciding that of all the options available to us regarding the Soviets — that we ought to put all our chips in trying to be first to the moon. It was that interest and concern about scientific matters that caused him to award the lady over at FDA who discovered that the drug, thalidomide, was having a devastating effect and ought to be pushed off the market instead of encouraged further.

In one area after another he demonstrated his interest and his commitment to moving this country ahead scientifically. He wanted to increase the grants that were given through the *National Science Foundation*. He wanted to increase scientific education in the schools that were receiving federal aid.

All of those trends seem to be reversed today. Frankly, though I'm usually an optimist, I have my doubts that you're going to celebrate your 75th or, even more doubtful, that you'll celebrate your 100th anniversary in this room because of the way things are going now in terms of this country and its reckless use of its arms and might. Its insistence on paying no attention to our allies. Its dangerous steps of inflaming the ranks and recruits of the terrorist world.

I'm not sure if this country or you or I or this building will be here for your 75th anniversary. So on that gloomy note, I'm sorry to say, I urge you please do more. And thank you for hearing me.

FAS

By Carl Kaysen, the Deputy Special Assistant for National Security Affairs under President John F. Kennedy.

Some Ruminations on the Nuclear Arms Race

This is the way the world ends,
Not with a bang, but with a whimper.
– T.S. Eliot "The Hollow Men," 1925

Since Hiroshima, we have feared the world would end with an enormous bang. It hasn't. Rather, it is the disarmament process, the attempt to preclude the possibility of the bang that has ended, with a curse rather than a whimper.

How it all started

In Washington, on October 9, 1941, Franklin D. Roosevelt initiated the nuclear arms race. He decided that the U.S. government should proceed full-speed-ahead to the goal of making fission weapons before the Germans did. His decision was based on the recommendation of Vannevar Bush, whom he had chosen as Chairman of the recently created National Defense Research Committee. Bush and his colleagues had before them the conclusions of the corresponding high-level scientific advisory committee in the U.K., known as the Maud Report.

The U.K. group surveyed the scientific research that had followed Hahn and Strassman's discovery of nuclear fission in Berlin in 1938; its explanation by Meitner and Frisch in Copenhagen a year later and the further work of Joliot-Curies in Paris, Fermi in Rome, and Cockcroft and Walton in Cambridge, England. All this was public science available to all the competent world. The U.K. group also had the classified paper by Frisch, now in England and Peierls, another refugee from Nazi Europe, which estimated the mass of U-235 that would need to be assembled rapidly to cause an immensely powerful explosion.

The Maud Committee came to two important conclusions. First, they confirmed the Smith-Peierls conclusion. Second, the U.K., subject to competing claims on resources to fight the ongoing war and the hazards of German air attack, could not afford the scale of technological and industrial effort to realize the possibility in time to be helpful in the war.

Before Roosevelt's decision, there had been a variety of small-scale efforts in the U.S. to explore the military possibilities of nuclear energy, none with a sense of urgency or high-level government commitment. The result of his decision was the mobilization of a vast scientific and technological effort in the *Manhattan Project*. Its pace increased after December 7, after the U.S. went to war. Within just one year, the first self-sustaining chain reaction in a uranium pile had been achieved in Chicago. A little more than two-and-a-half years later, the first atomic explosion was set off in Alamogordo, New Mexico, at dawn on July 16, 1945. On the 6th and 9th of August, the first two nuclear bombs were dropped on Hiroshima and Nagasaki respectively; the first and last nuclear weapons fired in war.

So far, there was only one competitor in the race. As Jerry Wiesner said later in another context: "We had an arms race with ourselves and we won."

The U.S. was driven by the fear that the Germans would reach the goal first, a fear especially deeply felt by the European refugees with important roles in the Manhattan Project. But, as we learned when the war in Europe ended, the Germans never really entered the race. Their leading physicists were skeptical or reluctant; such work as they did was directed more to a nuclear reactor than a bomb.

The Soviets too had a program. They had their own group of excellent physicists and chemists, and they had the further resource of a stream of information on the American program through espionage, especially through Klaus Fuchs, another German refugee who was part of the British team working at Los Alamos. The Soviets were working at a pace rather like that of the Americans before FDR's decision, and in a similar scattered way: theoretical physicists in one institute; chemists thinking about isotope separation at another; geologists searching for uranium deposits in Siberia. Like the Germans and the British, and even more so, they had urgent competing demands for resources, especially scientific personnel. Further, Stalin was suspicious of the information about the American program the KGB and GRU was producing; he feared it might be disinformation designed by the U.S. to mislead him into wasting time and money.

Hiroshima changed all that. Stalin felt deeply that the balance in the world had been destroyed.

Capitalist America could not be allowed a monopoly of this immensely powerful new weapon. He put Beria in charge of an urgent program, given first priority in satisfying all its needs. The leading Soviet scientists were as passionately motivated as their American counterparts had been. They too felt and said that an American monopoly was intolerable. Kurchatov, the Soviet Oppenheimer, vowed not to trim his beard until the Soviet effort was capped by a successful test.

The successful test came on 29 August 1949, four years and one month after Alamorgordo. The Soviet test startled and frightened U.S. political leaders. They had thought Soviet technology and industry were so far behind U.S. capacities that the U.S. could maintain its monopoly for a decade or more. The scientists knew better, but failed to persuade the politicians.

The race had begun.

Its pace and scope

The speed of the build-up of nuclear weapons was breathtaking. The table below shows the rapid multiplication of nuclear weapons, and the dates by which the indicated number of bombs, warheads, etc. were reached by the United States and the Soviet Union respectively.

No. of Weapons	U.S. date	U.S.S.R. date
1	1945	1949
10	1946	1951
100	1948	1953
1000	1952	1959
10,000	1958	1969
20,000	1960	1970
30,000	1964 (peak)	1980
40,000		1986 (peak)

The U.S. build-up was more rapid; the Soviets started more slowly, but persisted longer.

These numbers — which included weapons of all types — are only a crude indicator of the race. The increase in numbers was paralleled by an increase in quality. More powerful fusion weapons replaced fission weapons. In the U.S., B-52 bombers of truly inter-continental range replaced B-47s, that could reach the Soviet Union only from overseas bases. The Soviets shifted their major reliance from aircraft to missiles as delivery vehicles earlier than the U.S., but the U.S. based missiles in hardened underground silos before the Soviets. These and the use of nuclear powered missile-firing submarines as delivery vehicles, another major qualitative leap, depended in turn on the development of solid rather than liquid propellant rocket engines. Missile accuracy increased; so did more destructive power. This, in turn, allowed missiles to carry multiple, independently targetable war heads so that one missile could destroy several targets. In the late '70s and '80s, both sides added supersonic cruise missiles to their arsenals, launched from submarines, other ships, aircraft or from the ground.

Other nations joined the race: the United Kingdom in 1952, France in 1960, China in 1964, Israel probably in 1968 — since Israelis neither tested nor acknowledge their weapons, this is uncertain — India in 1974, Pakistan in 1980. The arsenals of these nations, however, are measured only in the hundreds of weapons, and the United States and the Soviet Union — now Russia — hold, and have always held, the bulk of weapons.

Was it inevitable?

Perhaps the question could be better posed: could the arms race have been stopped and even reversed?

A broad brush answer to these questions must start with the Soviet-American political struggle from 1945–1989 — the Cold War, and its interaction with the arms race. The U.S. saw this struggle as the necessary effort to prevent Soviet Communism from gaining control over even more of Europe beyond the 1941 Soviet borders than its armies had achieved in World War II and from spreading widely into the Third World of Latin America, Asia and Africa. The Soviets saw it as a capitalist encirclement, the effort to halt the march of Communism decreed by the laws of history, an extension of the attempts of the capitalist world to strangle the newly born communist state in its cradle in 1919–1920. It was, at the bottom, a religious war.

To the U.S. in the early post-war period, the nuclear arsenal was the necessary counter-balance to the overwhelming superiority of Soviet conventional forces in Europe. U.S. nuclear weapons would deter what, without them, would be an easy Soviet march to the Atlantic. If they failed to deter, then they could attack both the Soviet armies in the field and the sources of Soviet power and its command structure in the major urban centers of the Soviet Union. As the Soviet nuclear arsenal grew, the purpose of deterring a direct Soviet attack on the U.S. was added to the mission, as well as that of damage limitation, hitting Soviet missiles before they were launched. What one side saw as damage limitation, the other saw as first-strike capacity. So the stocks of weapons grew, and themselves added to the underlying fear and the sense of threat that sustained the struggle.

Yet, throughout the period, there were impulses in the other direction. In his final State of the Union message in 1952, President Truman, the first and only government leader to order the use of nuclear weapons, said:

"War has undergone a technological change which makes it a very different thing from what it used to be. War today… might be the end not only of our Stalinist opponents, but of our own society, our world as well as theirs. The war of the future would be one in which man could extinguish millions of lives at one blow… destroy the very structure of a civilization that has been slowly and painfully built up for hundreds of generations. Such a war is not a possible policy for a rational man."

Every U.S. president from Truman to George H.W. Bush has echoed this understanding in some way. But the race went on.

Truman had made his attempt at preventing the arms race very early. In June 1946, he advanced a proposal for international control of nuclear energy to ensure that it was used only for peaceful purposes. The core idea was the creation under United Nations auspices of an International Development Authority that would own all fissionable materials and the production facilities for creating them, supervise all

research and development of nuclear energy and ensure that only peaceful purposes, such as power generation or medical applications, were pursued. This was proposed by a committee consisting of Dean Acheson, David Lilienthal, and Robert Oppenheimer. At the insistence of James Byrnes, then Secretary of State, Bernard Baruch, a retired financier, was chosen to present the proposal to the U.N. He added two features to the core idea: one concerning staging. The other, the use of the veto.

As to the first, the U.S. would hold onto its fissionable material and production facilities until the Authority was functioning. Second, the use of the veto in the Security Council in respect to any actions to respond to breaches of the control regime was forbidden. Not surprisingly, the Soviets rejected the proposal.

They wanted to begin outlawing nuclear weapons; they asserted their right to control their own nuclear industry and refused to constrain the UN charter rights to use the veto in the Security Council. So died the first attempt at preventing a nuclear arms race.

The next effort, the *Partial Test Ban Treaty* of 1963, the first negotiated agreement about arms control between two rival powers, was much more modest. The U.S. had sought a comprehensive treaty, ending all nuclear testing; the Soviets wouldn't even discuss that. Had the U.S. succeeded, the qualitative dimension of the arms race would have been slowed down, if not stopped, and the spread of nuclear weapons to more states would have been inhibited. The limited scope of the agreement meant that its restraining effect was small. Still, it represented some recognition by the Soviet Union as well as the United States that an unrestrained competition in nuclear weapons was a threat to both. Further, "peaceful co-existence" was beginning to replace all-out competition as the basic mode of U.S.-Soviet relations.

The next step, the first big step in principle on the disarmament path, was the *Nuclear Non-Proliferation Treaty.* It was multilateral rather than bilateral, and opened for signature in 1968. The non-nuclear-weapons states-parties agreed not to acquire nuclear weapons. The five acknowledged nuclear-weapons states-parties agreed to two constraints on their nuclear dealings: first, not to assist non-weapons states in acquiring weapons; second (in Article VI of the treaty) to make effective efforts to stop the arms race, seek nuclear disarmament, and a treaty on general and complete disarmament. The IAEA was created to monitor compliance with the treaty, and report breaches to the UN Security Council for enforcement actions. There are now 188 parties to the treaty; the important non-signatories are India, Israel and Pakistan.

The treaty is significant for expressing in principle the desirability of stopping and reversing the nuclear arms race, as well as for slowing the spread of nuclear weapons to more states. The principle was not applied in practice.

In 2001, the U.S. withdrew from the ABM treaty, and increased the pace of development of the ABM systems.

In 1972, the U.S. and the Soviet Union agreed, as part of the first *Strategic Arms Limitation Treaty* (SALT) to limit sharply their deployment of defenses against ballistic missiles. This represented a major slow-down in the potential pace of the nuclear build-up, as defense deployment on one side stimulated further offensive deployment on the other.

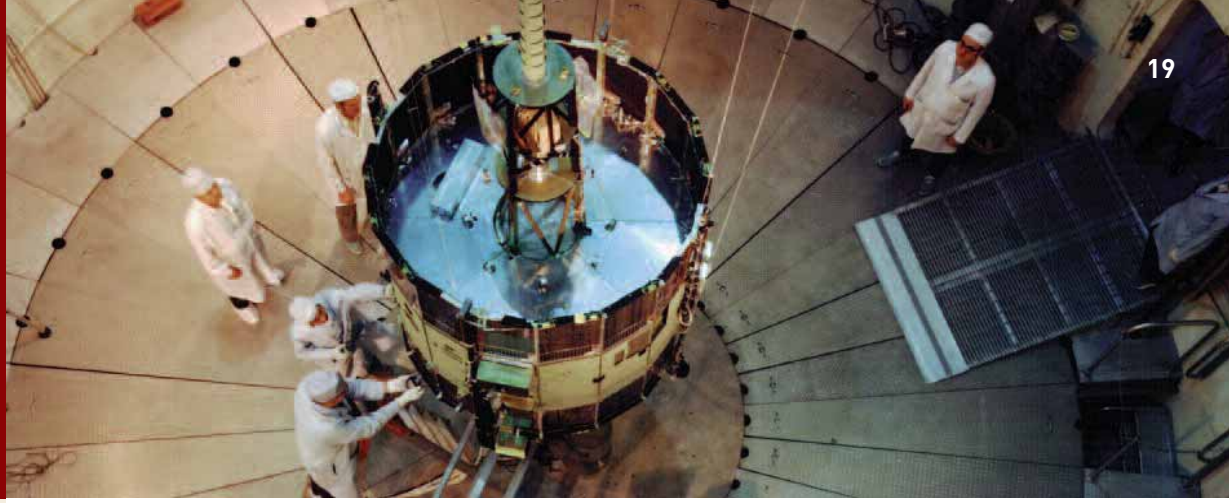
The *Intermediate Nuclear Forces Treaty* (INF) of 1987 eliminated entirely the hundreds of intermediate range missiles the Soviets had aimed at Western Europe and the corresponding ones that the United States was deploying in response. This was the first negotiated reduction in U.S. and Soviet deployed weapons, but their huge arsenals of long-range weapons remained. Indeed, after grudging tacit acceptance by both the U.S. and the Soviets of the status quo in Europe in 1962 and 1963, the arms race itself remained as one of the major expressions of continuing Cold War competition.

Substantial reversal of build-up came only with the end of the Cold War, 1989–1991, beginning with the re-unification of Germany within NATO, the end of Communist governments in what had been the Warsaw Pact States, and finally the disintegration of the Soviet Union. The Russian Federation, as the heir to Soviet nuclear forces, negotiated three successive *Strategic Arms Reduction Treaties* (START) with the United States in 1991, 1993 and 1997. The final agreed goal for each side's strategic warheads was 2000 to 2500. In 2000, the Russians called for further reductions, by another 1000 warheads.

The administration of George W. Bush ended this process. In 2001, the U.S. withdrew from the ABM treaty, and increased the pace of development of the ABM systems. The Russians refused to ratify START III, calling for reinvigoration of the AMB treaty as a condition of going forward with START. The Bush administration proposes an initial deployment of ABM in 2006, and is stepping-up the qualitative race in other ways. It has proclaimed its lack of interest in further arms control negotiations and resisted both the comprehensive *Test Ban Treaty* and discussion of a treaty to end the production of fissionable materials.

Rather than pursuing disarmament through diplomacy, the administration does it by military power, seeking through intimidation, and, if it deems necessary, preventive war, to maintain so dominant a military position as to discourage anyone from challenging it in any way. Disarmament — but only for others.

After the curse, the bang? **FAS**



By Henry Kelly, President, Federation of American Scientists

R&D in the FY2007 Budget

A deluge of studies pointing to pending problems with the nation's system of research and innovation have created a rare debate on national research strategy. The President introduced a National Innovation Initiative in the State of the Union address proposing to double the budgets of the *National Science Foundation* (NSF) and the Department of Energy's basic energy science over the coming decade. Legislation with similar goals is being actively pursued in the Senate. This could be a once-in-a-decade opportunity to reset priorities and rebuild a political commitment to federal research investment and education. Or, it could become another hollow exercise like the NSF budget doubling that never happened.

The next few months will make a lot of difference and a lot will depend on whether the scientific community itself is able to develop an approach that is creative, bold, and politically intelligent. Parts of the U.S. research enterprise acts with the agility of the managers in the last days of the Soviet Union — unable to make decisions or stop doing things when they stop making sense.

A debate is badly needed. The system of research and innovation that served us so well for generations has reached a moment of truth. Federal funding for research in critical areas has been declining. But it's equally important to strengthen the way research is managed. Priorities for the funds available are warped by an epidemic of earmarking and unstoppable growth in projects supported by politics instead of merit.

The consistent and frightening message coming from many independent sources is that the U.S. is unlikely to maintain a competitive position in technology unless we find a way to make a dramatic departure from business as usual. Two recommendations of these studies are crystal clear. First, nothing will happen without significant amounts of new funding for high priority research areas. And second, the research programs should be managed in a way that ensures that priorities are set wisely and that funding is available for high risk research — including research that may not fall conveniently into existing research disciplines.

A 2004 report from the President's Council of Advisors on Science and Technology observed that *"Civilization is on the brink of a new industrial order. The big winners in the increasingly fierce global scramble for supremacy will not be those who simply make commodities faster and cheaper than the competition. They will be those who develop talent, techniques and tools so advanced that there is no competition."*

A recent National Academy of Sciences' report *The Gathering Storm* warned that *"...the scientific and technical building blocks of our economic leadership are eroding... Although many people assume that the United States will always be a world leader in science and technology, this may not continue to be the case... We fear the abruptness with which a lead in science and technology can be lost and the difficulty of recovering."*

The National Commission on Energy Policy concluded in 2004 that: *"Investments by both the*

private and public sectors in energy research, development, demonstration, and early deployment have been falling short of what is likely to be needed to meet the energy challenges confronting the nation and the world in the 21st century." [1]

The President's budget proposes major increases in FY2007: an increase of $465 million for DoE's office of Science and $348 for NSF. Welcome as these increases are, they barely keep up with inflation.

In constant dollars, for example, the proposed NSF budget for FY2007 is 4.5 percent higher than the NSF budget in FY2003 while the DoE FY2007 request is 3% less than FY2003. A bill signed by the president in 2002 authorized an NSF budget for FY2007 that is 60% larger than the one proposed today.

Measured in constant dollars, the proposed FY 2007 civilian research budget is 3% lower than it was in 2003. No increase is proposed for the National Institutes of Health (NIH), though the biosecurity programs in the agency continue to grow (now nearly $2 billion). In constant dollars, NIH funding is 4.4% below its peak in 2003.

The research budget would be cut at the Environmental Protection Agency (EPA) by $557 million. The U.S. Geological Survey and other Department of Interior research programs would see funding decrease by $537 million. And the National Oceanic and Atmospheric Administration would be cut by $578 million.

The administration argues that many of these decreases are not cuts at all, but simply last year's budget without the Congressional earmarks. This is a smokescreen since the budgets submitted by the administration last year were far below reasonable levels, forcing Congress to restore funds. The price is that the Congress likes to say exactly where their money goes.

Given the absence of a serious science policy organization working for the Congress, the advice on where to spend money comes primarily from interested parties. The administration is clearly right in arguing that earmarks have grown to the point that they are undermining any semblance of reasonable research management. The AAAS estimates that earmarks increased 60% over the past three years. A fifth of all Academic Program spending in NASA is earmarked. Overall, nearly 14% of all funding for energy efficiency and renewable energy research is now earmarked. Nearly 60% of all biomass research, 28% of hydrogen research, and 33% of wind and hydro-power research is congressionally directed.[2]

The Department of Defense (DoD) provides the mother of all opportunities for earmarking. There are about $1 billion in clearly identifiable earmarks in the DoD budget. But long tradition of politically unstoppable research turkeys continues to consume a shameless amount of resources. The NSF research budget could be tripled by shutting down the strategic defense initiative research program that has failed every objective review.

The R&D budget also contains enormous, politically-driven research priorities that are, in fact, earmarks hiding in plain sight. The administration proposes to increase missile defense by an astounding $1.6 billion to $9.3 billion in 2007 — that's more than twice the NSF budget. Several NASA facilities and DoE labs in remote areas, once proud parts of the US infrastructure, are becoming facilities looking for a mission.

NASA never seriously argued that manned flight was the best possible use of space research money, but the program has now even lost a coherent rationale in international politics. The cost of manned programs is now $9.3 billion, up $690 million from FY06. Sums of this magnitude could be put to better use for science and for U.S. innovation.

In 2005, the General Accounting Office (GAO) released a report on conflict of interest created by five portfolio managers for the S&T directorate in the Department of Homeland Security (DHS) who came from national laboratories. DHS was saved from an accusation of abusing conflict of interest because the process of selecting R&D providers was so poorly defined that there was no clear record of who made decisions.

Building a U.S. research infrastructure prepared to take on the most important and interesting problems of the current century will require a hard look at successful and unsuccessful strategies of the past. There must be a clear way to discuss need and what additional money would buy. Calls for percentage increases in funding simply don't meet this test. The Academies' report takes a good step in the right direction by calling for a creative new research program in energy research. But other topics should be added to the list. It also points out the merits of the creative style of research management pioneered by DARPA.

Anyone paying attention knows that we've got to make major repairs to the nation's research and education infrastructure to ensure that funds are matched with the most promising and important areas of research and that the money is spent responsibly. We're playing with the family jewels. **FAS**

[1] The National Commission on Energy Policy, **Ending the Energy Stalemate,** December 2004.

[2] 109TH CONGRESS REPORT, House of Representatives, *1st Session* 109–275, "Making Appropriations for Energy and Water Development for the Fiscal Year Ending September 30, 2006, and for Other Purposes".

UP CLOSE AND PERSONAL:
DONOR PROFILE

By Monica Amarelo

Joseph R. Heller, Ph.D.

Joseph R. Heller, Ph.D., is a Renaissance Man. After retiring from a fulfilling career in psychology, he volunteers his time to community service and does a little bit of everything — from counseling the homeless to constructing homes to writing grants — for the *Primavera Foundation* and *Wingspan* in Tucson, Arizona.

Heller joined the Federation of American Scientists in 1970 and continues to support the organization. He learned about the security issues posed by the atomic bomb while researching a college English paper on Oppenheimer.

As a boy growing up in northern New Jersey, his interest in science grew from the many days spent wandering through the American Museum of Natural History in New York City. He also credits two librarians at the public library in Roselle Park, NJ, who fostered his inquisitive nature and interest in the sciences. Heller fondly recalls how, as a teen, he would check out the Kinsey reports, texts on tropical medicine or whatever else caught his eye in the two-story local library.

"My love of libraries and respect for librarians continues until this day," said Heller.

He and his brother were the first two of his family to graduate with college degrees. He graduated with a bachelor's degree in psychology and sociology from Rutgers University in 1959, and went on to get a Ph.D. in psychology from the University of California, Berkeley in1966.

"Earning my Ph.D. is my greatest accomplishment," he said.

Heller specialized in the psychological aspects of death and dying, and human sexuality. Most of his career focused on helping people living with the HIV disease and AIDS, homelessness and poverty.

"I had the freedom to create my own courses. Classes in death and dying were in real heavy demand. And AIDS was a very geopolitical topic," Heller said. "I liked the idea that someone could get an education and then use the information practically. You could learn something intellectually, and then apply that knowledge to real life."

From 1970–72 and then again in 1992–1997, Heller worked as the Chair of the Department of Psychology at the California State University, Sacramento. He also consulted for more than thirty years with various California state agencies including the Department for Employment Development, the youth authority, the state legislature, and the Office of AIDS.

Now Heller focuses on his legacy. A two-time cancer survivor, he advocates a preventive approach to public health matters.

"Be a role model to people. Try to stay politically involved regardless of the particular issue you may care about specifically. Don't sit back. Make things happen," he said. "Write letters, send emails and call your representatives."

Heller encouraged these habits in the many generations of students he taught. He hopes he influenced some to take an active approach to life.

"I see such a lack of involvement. People get so tied up in their day-to-day life that they forget what's going on around them," he said.

His advice to fellow FAS members? Take a global approach to advocacy because everything is interconnected. And don't be afraid to be a cranky curmudgeon.

FAS

For more information about donating to FAS or becoming involved with he organization, please contact Jeff Aron at ***jaron@fas.org.***

NEWS & NOTES from FAS Headquarters

Strategic Security

The FAS Strategic Security Program launched a new experiment – *The Strategic Security Project* (SSP) weblog **(http://www.fas.org/blog/ssp/)** and *The Secrecy News* weblog **(http://www.fas.org/blog/secrecy).**

Six project directors author the SSP Blog and post content on topics that cover nuclear weapons issues, conventional weapons issues, questions on nuclear energy that relate to nuclear proliferation, the need for balance between secrecy and a well-informed public, technology policy, the National Labs, nuclear doctrine and force structure, conventional arms control, the international arms trade, biology, bio-security, and bio-terrorism. As the weblog grows in popularity, guests will be invited to contribute opinions.

In other news, Ivan Oelrich, Vice President of Strategic Security, briefed members of *Congress on the Global Nuclear Energy Initiative* (GNEI) – a program in the U.S. Department of Energy (DOE) created by new legislation requiring plutonium recycling. For more information on this topic, please visit **http://www.fas.org/main/content.jsp?formAction=297&contentId=525.**

Arms Sales and Trade

In December, the *Arms Sales Monitoring Project* obtained a copy of the Defense Department's contribution to the FY2004 "Section 655" military assistance report. The report, which contains the most detailed information on U.S. defense exports available to the public, is obtained each year by the FAS under the *Freedom of Information Act* (FOIA). A summary of this year's report, and FAS' role in obtaining it, was published in the online version of Defense News, a trade journal that is widely read by policymakers.

Housing Technology

Henry Kelly and Mileva Radonjic, the Program Manager of the *Housing Technology Project,* met with representatives from Lafarge, a world leader in building materials and the largest cement-producing company in the world. The company is interested in partnering with FAS to conduct research on housing technologies.

Henry and Mileva met with representatives from the National Building Museum in Washington, DC. The museum is interested in collaborating with FAS to produce educational programs. We will be invited to lecture on the technical aspects of housing and on the ways home construction worldwide can be more affordable, safer and energy-efficient. The museum also showed interest in developing a game about home construction.

On 8 December 2005, FAS hosted a building technologies conference with the DOE. The group spoke of the technical challenges of producing housing that is hurricane and earthquake resistant, energy-efficient, affordable, and attractive to the average consumer. Panels were devoted to discussing products currently available on the market, the research and development of materials, issues of structural design, and new testing requirements.

Biological and Chemical Weapons

In December, FAS sent letters to Senators Bill Frist and Harry Reid concerning the state of national preparedness in the face of a public health emergency. FAS is working with several other groups as part of the *Working Group on Pandemic Influenza Preparedness.* A statement written by the group on the Department of Health and Human Services pandemic preparedness plan will appear in the January issue of the *Journal of Clinical Infectious Diseases* and recommendations have been passed on to the conferees on the Department of Defense Spending Bill. To see the FAS letter to Senators Frist and Reid, please visit–http://**www.fas.org/main/content.jsp?formAction=297&contentId=519.**

Government Secrecy

Steve Aftergood is presenting his listserv content in an alternative format through the *Secrecy News Blog.* For now, the content of the blog and the listserv are

nearly identical — however, the weblog does permit comments and the potential for virtual conversations with web users.

Nuclear Weapons

A new petition on the Nuclear Posture Review was posted to the **FAS.org** website at the end of January. The Pentagon is nearing its completion of the *Quadrennial Defense Review* – a comprehensive study that sets priorities for U.S. military strategy and capabilities for the next decade. The review also contains a nuclear posture review of nuclear policy and force structure. FAS is encouraging visitors to the website to sign the petition that advocates a more coherent nuclear posture. This is the second petition posted online, promoting an interactive online environment for web-users. The petition can be found here — **http://www.fas.org/main/content.jsp?formAction=297&contentId=522.**

On 25 January 2006, Anne Fitzpatrick spoke at the *Center for International Science and Technology Policy* at the Elliott School of International Affairs at George Washington University in Washington, DC. Her presentation was titled "Nuclear Energy Technology and its International Future."

Information Technologies

Henry Kelly is organizing a Lifelong Learning Working group for the *PBS Digital Future Initiative* (DFI). The DFI is a blue-ribbon panel chaired by former Netscape CEO Jim Barksdale and former FCC Chairman Reed Hundt. The panel, convened by PBS with the support of the MacArthur Foundation, will consider the role of public broadcasting in the on-demand, unlimited channel media environment of the future. The Lifelong Education working group will develop proposals for partnership-based projects to develop new public service media content and initiatives to address the need of lifelong education in America.

Sachin Patil completed his Masters degree in Computer Science with a concentration in human computer interaction from the George Washington University (GWU) in January 2006 and accepted a full-time staff position with FAS to develop advanced learning tools. He originally joined FAS as an intern to design the Question and Answer tool for the *Learning Technologies* project. While at GWU, Patil worked as a graduate research assistant in the computer sciences department on projects funded by the Naval Research Laboratory. He researched virtual reality technologies, multi-modal interfaces and the visualization of human anatomical structures. In India, he implemented a computer assisted learning system in more than 20 public schools in Bombay with the support of local NGOs and private corporations. He developed 12 educational games for different age groups in four different Indian languages. To Patil's credit, the initiative has been active for more than five years and has expanded to include schools outside Bombay, across India. For more details on this program please visit **http://pratham.org/ourwork/computer.php.**

FAS Games

The Discover Babylon game is installed in a kiosk outside of the *Near Eastern Art Gallery* of the *Walters Art Museum* (WAM) in Baltimore, MD. In April, a festival is being planned that includes several "free admission days" and family days to attract visitors to the WAM. FAS hopes the Discover *Babylon* kiosks see some heavy use on those days.

The initial prototype of *Immune Attack,* FAS's immunology game, is scheduled for testing in March and April. This spring, more than 200 high school students at four high schools will use the game during the immunology segment of their biology class. The selected high schools are Troy High School in Troy NY; Montgomery Blair High School in Silver Spring, MD; McKinley Technology High School in Washington, DC; and Bellarmine College Prep in San Jose, CA.

Learning Federation

Two reports by the Learning Federation are scheduled for release in March. The Virtual Patient R&D Roadmap is scheduled for dissemination this month. Also a March release is planned for the report on the Summit on Educational Games, the conference hosted by FAS, ESA and NSF in October 2005. The document will provide an action plan to be used by the government, the gaming industry, and the education enterprise. **FAS**

Digital Promise

FAS Board Members Larry Grossman and Lee Fikes are hard at work in efforts to realize the *Digital Opportunity Investment Trust* (DO IT) legislation. FAS Board Members co-signed a letter asking Senator Lamar Alexander to endorse DO IT. Senator Alexander has played an active role in drafting the *Protecting America's Competitive Edge* (PACE) legislation (PACE-Energy [S. 2197], PACE-Education [S. 2198] and PACE-Finance [S. 2199]) in response to the "Gathering Storm" report published by the National Academies. The DO IT goals closely align with those of the PACE legislation which calls for a national effort to strengthen science, engineering and mathematics education.

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